PROCEEDINGS

ONE HUNDRED AND Nineteenth ANNUAL MEETING

of the

UNITED STATES ANIMAL HEALTH ASSOCIATION

Rhode Island Convention Center
Providence, Rhode Island
October 22 – 28, 2015

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ABOUT USAHA

USAHA'S Vision and MISSION…

The United States Animal Health Association (USAHA) is the leading forum for animal health issues in the United States, promoting active participation from industry, academia, and government. USAHA provides a national venue for stakeholders to identify the most effective methods to protect and improve animal health and welfare and public health.

The United States Animal Health Association develops and promotes sound animal health solutions for the public good.

USAHA MEMBERSHIP

State Official Agency Members (50)

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Virginia
Washington
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USDA, APHIS, Veterinary Services
USDA, Agriculture Research Service
USDA, Cooperative State Research, Education and Extension Service
USDA, APHIS, Wildlife Services
USDHHS, Centers for Disease Control and Prevention
USDHS, Science and Technology Directorate
USDHS, Office of Health Affairs
USDI, US Fish and Wildlife Service
USDI, National Park Service
USDI, USGS, National Wildlife Health Center
USDOE, Lawrence Livermore National Laboratory

Territory and Sovereign Agency Members (2)

North Mariana Island
Navajo Nation

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Australia
Canada
Mexico
New Zealand

Allied Industry Organizations (40)

Alpaca Owners Association
American Association of Avian Pathologists
American Association of Bovine Veterinarians
American Association of Equine Practitioners
American Association of Small Ruminant Practitioners
American Association of Swine Veterinarians
American Association of Veterinary Laboratory Diagnosticians
American Association of Wildlife Veterinarians
American Association of Zoo Veterinarians
American Cervid Alliance
American Dairy Goat Association
American Association of Equine Practitioners
American Farm Bureau Federation
American Goat Federation
American Horse Council
American Sheep Industry Association
American Veterinary Medical Association
Association of American Veterinary Medical Colleges
Association of Fish & Wildlife Agencies
Battelle Memorial Institute
Exotic Wildlife Association
Holstein Association USA, Inc.
International Lama Registry
Livestock Exporters Association, USA
Livestock Marketing Association
National Association of State Public Health Veterinarians
National Bison Association
National Cattlemen's Beef Association
National Chicken Council
National Dairy Herd Information Association, Inc.
National Institute for Animal Agriculture
National Milk Producers Federation
National Pork Board
National Pork Producers Council
National Renderers Association
National Turkey Federation
North American Deer Farmers Association
North American Elk Breeders Association
Professional Rodeo Cowboys Association
US Poultry & Egg Association

District Delegates

Northeast: S. Klopp; B. Thompson
North Central: L. Neuder, P. Brennan
South: L. O. Lollis; A. G. Rosales
West: W. Sauble; H.M. Richards

Individual Members: 828
Life Members: 121
Student Members: 178

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I. 2015 Officers and Directors

A. Officers

2014-2015 Executive Committee

Front row (from left): Stephen Crawford, NH, Immediate Past President; Bruce King, UT, President; David Schmitt, IA, President-elect. Back row (from left): Kristin Haas, VT, Third Vice President; Barbara Determan, IA, Second Vice President; Annette Jones, CA, Treasurer; Boyd Parr, SC, First Vice President.

B. USAHA Board of Directors, 2015

Name		Affiliation
Jim	Kistler	American Assoc. of Veterinary Laboratory Diagnosticians
Robert	Gerlach	Alaska Dept. of Environmental Cons.
Tony	Frazier	Alabama Dept. of Agriculture
Pat	Long	Alpaca Owners & Breeders Assoc.
Eric	Gingerich	American Assoc. of Avian Pathologists
Chris	Ashworth	American Assoc. of Bovine Practitioners
David	Foley	American Assoc. of Equine Practitioners
Cindy	Wolf	American Assoc. of Small Ruminant Practitioners
Tom	Burkgren	American Assoc. of Swine Vets
Peregrine	Wolff	American Assoc. of Wildlife Vets
Laurie	Seale	American Cervid Alliance
Shirley	McKenzie	American Dairy Goat Association
Mary Kay	Thatcher	American Farm Bureau Federation
Anita	Teel-Dahnke	American Goat Federation
Paul	Rodgers	American Sheep Industry Assoc.
Christine	Hoang	American Veterinary Medical Assoc.
Robert	Hilsenroth	American Assoc. of Zoo Vets
Cliff	Williamson	American Horse Council
Brandon	Doss	Arkansas Livestock & Poultry Commission
John	Fischer	Assoc. of Fish & Wildlife Agencies
Andrew	Maccabe	Assoc. of American Veterinary Medical Colleges
Susan	Gale	Arizona Dept. of Agriculture
James	Swearengen	Battelle Memorial Institute
Annette	Jones	California Dept. of Food & Agriculture
Harpreet	Kochar	CAN Food Inspection Agency
Stacey	Bosch	Centers for Disease Control & Prevention
Keith	Roehr	Colorado Dept. of Agriculture
Mary	Lis	Connecticut Dept. of Agriculture
Heather	Hirst	Delaware Dept. of Agriculture
Mark	Schipp	Dept. of Agriculture - Australia
Charly	Seale	Exotic Wildlife Assoc.
Michael	Short	Florida Dept. of Agriculture
Robert	Cobb	Georgia Dept. of Agriculture
Raquel	Wong	Hawaii Dept. of Agriculture
David	Schmitt	Iowa Dept. of Agriculture
Bill	Barton	Idaho Dept. of Agriculture
Mark	Ernst	Illinois Dept. Agriculture
Bret	Marsh	Indiana Board of Animal Health
Karen	Conyngham	International Lama Registry
Robert	Stout	Kentucky Dept. of Agriculture
William	Brown	Kansas Animal Health Department
Brent	Robbins	Louisiana Dept. of Agriculture & Forestry
Thomas	Bates	Lawrence Livermore National Laboratory

Tony	Clayton	Livestock Exporters Assoc.
Chelsea	Good	Livestock Marketing Assoc.
Michael	Radebaugh	Maryland Dept. of Agriculture
Lorraine	O'Connor	Massachusetts Dept. of Food & Agric.
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James	Averill	Michigan Dept. of Agriculture
William	Hartmann	Minnesota Board of Animal Health
Linda	Hickam	Missouri Dept. of Agriculture
Marty	Zaluski	Montana Dept. of Livestock
James	Watson	Mississippi Board of Animal Health
Shawn	Schafer	N. Am. Deer Farmers Assoc.
Travis	Lowe	N. Am. Elk Breeders Assoc.
Dave	Hunter	National Bison Assoc.
Joni	Scheftel	National Assoc. of Public Health Veterinarians
Margaret	Wild	National Park Service
Paul	Sundberg	National Pork Board
Kathy	Simmons	National Cattlemen Beef Assoc.
Ashley	Peterson	National Chicken Council
Jay	Mattison	National Dairy Herd Improvement
R. Scott	Stuart	National Inst. for Animal Agriculture
Jamie	Jonker	National Milk Producers Federation
Elizabeth	Wagstrom	National Pork Producers Council
David	Meeker	National Renderers Assoc.
Lisa	Picard	National Turkey Federation
Glenda	Davis	Navajo Nation
Susan	Keller	North Dakota Board of Animal Health
Dennis	Hughes	Nebraska Dept. of Agriculture
Michael	Greenlee	Nevada Dept. of Agriculture
Manoel	Tamassia	New Jersey Dept. of Agriculture
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David	Smith	New York State Agriculture & Markets
Matthew	Stone	New Zealand Agriculture & Forestry
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Louis	Neuder	North Central District
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Douglas	Corey	Professional Rodeo Cowboys Assoc.
Scott	Marshall	Rhode Island Div. of Agriculture
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Laurent O'Gene	Lollis	Southern District
A. Gregorio	Rosales	Southern District
Dustin	Oedekoven	South Dakota Animal Industry Board
Boyd	Parr	South Carolina Livestock & Poultry/Clemson University
Charles	Hatcher	Tennessee Dept. of Agriculture
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John	Clifford	USDA-APHIS-VS
Thomas	DeLiberto	USDA-APHIS-WS
Cyril	Gay	USDA-ARS
Gary	Sherman	USDA-NIFA
Jonathan	Sleeman	USGS-National Wildlife Health
Barry	Pittman	Utah Dept. of Agriculture
Kristin	Haas	Vermont Dept. of Agriculture
Richard	Wilkes	Virginia Dept. of Agriculture
Joe	Baker	Washington State Dept. of Agriculture
Paul	McGraw	Wisconsin Dept. of Agriculture
Herbert	Richards III	West District
Bill	Sauble	West District
Jewell	Plumley	West Virginia Dept. of Agriculture
James	Logan	Wyoming Livestock Board

C. 2015 USAHA Committees

- USAHA/AAVLD COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
- USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH INFORMATION SYSTEMS
- COMMITTEE ON ANIMAL WELFARE
- USAHA/AAVLD COMMITTEE ON AQUACULTURE
- COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY
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- COMMITTEE ON INFECTIOUS DISEASES OF HORSES
- COMMITTEE ON INTERNATIONAL STANDARDS
- COMMITTEE ON JOHNE'S DISEASE
- COMMITTEE ON LIVESTOCK IDENTIFICATION
- USAHA/AAVLD COMMITTEE ON NATIONAL ANIMAL HEALTH LABORATORY
- COMMITTEE ON NOMINATIONS AND RESOLUTIONS
- COMMITTEE ON PARASITIC DISEASES
- COMMITTEE ON PHARMACEUTICALS
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- COMMITTEE ON SHEEP AND GOATS
- COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY
- COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE
- COMMITTEE ON TUBERCULOSIS
- COMMITTEE ON WILDLIFE DISEASES

Rosters of each committee as of the 2015 Annual Meeting are included within each report.

A current listing for committee rosters can be found on the USAHA web site, listed under each committee page respectively.

II. 2015 Annual Meeting Proceedings

A. USAHA/AAVLD President's Reception and Dinner
B. USAHA/AAVLD Plenary Session
C. USAHA Scientific Posters, Papers and Abstracts
D. USAHA Membership Meetings
E. Committee Reports
F. Other Reports

A. USAHA/AAVLD President's Reception and Dinner

INVOCATION

Boyd Parr

MEMORIAL SERVICE

David Schmitt

Colleagues, let us take a moment this evening to humbly pause in our busy lives to remember those that have served with us over the years, but will not be with us this evening because of their passing. Let us keep in mind that life is fragile, but also enjoy the memories, contributions and fellowship that we share that are no longer with us. We wish for strength to their families and friends, and that we carry forward their dedication in the work we do here.

Please take a moment and reflect on these individuals as I read their names:

Chester Mikel, Oklahoma (August 2013), USAHA Member 1950-2013

Giovanni Castrucci, Italy (March 2015), USAHA Member 1994-2015

Clarence Campbell, Florida (May 2015), USAHA President, 1966 and Medal of Distinction Awardee

David E. Herrick, Maryland (October 2013), USAHA Member 1973-2013

Charles Kanitz, Indiana, (September 2015), AAVLD Life Member and Pioneer in Virology Awardee

Let us humbly pause for silent prayer in remembrance of these deceased members. Amen.

WELCOME TO RHODE ISLAND

Sen. Susan Sosnowski

Rhode Island State Senator Susan Sosnowski

Senator Sue Sosnowski was first elected to represent South Kingstown and Block Island in the Rhode Island Senate in 1996. She is the first woman to represent South Kingstown in the Senate. In January of 2003, she became chairwoman of the newly-formed Senate Committee on the Environment and Agriculture, a position she continues to hold. Sue and her husband Mike have owned and operated an organic farm in West Kingston for the past twenty-five years, a very diversified operation.

PRESIDENT'S DINNER SPONSOR'S RECOGNITION

Jill Greene
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Thermo Fisher Scientific Inc. is the world leader in serving science, with revenues of $17 billion and more than 50,000 employees in 50 countries. Our mission is to enable our customers to make the world healthier, cleaner and safer. We help our customers accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics and increase laboratory productivity. Through our premier brands –Thermo Scientific, Applied Biosystems, Invitrogen, Fisher Scientific and Unity Lab Services –we offer an unmatched combination of innovative technologies, purchasing convenience and comprehensive support. For more information, please visit www.thermofisher.com.

USAHA President's Address
Bruce King

What a wonderful time in the history of man to be alive. I so appreciate the opportunity to serve on the Executive Committee of the United States Animal Health Association (USAHA). An organization that has made a positive difference in production agriculture for the past 118 years by bringing together the key decision and policymakers at the state and federal level. In the early days the organization worked on specific issues but now USAHA has become more broad-based. Ever-developing to meet an ever-evolving world. Policy making by state and federal partners has become more diffuse, complex, and global. If we as on organization are going to continue to be part of the decision making process, we are going to need to become clear as to our mission and the part we play.

In the United States Animal Health Association's Strategic Plan that was accepted by the general membership at the 2014 Annual Meeting, the following "Vision Statement" is found:

"The USAHA is the leading forum for animal health issues in the United States, promoting active participation from industry, academia, and government. USAHA provides a national venue for stake holders to identify the most effective methods to protect and improve animal health and welfare and public health." If this vision statement is going to remain accurate, we all are going to have to engage not only ourselves but those that are not currently part of USAHA. Have you told anyone about United States Animal Health Association and how the organization might need their input? Some examples might be: farmers, ranchers, accredited veterinarians, state veterinary medical associations, extension, and feed industry just to name a few.

We live in challenging times. Within every challenge an opportunity can be found. My wife has a placard on our bedroom wall that reads "Life is not about waiting for the storm to pass, it's about learning to dance in the rain."

As individual members of the USAHA, you need to make a difference and not be afraid to fail. This organization cannot be all things to all people but it can make a difference if we are not afraid to act. In my life, I have not met any more capable individuals than what can be found here.

The question that I ask myself at the end of each day is: "Have I done any good in the world today, have I helped anyone in need, have I cheered up the sad and make someone feel glad? If not, I have failed indeed." May you and I all endeavor to make a difference by not being afraid to act and reach out to make a difference. Thanks!

AAVLD President's Address
Francois Elvinger

Dr. François Elvinger, DVM, Ph.D., serves as Executive Director of the New York State Animal Health Diagnostic Center (AHDC) at Cornell University's College of Veterinary Medicine (CVM). He will also serve as Assistant Dean for Diagnostic Operations.

Dr. Elvinger has been a member of the faculty at the Virginia-Maryland College of Veterinary Medicine at Virginia Tech since 1997, most recently as a Professor of Veterinary Epidemiology and of Production Management Medicine. He was the founding director of the Virginia Tech Public Health Program and founding head of the Department of Population Health Sciences, with a secondary appointment as a professor in the Department of Basic Sciences at the Virginia Tech Carilion School of Medicine. Dr. Elvinger is currently serving as President of the American Association of Veterinary Laboratory Diagnosticians.

He earned his veterinary degree from the Hannover Veterinary School in Germany in 1983, where he was a research and teaching associate at the Institute for Milk Hygiene and Technology, and his Ph.D. in dairy science from the University of Florida in 1990. Dr. Elvinger then joined the faculty of the University of Georgia College of Veterinary Medicine as a veterinary epidemiologist at the Veterinary Diagnostic and Investigational Laboratory, Tifton. He left that post for Virginia Tech in 1997.

Dr. Elvinger is board certified as a diplomate by the American College of Veterinary Preventive Medicine and by the European College of Veterinary Public Health.

Recognition of 2015 Sponsors
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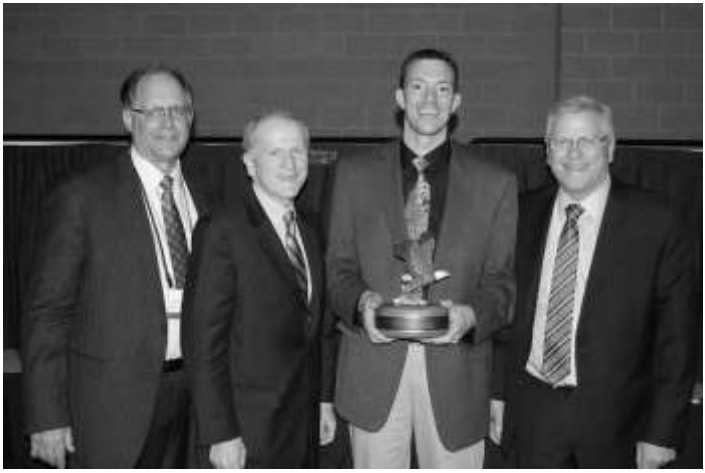
APHIS Administrator's Award
Kevin Shea
APHIS Administrator



Dr. Dustin Oedekoven, South Dakota State Veterinarian, was presented with the 2016 APHIS Administrator's Award.
From Left: Jere Dick, Kevin Shea, Dustin Oedekoven and John Clifford.

Oedekoven grew up on a ranch near Sturgis. He graduated from Sturgis High School in 1995. He attended South Dakota State University from 1995 to 1998 and received a bachelor's degree in animal science. Pursuit of a degree in veterinary medicine took him to Ames, Iowa, where he graduated from Iowa State University College of Veterinary Medicine in 2002. He began his veterinary career in Sheridan, Wyo., at an equine referral hospital prior to returning to South Dakota.

Throughout his life Oedekoven has been an active member of numerous professional, public, student and community organizations. He serves on the United States Animal Health Association's Board of Directors and as the Chair for the Committee on Tuberculosis. He also serves on the SDSU Animal Disease Research and Diagnostic Laboratory Advisory Board. During his career with the SD Animal Industry Board he has facilitated the structuring of South Dakota animal health laws dealing with Trichomoniasis, Johne's, Scrapie and CWD control along with effectively administering those laws that have been long established. In 2011 he was awarded the SDSU Distinguished Young Alumni award and received the Emerging Leader award in 2013.

Oedekoven and his wife, Jenn make their home in Pierre with their children Morgan, Madison, Alex, Sarah and Gabriel.

AAVLD Distinguished Service Award
Catherine Barr

Dr. Barbara E. Powers was announced as the winner of the AAVLD Distinguished Service award for 2015.

Dr. Powers is director of Colorado State University Veterinary Diagnostic Laboratories since 1996. She is a long time member of AAVLD, having served in elected leadership from 2004-2007. She was also chair of AAVLD foundation committee from 2002 until 2006 and initiated the foundation auction along with Dr O'Toole.

Dr. Powers helped form and has been co-chair of the Joint AAVLD/USAHA Committee on the National Animal Health Laboratory Network since 2008. She has also been active in the Colorado Veterinary Medical Association, being president of that Association in 2003-2004 and currently serving as the Chair of the Commission on Advocacy and Outreach.

The AAVLD Distinguished Service Award is bestowed upon an individual who has generously volunteered their time, energy, and professionalism to substantially enrich and advance AAVLD and the field of diagnostic veterinary medicine.

AAVLD E.P. Pope Award
Catherine Barr

Dr. Jeremiah T. Saliki was awarded the AAVLD E.P. Pope Memorial Award for 2015.

Dr. Saliki is a Professor of Infectious Diseases, and Director of the University of Georgia Athens Veterinary Diagnostic Laboratory in Athens, Georgia. Dr. Saliki also served for 11 years as editor-in-chief of the AAVLD Journal of Veterinary Diagnostic Investigation.

The AAVLD E.P. Pope Award is bestowed upon an individual who has made noteworthy contributions to the AAVLD and the field of veterinary diagnostic laboratory medicine.

USAHA Federal Partnership Award
Bruce King

In 2011, USAHA established an award to recognize our federal partners who may work closely with USAHA members on a regular basis. The USAHA Federal Partnership Award is designated for the recognition of a federal employee that has demonstrated commendable service to the betterment of animal health in the United States. Candidates can be employed at any level of an Official Federal Agency Member of USAHA. The candidate should exemplify partnership with states and industry stakeholders through leadership, expertise and/or other accomplishments. The recipient need not be a member of USAHA, but have a positive impact on animal health related to the work of USAHA.

This year's honoree is Dr. Kevin Petersburg.

Dr. Kevin L. Petersburg is the Assistant Director for Iowa and Wisconsin with District Three of USDA, APHIS, Veterinary Services (VS), with an official duty station of Des Moines, Iowa. He received his DVM from Iowa State University College of Veterinary Medicine in 1984 with a BS in Animal Science. He was commissioned a Captain in the United States Air Force and stationed in England for four years at RAF Greenham Common Air Force Base. Returning to the US in 1990 he was selected for the Public Veterinary Practice Career Program with USDA-APHIS-VS and assigned to Virginia for two years. During this time, he participated in various field programs, trained as a Foreign Disease Diagnostician and started reviewing export documents for animals and animal products. In 1990 he applied for and was selected as the Assistant Area Veterinarian for Illinois. For the next five years he helped supervise the Illinois personnel and honed his skills in export activity. In 1995 he applied for and was selected to be the Area Veterinarian in Charge for Iowa. He arrived in Iowa at the height of the

Pseudorabies Eradication Program. In 1999 the Accelerated Pseudorabies Eradication Program (APEP) started with the depopulation of thousands of swine and the deployment of hundreds of state and federal personnel. Dr. Petersburg in cooperation with the Iowa State Veterinarian directed APEP in Iowa from start to finish. He was next selected to be one of the rotating Incident Commanders for the Exotic Newcastle Disease Response in California in 2003. Later in 2003 his Incident Command System (ICS) team was deployed to Northwest Washington for surveillance due to an outbreak of Avian Influenza (AI) in British Columbia. He was the IC for the Red Team for ICS response from 2003 to 2014. He was selected to teach ICS in Guatemala, Central America. He was also selected in 2014 to participate in an American Veterinary Medical Association (AVMA) meeting to discuss large scale depopulation and euthanasia. Drawing on his experience with APEP and two recent Cervid Chronic Wasting Disease (CWD) depopulations his input would be from an actual field perspective. In 2014 the reorganization of VS brought a title change to Assistant Director and added responsibilities of supervision in Wisconsin. 2015 brought the current Highly Pathogenic Avian Influenza (HPAI) outbreak to Iowa. Even though he was no longer the IC of the Red Team, he was involved with this current outbreak from the very start and continues to this day with the resulting administrative duties involved with the cooperative agreements.

Dr. Petersburg is recognized among his peers as a valued partner and leader over the years. His efforts through numerous diseases events are to be commended, capped recently by the HPAI situation in his home state.

Dr. Petersburg is married and has three sons. He lives in Ankeny, Iowa.

USAHA Medal of Distinction Award
Bruce King

The USAHA Medal of Distinction is awarded annually to recognize distinguished USAHA members who have demonstrated outstanding leadership, provided exemplary service, and have made significant contributions to the advancement of USAHA.

As with many that have received the award, tonight's recipient is no stranger to USAHA or AAVLD, let alone many that are involved in animal health. His list of accomplishments, activities and awards is exhaustive, which all lead to his honor tonight.

Dr. Richard Breitmeyer is a native of California, DVM graduate of the University of California, Davis, and currently serves as the Director of the California Animal Health and Food Safety Laboratory System. Many of you know him from his 17-year tenure as State Veterinarian of California, part of his 26-year career with the department. He has also served multiple terms on the USDA Secretary's Advisory Committee for Foreign Animal Diseases and spent time in Washington, DC advising the Secretary of Agriculture on foot and mouth disease (FMD), bovine spongiform encephalopathy (BSE) and other related issues.

His presence within USAHA has also been strong and very evident. His leadership on the executive committee and presidency in 2010 came at an important time of transition for the organization, with a strong balance of tradition and vision for USAHA. He has participated in strategic planning for the organization, as well as chairing two committees. He has served on numerous other committees and demonstrated great leadership in each role that he takes on. He is a strong proponent of partnerships, and notably continued to strengthen the relationships of USAHA with AAVLD and National Institute for Animal Agriculture (NIAA).

Dr. Breitmeyer's accomplishments are well recognized by the several awards he has received from government, academia, associations and industry. It is only fitting tonight that he receives the top honor from USAHA. He is joined tonight with his wife, Cindy. Let us congratulate Dr. Breitmeyer.

National Assembly Award
Jim Logan
Wyoming State Veterinarian

The 2015 National Assembly Award recipient is Dr. Bob Meyer. Dr. Meyer attended Kansas State University and graduated with his DVM degree in 1974. He earned his Master's Degree in Environmental Health with an emphasis on Epidemiology in 1988 from Colorado State University. His thesis was entitled "Development of a Database Management System for the National Bovine Tuberculosis (TB) Eradication Program."

He began his veterinary career in a mixed practice in Fort Morgan, Colorado in 1974 and began his own private practice in Hudson, Colorado in 1975 where he practiced solo for four years. In 1979 Dr. Meyer accepted a position as a veterinary medical officer (VMO) with USDA-APHIS in Tucson, Arizona. He was moved up to a staff position in APHIS in 1982 to assist with the development and implementation of the Brucellosis Information System, the International and State Regulations and Requirements Retrieval database system, and the Tuberculosis Information Management System.

From 1986 to 1990 Dr. Meyer served as the national TB Epidemiologist and National TB Surveillance Coordinator. He served as the Utah Area Veterinarian in Charge for a year (1990-91) and then returned to a regional epidemiology position at Ft. Collins, Colorado from 1991 until July of 2010 when he came to work for the Wyoming Livestock Board as Assistant State Veterinarian.

Dr. Meyer served as the RB Technical Advisor for the US-Mexico Bi-National TB and Brucellosis Committee since 1995. He is the author of over 16 publications and papers on tuberculosis and has helped many industry groups and states with TB and brucellosis eradication and control efforts.

Bob is planning to retire this fall but hopes to continue helping state veterinarians and industry groups through contract work. He is married to his wife Judy. They have one son and two grandsons.

II. B. USAHA/AAVLD Plenary Session

Future of Livestock and Poultry: Food Security for the Next Decade

Drs. David Schmitt, Tom Baldwin, Co-chairs

USDA Perspective - Mr. Gary Woodward, Deputy Under Secretary for Marketing and Regulatory Programs

Industry Perspective - Mr. Don Villwock, President, Indiana Farm Bureau

Preventing Human Infections from Meat and Poultry in the 21st Century – A Public Health Perspective - Dr. Robert Tauxe, Deputy Director, Division of Foodborne, Waterborne and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC

Evolving Food Systems for Global Food Security: Can Animal Production and Veterinary Infrastructure Keep Up? – Dr. Michael Murphy, VMO, Center for Veterinary Medicine, Food and Drug Administration.

USDA PERSPECTIVE

Gary Woodward
Deputy Under Secretary for Marketing and Regulatory Programs
US Department of Agriculture

Gary Woodward most recently served as Legislative Director for Congressman David Scott, who represents the 13th Congressional District of Georgia. Gary was the chief policy advisor for Congressman Scott on all issues; however, he was primarily responsible for the Congressman's work on the House Committee on Agriculture and foreign policy. Gary graduated from Mary Washington College in Fredericksburg, Virginia with a Bachelor of Science degree in Environmental Science. Prior to working for Congressman Scott, Gary was employed by Representative Emanuel Cleaver of Missouri and Representative Denise Majette, also of Georgia. Gary has worked for the House of Representatives since 2002, prior to which he was employed as a high school teacher of Earth science and oceanography.

The son of military parents, Gary was born in Washington, DC at Walter Reed Army Medical Center. And after years of travel is proud to call Virginia home.

INDUSTRY PERSPECTIVES

Don Villwock
Indiana Farm Bureau

Don Villwock of Edwardsport, took office as president of Indiana Farm Bureau and Indiana Farm Bureau Insurance in January 2002. His farming operation produces white corn, soybeans, seed soybeans, and seed wheat.

Villwock served in many capacities with Farm Bureau prior to his election as president, including vice president, District 7 director, Knox County president, State Young Farmer Committee chairman, and Feed Grains Committee chairman. He has served on the Farm Bill Task Force and the Farm Credit Task Force.

At the national level, Villwock is a member of the American Farm Bureau board of directors and a member of the executive committee. He is the National Vice President of the Farm Bureau Bank, American Agricultural Insurance Company, and American Farm Bureau Insurance Services (AFBIS). In January 2004 he was appointed to the American Farm Bureau Federation (AFBF) Trade Advisory Committee. In June 2003, he was elected chairman of the board of trustees of the Farm Foundation. He is a member of the 25 x 25 Ag Energy Working Group, a national task force promoting the use of renewable fuels. He was also a finalist in the national Young Farmer and Rancher Discussion Meet, was elected national chairman of the Young Farmer/Rancher committee, and in that role served on the AFBF board of directors.

A 1972 graduate of Purdue University with a degree in agricultural economics, Villwock was appointed by President Bush to serve as state executive director of the Agricultural Stabilization and Conservation Service from 1989 to 1993. He also served as state agricultural liaison for US Sen. Richard Lugar. Villwock was appointed to the national Commission on 21st Century Production Agriculture in 1997.

Villwock has been involved with the Indiana Corn Growers, Indiana Soybean Growers, and the Indiana Pork Producers. He has also served as chairman of the Indiana Institute of Agriculture.

Other leadership positions and awards include Purdue Distinguished Agricultural Alumnus, Certificate of Distinction from Purdue Ag Alumni Association, past president of the Purdue Ag Alumni Association, Prairie Farmer Master Farmer, Friend of Extension, 33rd degree Scottish Rite Mason and was named a Sagamore of the Wabash by Indiana’s governor. He also holds an Honorary Doctorate from Vincennes University.

PREVENTING HUMAN INFECTIONS FROM MEAT AND POULTRY IN THE 21ST CENTURY – A PUBLIC HEALTH PERSPECTIVE

Dr. Robert Tauxe
Division of Foodborne, Waterborne and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC

Presentation Overview

Each year, 48 million people become sick (1 in 6 Americans), 128,000 are hospitalized, 3,000 die, and 1,000 foodborne outbreaks occur. *Salmonella* alone incurs $2.8 billion in health-related costs. Preventing a single fatal case of *E. coli* O157 infection would save an estimated $7 million.

There are more than 250 pathogens and toxins transmitted by food, with more pathogens that continue to be identified.

Major identified pathogens recognized as foodborne since 1970 include:

- Bacterial:
    - *Arcobacter butzleri*
    - *Campylobacter jejuni*
    - *Campylobacter fetus*
    - *Cronobacter sakazakii*
    - *E. coli* O157:H7
    - *E. coli*, non-O157 STEC
    - *E. coli*, enteroaggregative/STEC
    - *E. coli*, other diarrheagenic
    - *Listeria monocytogenes*
    - *Vibrio vulnificus*
    - *Vibrio parahaemolyticus*
    - *Yersinia enterocolitica*
    - *Yersinia pseudotuberculosis*
- Algal
    - *Pseudo-nitzschia pungens*
        - *(domoic acid producing)*
- Parasitic:
    - *Cryptosporidium*
    - *Cyclospora*
    - *Sarcocystis*
    - *Trypanosoma cruzii*
- Viral:
    - Noroviruses
    - Rotavirus
    - Astrovirus
    - Hepatitis E
    - Nipah virus
- Fungal
    - Aflatoxin

- Prion
    - Transmissible nvCJD agent

Each one of these listed required a public health response somewhere. Most cases were identified in the course of public health investigations. Significant to animal agriculture, 68% have animal reservoirs.

Center for Disease Control and Prevention (CDC) notes that attributing illnesses to specific foods helps guide food safety policy and practice. They gathered information from 4,589 outbreaks reported 1998 – 2008, and estimated how much illness came from each of 17 food types.

Could 2015 be a tipping point for improving foodborne disease prevention? USDA, Food Safety and Inspection Service (FSIS) is implementing new performance standards for poultry parts, ground poultry, for *Salmonella* and *Campylobacter.* FDA is publishing new regulations under Food Safety Modernization Act (FSMA) for Preventive controls for processed foods and animal feeds; Produce safety; and Foreign supplier verification. Companies are imposing new requirements for suppliers, making food safety part of corporate culture. And consumers are demanding food that is responsibly produced.

The changing landscape of foodborne infections is impacted by the following factors:

- Food industry is becoming more centralized
- Food sourcing is going global
- Consumer tastes and practices are changing
- Rising demand for food that is less processed
- Emerging pathogens and unsuspected food hazards
- Better surveillance means that we detect widespread outbreaks

Ultimately, foodborne disease in the 21st century is an evolving public health problem. We expect new pathogens (often from animal reservoirs).

- With Whole Genome Sequencing (WGS), will detect more and smaller outbreaks, with better traceback, guiding interventions
- Additional prevention strategies needed to reach goals by 2020
- Understand pre-harvest sources, spread and internalization that contribute to food contamination
- Better stewardship of antibiotic use in human and animal medicine
- Multidisciplinary networks and partnerships vital to progress

EVOLVING FOOD SYSTEMS FOR GLOBAL FOOD SECURITY: CAN ANIMAL PRODUCTION AND VETERINARY INFRASTRUCTURE KEEP UP?

Michael Murphy
Center for Veterinary Medicine, Food and Drug Administration

Food Safety Modernization Act (FSMA): Final Rule for Preventive Controls for Animal Food

The actual title of the rule, slightly revised from the title in the proposed rule, is Current Good Manufacturing Practice, Hazard Analysis, and Risk-Based Preventive Controls for Food for Animals, or in short the Preventive Controls for Animal Food rule. The rule is found in Part 507 of the Code of Federal Regulations. The original proposal was published in the Federal Register on October 29, 2013. We received more than 2,400 comments on the proposal. As a result of these comments, we made substantial changes and issued a supplemental proposal on September 29, 2014. We received more than 140 comments on the supplemental proposal. The final rule, that went on display September 10 and published in the Federal Register on September 17, 2015, is the result of careful consideration of all the comments received.

The Preventive Controls for Animal Food rule applies to facilities that manufacture, process, pack, or hold animal food for consumption in the US. These are facilities that are required to register with Food and Drug Administration (FDA) under section 415 of the Federal Food, Drug, and Cosmetic Act. Facilities that are not required to register, such as farms, are not subject to the requirements of this rule. The rule does apply to both domestic and imported food. The final rule does provide some exemptions and modified requirements for certain facilities. Most of the exemptions were directed by FSMA itself.

The final rule is a very complex rule. There are two key areas that I will address in this presentation. The first key area relates to establishing Current Good Manufacturing Practice requirements for animal food.

The second of these is the FSMA-mandated requirement that facilities conduct a hazard analysis and implement risk-based preventive controls for hazards requiring preventive controls. Each facility would be required to implement a written food safety plan that focuses on preventing hazards in animal foods.

Veterinary Feed Directive (VFD)

What changes are being made and why?

- Use as a driver of resistance
- All uses (human, animal, horticultural, other) are part of the picture
- Despite complexities and uncertainties steps can be identified to mitigate risk

- Intent is to implement measures that address public health concern while assuring animal health needs are met
- Guidance #209: Outlined antimicrobial resistance (AMR) policy
- Guidance #213: Implementation

What drugs are affected, which ones are not?

The rule only affects antibiotics that are considered "Medically important" and Administered in feed or drinking water. Other dosage forms (e.g., injectable, bolus) are not affected.

Antibiotics that are not affected include types that are already VFD or prescription, as well as ones that are not medically important.

What is a veterinary feed directive?

By definition, "(6) A ''veterinary feed directive (VFD) drug'' is a drug intended for use in or on animal feed which is limited by a [CVM] approved application. … to use under the professional supervision of a licensed veterinarian. …"

(7) A ''veterinary feed directive'' is a written (nonverbal) statement issued by a licensed veterinarian in the course of the veterinarian's professional practice that orders the use of a VFD drug or combination VFD drug in or on an animal feed. …"

Table 1. Examples of medicated feed-use antibiotics that are expected to transition to VFD status

Antimicrobial Class	**Specific drugs approved for use in feed**
Aminoglycosides	Apramycin, *Neomycin*, Streptomycin
Diaminopyrimidines	Ormetoprim
Hygromycin B	Hygromycin B
Lincosamides	*Lincomycin*
Macrolides	Erythromycin, Oleandomycin, *Tylosin*
Penicillins	Penicillin - Currently only production uses.
Streptogramins	*Virginiamycin*
Sulfas	Sulfadimethoxine, Sulfamerazine, Sulfamethazine, Sulfaquinoxaline
Tetracycline	*Chlortetracycline, Oxytetracycline*

What are key elements of VFD regulation?

Information Required on VFD Form:

- Regulation lists all information that must be included on VFD in order for it to be lawful
- Veterinarian is responsible for making sure the form is complete and accurate
- See brochures on CVM's website for a listing of required information
- http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/ucm464991.htm

Additional key areas include:

- Two Drug Categories
- Expiration Date and Duration of Use
- Approximate Number of Animals
- Combination VFD drugs
- Substitution of VFD drugs
- Veterinary Client Patient Relationship (VCPR)

When will this go into effect?

- **October 1, 2015** – VFD Final Rule went into effect
    - Applies to current VFD drugs
- **January 1, 2017** – Target for all medically important antimicrobials for use in or on feed to require a VFD
    - December 2016 – Target for drug sponsors to implement changes to use conditions of products affected by GFI #213

Additional information and updated resources can be found at http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/ucm464991.htm

II. C. USAHA Joint Scientific Session Abstracts, and Posters

1. Papers and Abstracts

Acute Liver Necrosis with Massive Death Loss in a Herd of Beef Cows in Northern Colorado – *Gene A. Niles. 131*

Isolation of *Helcococcus ovis* from an aborted calf with pathology – *Yan Zhang, Jing Cui, Jeffrey R. Hayes, Mary B. Weisner, Beverly Byrum. 84*

Managing CWD in Farmed Cervids – *Nicholas J. Haley. 59*

Novel *netB*-like toxin gene identified in isolates of *Clostridium perfringens* from canine necrohemorrhagic enteritis – *Neha Mishra, Joan Smyth. 51*

The missing piece: Utilizing a common database for disease outbreak investigations – *Kerry Sondgeroth. 69*

To be PED, or not to be PED – that is the question! – *Yan Zhang, Jeffrey R. Hayes, Leyi Wang, Jing Cui, Beverly Byrum. 153*

Tracking of antimicrobial resistance in food-borne pathogens in small poultry production sectors, Options for action – *Mohamed A. El Bably. 61*

2. POSTERS

Screening of archived paraffin-embedded tissues from equine surgical skin biopsies for the presence of *Bovine Papillomavirus*-1&2 by a Taqman real-time PCR – *Feng (Julie) Sun, Bruce Abbitt, Andres D. Concha-Bermejillo, Pamela Ferro, Alfonso Clavijo. 203*

ACUTE LIVER NECROSIS WITH MASSIVE DEATH LOSS IN A HERD OF BEEF COWS IN NORTHERN COLORADO

GENE A. NILES
Colorado State University Veterinary Diagnostic Laboratory, Rocky Ford, CO

A herd of beef cattle in northern Colorado experienced the loss of approximately one-third of its mature cows due to acute liver failure after they were fed alfalfa hay heavily contaminated with kochia. Cows were found dead in less than 24 hours after the initial exposure to the hay and deaths continued for several weeks. The majority of the deaths occurred within a week of exposure to the hay although the cows had access to the hay for less than 24 hours before it was removed from the pastures. Deaths occurred in two groups of cows which were fed this hay. Death loss did not occur in a group of bulls and cull cows which did not receive the hay. All groups of cattle drank from the same water sources and were given the same mineral mixture. The cattle did not receive any additional feeds or supplements. The liver damage was characterized as severe centrilobular necrosis. This presentation will outline the case history, clinical syndrome, treatments, pathology and diagnostic tests. A wide group of veterinarians, animal and plant scientists and laboratory diagnosticians from around the country have contributed in the effort to determine the toxic agent in this case, which has not been identified. Presentation of this case to the AAVLD toxicology committee will hopefully bring new insight in determining the cause of the acute liver lesions in these cows.

ISOLATION OF *HELCOCOCCUS OVIS* FROM AN ABORTED CALF WITH PATHOLOGY

Yan Zhang, Jing Cui, Jeffrey R. Hayes, Mary B. Weisner, Beverly Byrum
Ohio Department of Agriculture, ADDL, Reynoldsburg, OH

Helcococcus ovis is a Gram-positive, facultative anaerobic coccus. It was originally isolated in 1999 from sheep in different geographical locations. It is now considered to be an emerging veterinary pathogen and has been reported as the causative agent of bovine valvular endocarditis and metritis, pulmonary abscesses in a horse, and pleuritis and bronchopneumonia in sheep. *H. ovis* was also recently isolated in the United Kingdom from the stomach contents of an aborted bovine fetus, suggesting this agent as a potential causal pathogen for the abortion. However, pathology from the aborted fetus or placenta was not reported. Here, we report the finding of moderate to heavy growth of *H. ovis* from the placenta as well as the lung and stomach contents of a Holstein fetus, reported to have aborted at 115 days in gestation. The identity of the bacterium was confirmed by MALDI-TOF and 16S RNA sequencing. This was the fourth abortion in the herd over an eight-month period. Microscopic examination of the allantochorion revealed severe necrosuppurative placentitis with thrombosis, vasculitis and intralesional cocci. Lesions in fetal tissues included moderate suppurative bronchopneumonia with intralesional cocci, mild lymphohistiocytic myocarditis, mild lymphocytic interstitial nephritis and also moderate neutrophilic rumenitis. Other tests performed did not detect additional pathogenic agents. Based on microscopic lesions in multiple tissues, recovery of pure growth of *H. ovis* from two of those tissues as well as from fetal stomach contents, and the exclusion of other pathogens, a diagnosis of bacterial abortion associated with *Helcococcus ovis* was made. To our knowledge, this is the first report of bovine abortion associated with *Helcococcus ovis* in the United States.

MANAGING CWD IN FARMED CERVIDS

Nicholas J. Haley
Diagnostic Medicine and Pathobiology, Kansas State University, Manhattan, KS

Chronic wasting disease (CWD) is an efficiently transmitted spongiform encephalopathy of cervids (e.g. deer, elk, and moose), and is the only known prion disease affecting both free-ranging wildlife and captive animals. The management of CWD in farmed cervids will require three avenues of research: 1) the development of a sensitive live animal test, 2) the discovery and implementation of a safe and effective vaccine strategy, and 3) with or without a vaccine, the identification and cultivation of CWD-resistant cervids. The antemortem detection of CWD and other prion diseases has proven difficult, due in part to difficulties in identifying an appropriate peripheral tissue specimen and complications with conventional test sensitivity. At present, biopsies of the recto-anal mucosalassociated lymphoid tissues (RAMALT) have shown promising sensitivity in various assays and are not impractical to collect in live animals. Nasal brush collections have likewise proven both sensitive and practical for identification of prion infections in humans, though in cervids both rectal biopsy and nasal brush collection sensitivity is critically dependent on stage of infection and genetic background. A blood test would be ideal; however rudimentary assays currently in development have yet to be evaluated blindly on naturally occurring populations or on a large scale. Vaccine development is currently underway at several institutions, though an effectively protective strategy has yet to be identified. Ultimately, genetic resistance to CWD may be a critical corner piece in the management of CWD in farmed cervids – an approach which has been used effectively to reduce the incidence of scrapie in sheep worldwide. By exploiting resistant *PrP* alleles in currently available white-tail and elk genetic pools, and searching various isolated populations for evidence of additional resistance mechanisms, a suitable approach to improving CWD resistance in farmed cervids may be identified. Our research has specifically sought to develop an antemortem test for CWD using amplification-based assays on collections from recent CWD depopulations, while additionally using these assays to model CWD resistance in cervid populations. Our findings from this research represent the early stages in the management and ultimately eradication of CWD in farmed deer and elk.

NOVEL NETB-LIKE TOXIN GENE IDENTIFIED IN ISOLATES OF CLOSTRIDIUM PERFRINGENS FROM CANINE NECROHEMORRHAGIC ENTERITIS

Neha Mishra, Joan Smyth
Pathobiology & Veterinary Science, University of Connecticut, Storrs, CT

Clostridium perfringens is a well-recognized cause of enterotoxemia and/or necrotizing enteritis in cattle, sheep, pigs and rabbits, and of necrotic enteritis in poultry. *C. perfringens* produces an array of extracellular toxins. Differential production of the four major toxins (alpha, beta, epsilon and iota) is used to classify the organism as types A, B, C, D or E. NetB (necrotic enteritis toxin B-like) is a pore-forming toxin produced by *C. perfringens* type A, that has been reported as the major virulence factor for necrotic enteritis in poultry and, with one exception, has only been identified in isolates from poultry. The role of *C. perfringens* in hemorrhagic gastroenteritis in dogs is not well-characterized. To better understand the significance of *C. perfringens* in the canine intestine, we swabbed the jejunum and cecum of 121 dogs. 66% of dogs carried *C. perfringens* in intestine and there was little difference in carriage rate between dogs with or without enteritis. Toxinotyping revealed that 99% of the isolates were *C. perfringens* Type A, and of these isolates 15% and 5% were also positive for *beta-2* toxin and *cpe* respectively. One percent of the isolates were Type B. A *netB* like gene was found in 16 % of *C. perfringens* isolates from dogs which had enteritis. Histopathology revealed severe necrohemorrhagic enteritis in the *netB*-like positive dogs. The *netB*-like gene was not found in dogs that did not have enteritis. Sequencing of *netB* amplicons in both directions revealed 88% and 89% identity match with *netB* by BLASTN and BLASTX respectively. These canine strains were not toxic to Leghorn male hepatoma (LMH) cells. Sequencing of the full *netB* like gene shows that it encodes a protein related to the pore-forming Leukocidin/Hemolysin Superfamily.

THE MISSING PIECE: UTILIZING A COMMON DATABASE FOR DISEASE OUTBREAK INVESTIGATIONS

Kerry Sondgeroth
Wyoming State Veterinary Laboratory, University of Wyoming, Laramie, WY

Pulse-field electrophoresis (PFGE) is a tool for genotyping bacterial strains. Currently, there is no common database for strains isolated from both animals and humans. The genotyping data from pathogens isolated from humans is maintained in PulseNet, while most veterinary diagnostic laboratories utilize the National Veterinary Services Laboratory to provide their genotyping information for *Salmonella* strains. *Salmonella* and *Campylobacter* isolated from animal specimens at the Wyoming State Veterinary Laboratory are genotyped by the Wyoming Public Health Laboratory and uploaded into the PulseNet database. Isolates with matching PFGE patterns can be identified, and clusters evaluated for a common source. A case study from Montana isolates will demonstrate that the interface of animal and human isolates in a single database allows for more robust disease investigations.

TO BE PED, OR NOT TO BE PED – THAT IS THE QUESTION!

Yan Zhang, Jeffrey R. Hayes, Leyi Wang, Jing Cui, Beverly Byrum
Ohio Department of Agriculture, ADDL, Reynoldsburg, OH

Four 14-day-old nursing piglets were submitted for investigation of pre-weaning diarrhea. The farm had a history of porcine epidemic diarrhea virus (PEDV) infection on the premises. At necropsy, all piglets had similar changes. The stomachs were filled with casein curds. The small intestines were thin walled, flaccid and contained fluid yellow ingesta. The colon and rectum of each pig contained fluid yellow feces. Sections of pancreas, duodenum, jejunum, ileum, spiral colon and lymph node were examined microscopically from each piglet. Small intestines of all four pigs exhibited mild to moderate segmental neutrophilic enteritis, with intralesional enteroadherent coccobacilli and intraluminal large bacterial rods. There was very mild multifocal villous atrophy in intestinal sections of only one pig. Sections of spiral colon of three pigs had mild to moderate segmental neutrophilic colitis, with intralesional enteroadherent coccobacilli. Many sections of both small and large intestines contained moderate to large numbers of large bacterial rods in the lumen. Small intestinal tissues and content of each pig were subjected to real time polymerase chain reaction (PCR) for Porcine Epidemic Diarrhea Virus (PEDV), transmissible gastroenteritis virus (TGEV), and porcine deltacoronavirus (PDCoV). All four pigs' samples were positive for PEDV, with Ct values ranging from 15 to 18. All samples were negative for TGEV and PDCoV. Next Generation Sequencing (NGS) indicated that the virus is the virulent strains of PEDV. NGS also confirmed the presence of type A *Clostridium perfringens* and *E. coli* DNA in the sample material. The Ct values for PEDV in intestinal content of each pig indicated a high viral load of the coronavirus. However, microscopic changes noted were primarily compatible with intestinal colibacillosis. Furthermore, the presence of large bacterial rods in the luminal contents also suggested a possible role of type A *Clostridium perfringens* infection. The lack of villous atrophy and attenuation of superficial villous enterocytes was surprising in these piglets. It is unknown if maternal antibody precluded the development of atrophic enteritis lesions in the piglet, or if other factors prevented the development of typical PED virus-induced mucosal lesions. Further pathogenesis studies of this PED virus isolate are warranted.

TRACKING OF ANTIMICROBIAL RESISTANCE IN FOOD-BORNE PATHOGENS IN SMALL POULTRY PRODUCTION SECTORS, OPTIONS FOR ACTION

Mohamed A. El Bably
Animal Hygiene and Zoonoses, Faculty Veterinary Medicine, Benisuef University, Egypt, Benisuef, Egypt

Background. Antibiotic resistance and the probable transmission to human bacteria through poultry food-borne pathogens have led to increased public concern and scientific interest regarding the administration of therapeutic and subtherapeutic antimicrobials to animals. Surveillance of antimicrobial resistance at targeted intervals constitutes a critical part of animal health and food safety strategies.

Objectives. To investigate the occurrence and frequency of antimicrobial resistance and associated resistance genes in food-borne pathogens isolated from poultry and their environment in small commercial production sectors and to use these data to reduce the transfer of antimicrobial resistant bacteria from animals to humans.

Method. A cross sectional study targeted poultry at different production sectors (backyard and small commercial farms) and types (broiler &layers) for tracking of different pathways of transmission of antimicrobial resistance bacteria such as, *E.coli*, *Salmonella* and *Enterococcus* species through poultry production chain. Data on the current pattern and determinant of antibiotic use and resistant were collected through the administration of questionnaire at veterinarian and stakeholder meetings. A representative samples were collected from poultry at backyards and small commercial farms (cloaca swabs and eggs), environment (feed, water, flies and fresh manure); from slaughtered birds at live-bird markets using stratified sampling technique. A standardized laboratory methodology for isolation and identification of pathogens of zoonotic importance was done. Identified bacteria tested against eighteen antimicrobial agents based on a disc diffusion method. Genetic characterization of resistant isolates involved plasmid analysis, detection of gene cassettes associated with integrons and investigation of multi-drug resistant efflux pumps. The obtained data were recorded and analyzed.

Results. It revealed high levels of antimicrobial resistance in bacteria isolated from poultry and their environment. Multi-drug resistance to three or more antimicrobials was observed in (93.6%) of all the isolates. The highest percentage of antibacterial resistance were found in bacteria isolated from layer's farms and their environment (91.7 5 & 94.5 % resp.) then slaughtered poultry followed by isolates from broiler farms (74.3 % & 81.3 % resp.) while the least percentage of antimicrobial resistance was recorded in isolates from poultry raised at backyards.

Conclusion. Poultry and their environment particularly layer's farms represent potential reservoirs of resistant bacterial strains and AMR genes that may spread from poultry farms to human populations via poultry meat.

Reducing antimicrobial usage requires collaboration between farming, veterinary and public health communities.

SCREENING OF ARCHIVED PARAFFIN-EMBEDDED TISSUES FROM EQUINE SURGICAL SKIN BIOPSIES FOR THE PRESENCE OF *BOVINE PAPILLOMAVIRUS*-1&2 BY A TAQMAN REAL-TIME PCR

Feng (Julie) Sun[1], Bruce Abbitt[1], Andres D. Concha-Bermejillo[1], Pamela Ferro[1], Alfonso Clavijo[1,2]
[1]Texas A&M Vet Med Diag Lab, College Station, TX;
[2]Institute for Infectious Animal Diseases, College Station, TX

Equine sarcoid is the most common neoplasm in Equidae and accounts for over half of all skin neoplasms in this family. Equine sarcoids have been associated with *bovine papillomavirus* (BPV)- type 1 & 2 (BPV 1&2) and are routinely diagnosed based on histologic features. In some cases, there is difficulty differentiating sarcoids from other spindle cell tumors, or granulation tissue. In these cases, the absence/presence of BPV 1&2 may aide diagnosis. A qPCR assay targeting a gene fragment of E5L2 from BPV 1&2 was designed and the limit of detection was determined to be two copies (cutoff value Ct 38.0) using 10-fold serial dilutions of a plasmid containing BPV target DNA. Archived paraffin embedded tissue from 98 equine skin biopsy cases were evaluated in this study. Based on histological findings, thirty-one of these cases were diagnosed as sarcoids. Thirty of these cases tested positive and one tested negative for BPV 1&2 by qPCR. The case testing negative was a periocular tumor diagnosed as an occult sarcoid. Specificity of the assay was determined using 62 equine skin biopsy cases diagnosed as various conditions other than sarcoid by histologic findings. Fifty-five of 62 were negative and seven were positive for the presence of the BPV 1&2 by qPCR. The qPCR products from the seven positive cases were cloned and results confirmed as BPV by sequencing. Histologic diagnosis of the seven cases in this group included squamous cell carcinoma (2), granulation tissue (2), peripheral nerve sheath tumor (1), botryomycosis (1), and allergic dermatitis (1). The significance of the presence of BPV 1&2 in these seven cases could not be determined. Five of BPV 1&2 positive cases by qPCR were inconclusive by histologic evaluation; differentials considered were sarcoids, spindle cell tumors, or granulation tissue. Of these five cases, three were positive and two were negative for the presence of BPV 1&2 by qPCR. The findings in this study are consistent with the association of BPV- 1&2 with equine sarcoids. Knowledge of the presence or absence of BPV 1&2 in some of these cases would have aided the pathologist in interpretation of histologic findings. The developed qPCR assay using paraffin embedded tissues may prove helpful to both elucidating the role of BPV 1&2 in some pathologic conditions in equine skin and interpreting the histologic findings by the pathologist.

II. D. USAHA Membership Meetings

USAHA MEMBERSHIP LUNCHEON AND MEETING
MONDAY, OCTOBER 26, 2015
Bruce King, Presiding

Sponsor's Welcome was provided by Mr. Steve Parker, Merial Ltd.

Treasurer's Report

Annette Jones, Treasurer

The United States Animal Health Association (USAHA) continues to operate on a sound financial basis. While we finished the 2014-15 fiscal year at a net income loss of $37,509, of this amount, $9,600 reflects a budgeted investment from our reserve account for student grants to attend the 2014 annual meeting. The additional loss is primarily due to an accounting adjustment of $9,000 for unrealized loss on investments, $12,500 in increased contract, personnel and insurance costs, $3,700 in increased credit card fees and increased annual meeting costs that surpassed associated increased revenue by about $1,500. Considering that the USAHA management team controls a $440,000 budget, they did another excellent job of managing those revenues and costs that can be controlled throughout the year.

During fiscal year 2014-15, the Association earned $18,774 in investment income with $8,939 unrealized loss on investments. The Association's net worth on June 30, 2015 was $1,120,910. USAHA continues the policy of maintaining two years' expenses in reserve held in secure investments like CD's, and invests the excess in securities with potentially higher anticipated returns then CD's. The intent is to use any excess reserve or interest income to enhance member services.

While USAHA continues to maintain a healthy reserve, and membership dues were adjusted last year to reflect costs, the organization finished 2014-15 with a minimal loss for the second year in a row. While these losses largely reflected planned investments, revenue and expenses are being monitored and evaluated carefully during the current fiscal year.

The audit committee met Sunday October 25, 2015, reviewed the fiscal year 2015 Statement of Financial Position and found that all financial affairs of the Association are in order.

State of the Association

Bruce L. King

The Executive Committee this past year has been largely involved with our strategic plan, which covers the years of 2015 through 2020. And so, I'd like to, if I might, just review that briefly with you. There's actually five goals within that strategic plan.

The first step in each one of the Executive Committees was giving the assignment to make sure that these goals moved forward.

The first goal is to increase membership and meeting participation. Led by Dr. Kristin Haas, we've categorized who we plan to approach in this regard. With the allied professionals, we would like to get to more farmers and ranchers involved. We want to collaborate with the accredited veterinarians out there, state veterinary medical associations, veterinary diagnosticians, extension, animal scientists. These are folks we feel are under-represented, we would like to have them become more a part of this organization.

Our second objective is to develop criteria for committees and subcommittees to be reviewed, established, combined or dissolved to make structure and function more streamlined and comprehensive. These criteria are now being put together by the very capable leadership of Barb Determan, along with some of the folks that have had far more history in this organization than I. We hope to have this evaluation and this structure put together by our spring meeting in Washington, D.C.

The third goal is to increase the effectiveness of resolutions. We already have those recommendations in, and now in the implementation process of that. The process is to ensure that the status of all resolutions can be quickly accessed by the memberships and committee members, and they know just exactly where those resolutions are and what has been done with them. And of course, that's the product of much of what we do here.

The fourth goal is to increase the awareness of the role of USAHA to a broader audience and influence animal health policy for the public good. We're in the process of making contacts and developing relationships with some priority groups. For example, the White House Office of Science and Technology; Food and Drug Administration (FDA); the US Environmental Protection Agency (EPA); and the Center for Disease Control and Prevention (CDC). We need to have more of a relationship with USDA, Food Safety and Inspection Service (FSIS), Federal Emergency Management Agency (FEMA) and like-organizations. Dr. Dave Schmitt has taken the lead and we're making some inroads there. We made some worthy contacts last year while we were out at the government relations meeting in Washington DC, with some individual meetings.

Now, the fifth goal is to engage the USAHA throughout the year with the most effective technology. A lot of people communicate, as you well know, through social media. We want to have more of a presence on Facebook, Twitter, Linked-In, Rich Site Summary (RSS) feeds, and there are a lot of others out there. So, we're spending quality time looking into this technology and how we might get up to speed; especially for those that are younger among us and use that as their primary way of getting information. Dr. Boyd Parr is our point person for that goal.

There's much to be done and never enough time to do it in. Overall, the plan has given us good direction to advance USAHA for the future.

Report of the Committee on Nominations

Stephen Crawford

The action of the Report of the Committee on Nominations will take place at 2:05 p.m. on October 28, 2015, during the Membership Meeting. The 2015-2016 Nominations are:

OFFICERS

PRESIDENT..... David D. Schmitt, Des Moines, IA
PRESIDENT-ELECT..... Boyd H. Parr, Columbia, SC
FIRST VICE-PRESIDENT..... Barbara C. Determan, Early, IA
SECOND VICE-PRESIDENT..... Kristin M. Haas, Montpelier, VT
THIRD VICE-PRESIDENT..... Martin A. Zaluski, Helena, MT
TREASURER..... Annette M. Jones, Sacramento, CA

DISTRICT DELEGATES

NORTHEAST.....Spangler “Buzz” Klopp, DE; Bruce Akey, NY
NORTH CENTRAL.....Paul. Brennan, IN; Louis Neuder, MI
SOUTH.....L. “Gene” Lollis, FL; A. Gregario Rosales, AL
WEST.....Bill Sauble, NM; H. M. Richards, III, HI

The following committee chairs were recognized for their service by Bruce King:

- Dee Ellis, Parasitic Diseases
- Harry Snelson, Transmissible Diseases of Swine
- Larry Thompson, Environment and Toxicology
- Doug Waltman, Salmonella

With no further business, the meeting was adjourned.

USAHA MEMBERSHIP MEETING
WEDNESDAY, OCTOBER 26, 2015
Bruce L. King, Presiding

The Second Membership Meeting was called to order by Dr. Bruce King, President.

Report of the Action of the Committee on Nominations
Stephen Crawford

OFFICERS

PRESIDENT..... David D. Schmitt, Des Moines, IA
PRESIDENT-ELECT..... Boyd H. Parr, Columbia, SC
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Passing the Presidential Gavel
Bruce King

Immediate Past President Bruce King (r) presents incoming President David Schmitt with his president's gavel.

President's Address
David Schmitt

Recognition of Immediate Past President
Stephen Crawford

Stephen Crawford presents Bruce King with the Past President's plaque, recognizing him for his dedicated leadership and service to USAHA.

Executive Director's Report

Benjamin D. Richey

Welcome, nice to see everyone here in Providence and a new venue for USAHA. I am pleased to announce that our registration has come in strong – early results indicate that we may surpass last year's participation. It is a very good year for attendance.

As always, and imperative that we recognize some of those that have put much time and effort into the meeting. First of all, Kelly has again worked tireless hours in preparation for this year, and I cannot thank her enough for her organization and effort to make things run smoothly, both leading up to and during the meeting. And Linda, as always your presence is an absolute gift for all that you do, and have done for USAHA. We thank you immensely for your support in planning the logistics. Ms. Kim Sprout, our fearless resolution coordinator this week. I know our Committee on Resolutions appreciates all that you do just as much as I do. Likewise, Dr. Scott Marshall and Dr. Peter Belinsky, for welcoming us graciously to your state, providing support and hosting us this year. And also Drs. Bill Smith and Tom McKenna with APHIS, thank you to you and your staff for your help.

I offer my personal thanks to all of the Northeast USAHA district. We will be looking forward to all comments on the venue, but anecdotally, this seems to be quite popular here in Providence.

For our committees, our chairs deserve the credit for what USAHA is and the quality of the programs that are offered here. We ask much of you in preparation, but truly the expertise and coordination is something many organizations do not enjoy.

I wish to express my gratitude to the Executive Committee for this continued opportunity with USAHA. I have enjoyed a few conversations thinking back to when I was hired nine years ago. I truly enjoy working with each of you.

Dr. King, congratulations on a great year as President. I am grateful for the leadership and friendship to myself and this organization. And, as each meeting passes, we refresh and I know Dr. Schmitt will thrive in your wake for the coming year.

I look forward to the continued evolution of USAHA through the strategic plan and vision of our leaders. My tenure with USAHA has not left a dull moment – and while I'm pretty much spent by this time in the meeting, it is exciting to take the work of the last several days forward for the coming year and doing our part in improving our collective ability to feed the world. Thank you.

Report of the Committee on Nominations and Resolutions*

Stephen K. Crawford

The Report of the Committee on Resolutions is approved by consent calendar. Chair Crawford reported a total of 27 resolutions submitted by Committees for 2015. Crawford read through each resolution as reviewed by the Committee. The following resolutions were recommended to be combined by the Committee:

- 3 and 7
- 6 and 14
- 8 and 27
- 12 and 26
- 19 and 25

It was moved and seconded to combine these resolutions, and approved by the membership.

The following resolutions were held for review, with action indicated:

- Resolution 1, Approved
- Resolution 3 and 7, Approved
- Resolution 4, Approved
- Resolution 5, Tabled
- Resolution 10, Approved
- Resolution 12 and 26, Not Approved
- Resolution 16, Approved as Amended
- Resolution 18, Approved
- Resolution 19 and 25, Approved
- Resolution 20, Approved
- Resolution 23, Not Approved

All other resolutions were approved by consent calendar by the Membership.

With no further business, the Membership Meeting was adjourned.

**The detailed report of the Committee on Nominations and Resolutions is included in these proceedings, Section E.*

II. E. COMMITTEE REPORTS

REPORT OF THE USAHA/AAVLD COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT

Chair: Heather Simmons, TX
Vice Chair: Charlotte Krugler, SC

Sara Ahola, CO; Bruce Akey, TX; Kelli Almes, KS; Jamee Amundson, IA; Gary Anderson, KS; Marianne Ash, IN; James Averill, MI; Lyndon Badcoe, WA; Deanna Baldwin, MD; Karen Beck, NC; Tammy Beckham, KS; Lisa Becton, IA; Danelle Bickett-Weddle, IA; Patricia Blanchard, CA; Fred Bourgeois, LA; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Charlie Broaddus, VA; William Brown, KS; Minden Buswell, WA; Bruce Carter, IA; Gregory Christy, FL; Matt Cochran, TX; Dustin Cox, NM; Stephen Crawford, NH; Tarrie Crnic, KS; Wendy Cuevas-Espelid, GA; Susan Culp, TX; Glenda Davis, AZ; Ignacio dela Cruz, MP; Leah Dorman, OH; Brandon Doss, AR; Cheryl Eia, IL; Brigid Elchos, MS; Dee Ellis, TX; Larry Elsken, IA; François Elvinger, VA; W. Kent Fowler, CA; Mallory Gaines, DC; Jane Galyon, IA; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Michael Gilsdorf, MD; Linda Glaser, MN; Patricia Godwin, KY; Timothy Goldsmith, MN; Alicia Gorczyca-Southerland, OK; Larry Granger, CO; Kristin Haas, VT; Rod Hall, OK; Timothy Hanosh, NM; Charles Hatcher, TN; Greg Hawkins, TX; Burke Healey, CO; Carl Heckendorf, CO; Julie Helm, SC; Kristi Henderson, IL; Linda Hickam, MO; Rick Hill, IA; Donald Hoenig, ME; Guy Hohenhaus, MD; Dennis Hughes, NE; Pamela Hullinger, CA; David Hunter, MT; Carla Huston, MS; Russell Iselt, TX; Annette Jones, CA; Jamie Jonker, VA; Subhashinie Kariyawasam, PA; Darlene Konkle, WI; T.R. Lansford, TX; Elizabeth Lautner, IA; Delorias Lenard, SC; Randall Levings, IA; Tsang Long Lin, IN; Mary Lis, CT; Eric Liska, MT; Kevin Maher, IA; Bret Marsh, IN; Barbara Martin, IA; Sarah Mason, NC; Chuck Massengill, MO; Rose Massengill, MO; Paul McGraw, WI; Sara McReynolds, ND; David Meeker, VA; Shelley Mehlenbacher, VT; Emily Meredith, VA; Gay Miller, IL; Mendel Miller, SD; Janice Mogan, IA; Alfred Montgomery, DC; Lee Myers, GA; Yvonne Nadler, IL; Sherrie Nash, MT; Cheryl Nelson, KY; Sandra Norman, IN; Dustin Oedekoven, SD; Kenneth Olson, IL; Claudia Osorio, MD; Stephanie Ostrowski, AL; Kristy Pabilonia, CO; Elizabeth Parker, TX; Roger Parker, TX; William Parker, GA; Boyd Parr, SC; Janet Payeur, IA; Virginia Pierce, MD; Jewell Plumley, WV; Barbara Porter-Spalding, NC; Jeanne Rankin, MT; Renate Reimschuessel, MD; M. Gatz Riddell, Jr., AL; Julia Ridpath, IA; Paul Rodgers, WV; Keith Roehr, CO; James Roth, IA; Margaret Rush, MD; Mo Salman, CO; Michael Sanderson, KS; David Scarfe, IL; Joni Scheftel, MN; David Schmitt, IA; Gary Sherman, DC; Kathryn Simmons, DC; Marilyn Simunich, ID; David Smith, NY; Julie Smith, VT; Justin Smith, KS; Harry Snelson, NC; Diane Stacy, LA; Patricia Stonger, WI; Nick Striegel, CO; Darrel Styles, MD; Manoel Tamassia, NJ; Belinda Thompson, NY; Peter Timoney, KY; Jeff Turner, TX; Hana Van Campen, CO; Victor Velez, CA; Liz Wagstrom, DC; James Watson, MS; Patrick Webb, IA; Steve Weber, CO; Michelle Willette, MN; Brad Williams, TX; Ellen Mary Wilson, NM; Cristopher Young, GA.

The Committee met on Saturday, October 24, 2015, at the Rhode Island Convention Center in Providence, Rhode Island, from 8:00 a.m. to 1:00 p.m.

There were 70 members and 46 guests present. At the beginning of the meeting, the mission statement was reviewed, along with the response to the 2015 Committee on Animal Emergency Management (CAEM) Resolution #1, *Radiological Incident Response and Resource and* 2015 CAEM Resolution #2, *Veterinary License Reciprocity in Emergencies*. Members and guests were referred to the USAHA website to view the responses to all of the 2014 resolutions. Fourteen presentations were heard, two of which were panel discussions.

Presentations

2014- 2015 Highly Pathogenic Avian Influenza (HPAI) Outbreak
Jon Zack, Preparedness and Incident Coordination Center, USDA-APHIS-VS, Surveillance, Preparedness and Response Services (SPRS)

Dr. Zack gave an overview of HPAI outbreak to include response and recovery efforts, policy updates, and ongoing preparedness. This outbreak was the largest animal health incident in US history with $950 million in emergency funding for response and preparedness for HPAI.

Veterinary Services: National Training and Exercise Program
Lee Myers, National Veterinary Stockpile, USDA-APHIS-VS-SPRS

Dr. Myers in the United States Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS). Surveillance, Preparedness and Response (SPRS) Unit provided an update on the APHIS-VS Emergency Preparedness and Response Training and Exercise (T&E) Program. Progress continues to be made since the program was first proposed at the 2012 United States Animal Health Association meeting.

Myers reviewed many T&E events accomplished in the Federal Fiscal Year 2015. VS delivered 43 training events, and conducted four workshops and one drill. Additionally, VS representatives participated in six exercises sponsored by external organizations.

Myers emphasized the priorities, objectives, and events contained in the *USDA-APHIS-VS- Emergency Preparedness and Response Training/Exercise Strategy and Plan Fiscal Year 2016 – 18* (VS TEP). The 45-member VS T&E team developed the initial draft during its annual T&E planning workshop in April 2015, and lessons learned from the 2015 highly pathogenic avian influenza emergency response were incorporated into the plan in September 2015. The VS TEP provides the framework and process to build the VS-wide T&E strategy and plan in collaboration with external stakeholders and T&E subject matter experts. The plan also provides the roadmap to enhance emergency response capabilities, and identifies T&E priorities and objectives that support the VS emergency preparedness strategy. The plan outlines a multi-year schedule of T&E events linked to each priority and objective, adding practical value.

The VS T&E program continues to establish itself and focus on the VS mission-critical responsibility to prepare for and respond to foreign animal

diseases/emerging disease incidents (FAD/EDI). The program is establishing a track record of success beginning with simple, achievable events.

The VS TEP includes three overarching priorities.

1. Build the VS T&E program.
2. Train VS and external stakeholder emergency responders.
3. Exercise VS and external stakeholder emergency responder capabilities.

The following 12 VS TEP objectives are aligned accordingly with each T&E priority.

1.1. Institutionalize the VS T&E program within VS SPRS.
1.2. Solicit input for T&E planning.
1.3 Integrate One Health concepts into future training and exercise events for all VS TEP priorities.
2.1. Leverage existing training and exercise programs to raise awareness and encourage participation.
2.2. Identify training needs, develop training materials, and deliver training for FAD/EDI preparedness and response.
2.3. Promote and support FAD/EDI response training provided by the VS Professional and Development Services. For a complete list of routine emergency preparedness and response training, visit the VS PDS website: http://www.aphis.usda.gov/animal-health/training.
2.4. Train on new and emerging animal disease Foreign Animal Disease Preparedness and Response Plan (FAD PReP) documents.
2.5. Create a model for Incident Command System (ICS) position-specific on-the-job training to facilitate emergency preparedness and response training for VS and external stakeholder emergency response personnel.
3.1. Conduct discussion-based exercises to validate emergency preparedness and response plans and capabilities.
3.2. Conduct a series of drills and functional exercises to validate specific operational procedures and functions.
3.3. Participate and engage in trainings and exercises sponsored by or in collaboration with external stakeholder emergency responders that support the VS T&E strategy.
3.4. Adopt a process for VS T&E improvement planning.

There are multiple events in alignment with and support of each VS TEP objective. The plan identifies for FY2016 a total of nine events to build the VS T&E program; 27 events to train VS and external stakeholder emergency responders; and 15 events to exercise VS and external stakeholder emergency responder capabilities. All events engage both VS and external emergency response stakeholders to the extent possible.

Events may be specific tasks or actions, training initiatives, or discussion-based or operations-based exercises. Working groups are formed for each event and are open to VS T&E team members, subject matter experts, and other personnel impacted by the event. Groups meet regularly throughout the year, primarily through virtual means, to continue progress.

VS recognizes the wisdom in developing a T&E strategy and identifying program-wide T&E priorities to assure the emergency preparedness and response mission will continue to be achieved. This process is particularly important in light of the lessons learned from the 2015 highly pathogenic avian influenza emergency response. Implementing the VS emergency preparedness and response strategy will enhance capabilities in the 23 VS FAD PReP critical activities in preparation for the next high-consequence FAD/EDI and/or pest response requiring emergency responders for multiple rotations. The complete VS TEP is available for download from the APHIS-VS website.

HPAI Response Panel Discussion – Lessons Learned

1. Mr. Mike Starkey – Emergency Planning and Response Director, Minnesota Department of Agriculture
2. Mr. Mark Shearer – Iowa Department of Public Defense, Iowa Homeland Security Emergency Management Division
3. Dr. Linda Glaser – Program Director, Minnesota Board of Animal Health
4. Dr. Julie Helm – South Carolina NPIP Coordinator, Clemson University
5. Mr. Gary Flory – Agricultural Program Manager, Virginia Department of Environmental Quality

Minnesota H5N2 HPAO: Lessons Learned

Mike Starkey, Minnesota Department of Agriculture

Mr. Starkey gave an overview of the lessons learned in Minnesota's response to HPAI. The response measures for HPAI in Minnesota lasted from March 5 to October 5, 2015 with 9 million birds affected and an economic loss of $650,000. Ninety-eight commercial turkey flocks, 6 dangerous contact turkey flocks, 4 commercial layer flocks, 1 pullet flock and 1 backyard flow were affected. Challenges presented by Starkey included, payment to federal and site contractors, confidentiality issues, need for a dedicated flock/case manager, management of water, and CO_2 availability.

2015 Iowa High Path Avian Influenza Response

Mark Shearer, Iowa Department of Homeland Security and Emergency Management

Highlights of the presentation are as follows:

- Snapshot of HPAI geographic dispersion, case numbers and response characteristics
- Review operational challenges and successes
- Industry inputs to protect non-affected operations
- Carcass disposal and landfill issues
- Use of incinerators
- Repopulation and return to operations

Continuity of Business in the HPAI 2015 Outbreak: Permitting
Linda Glaser, Minnesota Board of Animal Health

Once Control Areas were established in the poultry dense area of Minnesota, at the end of March 2015, a permitting section to the Incident Management Team was formed to address the need for business continuity. The group quickly transitioned from a Word document and spreadsheet method to using the Emergency Management Response System (EMRS2) data system for tracking and storing permit and movement data and generating permit/movement documents.

Using EMRS2 required intensive up front data entry as Minnesota's poultry premises locations were not previously in the data system and did not have an alphanumeric premises identification number assigned to the location. Once premises were entered into EMRS2 with the required business and investigation data, the permit and movement information could be entered and permit documents readily generated from this system.

In planning for continuity of business in future outbreaks, consider the following:

1) Where does the permitting section fit into the Incident Command System (ICS) structure?
2) Who makes final decisions on questions of movement?
3) What do you plan to permit – what will not be permitted?
4) Where will information be stored and how will permit documents be generated and transferred to those who need them?

National Assembly's HPAI State Permit Working Group
Julie Helm, Clemson University

The Highly Pathogenic Avian Influenza (HPAI) permitting working group was formed on April 16, 2015 at the request of the National Assembly of State Animal Health Officials (NASAHO). The charge of the working group was to develop a document summarizing the recommendations for permitting interstate movement of poultry and eggs from a HPAI Control Area, to include frequency of surveillance testing, number of tests per premises and biosecurity procedures for movement. The recommendations were finalized on May 20, 2015, and approved by the National Assembly.

The intention of the working group was to create a document to function as a reference for State Animal Health Officials (SAHO) and their poultry health committees for use during a HPAI incident. This document contains the most basic uniform permitting recommendations. The intent of the working group was not to create new requirements that every state had to follow and was not to rewrite the secure poultry supply plans. These recommendations do not replace or supersede existing movement requirements of receiving States. Normal movement requirements must be met in addition to fulfilling the recommendations below for HPAI Control Area permitted movement.

Recommendations for interstate permitted movement of poultry and eggs out of or within an HPAI Control Area (Infected and Buffer Zones), include:

1. Delay moving live poultry (including hatching eggs) after a new Control Area is established until such time as the Control Area testing of *commercial premises is completed.
2. States should avoid placing additional restrictions on interstate movement of poultry and poultry products from outside of the Control Area in HPAI affected States. These recommendations do not supersede existing state regulations or requirements.
3. Traceability information is required for the premises of origin and premises of destination (each premises will need a Federal Premises Identification Number or Emergency Management Response System (EMRS) will create one).
4. The flock has normal flock production parameters as described in the Secure Poultry Supply Plans (Egg, Broiler and Turkey).
5. All movement should follow biosecurity procedures for Truck and Driver and Product Specific Biosecurity as described in the Secure Poultry Supply Plans (Egg, Broiler and Turkey).
6. The premises of origin is not an Infected, Suspect or Contact Premises (refer to *Section 5.5, Epidemiological Investigation and Tracing in USDA's HPAI Response Plan*).
    a. The Incident Commander should determine the need for an epidemiology questionnaire if the flock has normal production parameters and negative tests.
    b. Receiving State may require information from the epidemiology questionnaire prior to granting permission to move.
7. Egg Movements:
    a. Hatching eggs should follow the two day holding procedure as described in the Secure Poultry Supply Plans (Egg, Broiler and Turkey), provided the Control Area testing of commercial premises is completed (refer to #1), and should use the recommended testing procedures (refer to #8).
    b. Table eggs (non-hatching eggs) should follow the two day holding procedure as described in the Secure Poultry Supply Plans (Egg, Broiler and Turkey) and the recommended testing procedures (refer to #8).
8. Testing of poultry should consist of a minimum of two 11-bird AI negative PCR pools per house.
    a. The sample size consists of one pool of 11 dead/sick birds sampled per 50 dead birds per house.
    b. Frequency of sample collection:
        i. Collect all pools within 24 hours prior to movement, or

Collect one set of pools within 48 hours prior to movement and the second set of pools within 24 hours prior to movement.

The USDA-APHIS-Veterinary Services (VS), Surveillance Preparedness and Response Services (SPRS)has incorporated the working group's recommendations into a critical response activities document entitled "Testing

Requirements for Movement from the Control Area" and included it as part of the FAD PReP Materials and References for HPAI Response and Policy Information: 2014-2015 Outbreak.

*Commercial poultry premises defined from NPIP §146

1. Meat type chicken slaughter plant (broilers) – 200,000 or more chickens are slaughtered in an operating week (*all the broilers that feed that plant are considered commercial*),
2. Table egg laying premises – 75,000 or more chickens on a premises,
3. Meat type turkey slaughter plant – 2 million or more turkeys are slaughtered in a 12-month period (*all the turkeys that feed that plant are considered commercial*),
4. Commercial meat waterfowl/upland game bird slaughter plants – 50,000 or more birds are slaughtered annually (*all the birds that feed that plant are considered commercial*),
5. Raise for release waterfowl/upland game bird premises (e.g. hunting purposes) – 25,000 or more birds are raised annually on a premises, and
6. Breeder flocks that produce any of the above birds.

2015 HPAI Response - 3D Issues

Gary Flory, Virginia Department of Environmental Quality

Since December 19, 2014, 223 detections of HPAI have been reported across the country resulting in the death, either directly from the virus or in an effort to prevent the spread of the disease, of nearly 50 million birds. The depopulation of infected flocks and the disposal of the associated poultry carcasses created significant challenges for responders. This presentation will discuss challenges and lessons learned from these depopulation and disposal activities.

DEPOPULATION

In recent history, diseased poultry flocks were depopulated using whole-house CO^2 depopulation. In the early 2000's fire-fighting foam started being used for whole-house depopulation to improve efficiency and address worker safety concerns. Skid-mounted and handheld foaming units had been purchased by poultry companies and state and federal responders. However, the 2015 outbreak highlighted both the need for additional equipment and training for foaming unit operators.

Handheld foam units used to depopulate turkeys in Minnesota in 2015. Photo by Gary Flory

While foaming proved effective for floor raised birds, the method was not appropriate for cage layer operations. For those operations, CO^2 kill carts were the only available option. With an individual capacity of about 150 birds, the depopulation of operations with greater than a million birds became a slow and labor intensive process. Depopulation activities spanning several weeks and the resulting biosecurity and animal welfare implications have caused many to look for alternative depopulation methods. In response, USDA released is policy on Ventilation Shutdown on September 18, 2015.

DISPOSAL

During recent avian influenza outbreaks poultry carcasses have been disposed of with a variety of methods:

- Burial
- Incineration
- Landfilling
- Composting

BURIAL

Burial in unlined trenches is the traditional method of carcass disposal which has been used for decades. Though the method is cheap and easy to implement, concerns about groundwater contamination have decreased its use in more urbanized environments and in areas with a shallow groundwater table.

INCINERATION

Burning carcasses in open pyres drew the public's attention during the 2001 outbreak of Foot and Mouth Disease in the United Kingdom. In the United States, air curtain destructors and incineration units have been more commonly used to destroy carcasses from flooding and disease eradication

efforts. These types of facilities provide more emission controls but are often costly and limited in their treatment capacity.

An air curtain destructor being used to destroy turkey carcasses infected with low pathogenic avian influenza in Virginia in 2002. Photo by Gary Flory

LANDFILLING

Disposal at regional landfills allows animal carcasses to be quickly removed from the infected farm. Landfilling, like other off-site disposal options, require the transportation of potentially infectious material off the farm which can generate public perception and biosecurity challenges. Preplanning and open discussions with potential disposal facilities is required to mitigate those concerns.

COMPOSTING

Composting for disease response was first implemented during an avian influenza outbreak in chickens in Delaware in 2004. In the fall of 2004, researchers in Virginia initiated a demonstration project to evaluate the effectiveness of in-house composting on turkeys. Based on the result of this work, composting was used to control outbreaks of avian influenza in West Virginia and Virginia in 2007. The success of composting during these outbreaks resulted in composting being one of the primary carcass disposal method during the 2015 High Pathogenic Avian Influenza outbreak. In Minnesota for example, 108 of the 109 commercial poultry operations successfully composted their flocks.

Composting's successes during the 2015 avian influenza outbreak can be attributed to efforts to ensure consistency in implementing the process. Subject matter experts (SMEs) from across the country traveled to each infected farm to ensure the composting process was implemented to effectively inactivate the avian influenza virus. In May, USDA established the USDA Composting

Technical Team comprised of SMEs who meet weekly to gather lessons learned, discuss problem sites and to develop a national composting protocol.

Composting in a poultry house during an outbreak of avian influenza in Virginia in 2007.
Photo by Gary Flory

Use of APHIS Carcass Management Decision Tool and Highly Pathogenic Avian Influenza (HPAI) 2015

Lori Miller, USDA-APHIS, Veterinary Services (VS), Science, Technology and Analysis Services (STAS)

During the 2007 H5N1 outbreaks in Asia, APHIS increased planning, preparedness, and exercise activities to improve response capabilities in the US. Part of that effort involved developing carcass management decision tools and online training modules, which have been available on the APHIS website for several years. The tools were exercised in 2012 during a workshop in Denver. Feedback from that workshop and input from a team of federal subject matter experts was used to revise the tools into a Matrix, Decision Loop and Checklist (MLCh). The MLCh Tool differs from the original decision tree in that it covers all species, not just poultry.

During the Spring 2015 HPAI response, disposal decisions in the affected states closely mirrored the recommendations in the original decision tree, favoring onsite options over offsite options requiring transport. The original decision tree favored in-house composting, outdoor composting, and onsite burial; if those options were exhausted, then secure transport to landfill, rendering, or incineration was recommended. Use of transportable technologies onsite was also explored.

The revised MLCh Tool considered all species, so it favored high-capacity disposal options such as landfill, rendering, incineration and composting over open burning and onsite burial due to the likelihood that mass cattle or swine mortalities would overwhelm onsite options quickly. During the 2015 HPAI response, the initial approach to compost onsite was realistic and effective; however, as the outbreak expanded, particularly into egg layer operations, onsite composting was no longer feasible, and the strategies shifted to offsite disposal, as would be expected for large animal response. The lessons learned included recognition that limiting factors for onsite options included poorly suited soils for burial, and an insufficient number of mortality composting experts to ensure proper windrow construction. APHIS is working to expand the pool of composting experts through new training initiatives, and to work with landfill, rendering, and other technology companies to increase our ability to manage mass livestock mortalities.

ICS in Animal Disease Events: Lessons Learned in California – Ideas to Improve Success

Lisa Quiroz, California Department of Agriculture

Like many other State animal health entities, the California Department of Food and Agriculture Animal Health Branch has had to overcome a steep learning curve when it comes to melding animal disease response functions with the incident command system (ICS) – and we are still learning. After every response, our personnel have learned from successes and challenges with embracing ICS principles. This presentation will share ideas on implementing ICS for animal disease responses that incorporate many lessons learned. The presentation outlines, step-by-step, a typical California disease response activation and strategies we have implemented to help responders "stay in their lane."

State Regional Alliances Panel

- Mr. Jeff Turner, Director of Emergency Management, Texas Animal Health Commission
- Dr. Greg Christy, Emergency Programs Veterinarian Manager, Florida Department of Agriculture and Consumer Services
- Dr. Kristen Haas, State Veterinarian and Director of Food Safety and Consumer Protection, Vermont Agency of Agriculture, Food, and Markets
- Mr. Mark Shearer, Multi-State Partnership Coordinator, Iowa Department of Defense, Iowa Homeland Security Emergency Management Division

Southern Agriculture and Animal Disaster Response Alliance (SAADRA) Update

Jeff Turner, Texas Animal Health Commission

Greg Christy, Florida Department of Agriculture and Consumer Services

Southern Agriculture and Animal Disaster Response Alliance (SAADRA) is an interactive collaboration of states at risk from similar natural, intentional, technological, and disease disasters affecting agriculture and animals. Our mission is to strengthen all-hazard capabilities through partnerships with the public, animal and agriculture industries, and every level of government. Both regional and individual state preparedness will be enhanced through collaborative planning, mitigation, response, and recovery efforts that help to ensure the safety and health of its citizens, food systems, agriculture infrastructure, animals, and economy. Thirteen state participate in SAADRA - AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, TX, VA, WV. Greg Christy and Jeff Turner are the current co-chairs.

New England States Animal Agricultural Security Alliance (NESAASA) Update

Kristen Haas, Vermont Agency of Agriculture, Food, and Markets

Dr. Haas provided an overview, history, and current initiatives occurring with NEESASA. Initiatives include recodification of the NESAASA Charter, strategic planning, and HPAI planning. Limitations for moving forward is prioritizing items for consideration in a resource-constricted environment.

Multi-States Partnership for Security in Agriculture (MSP) Update

Mark Shearer, Iowa Department of Homeland Security and Emergency Management

Mr. Shearer provided any overview of partnership activities and networks and emphasized the planning for a 2018 Multi-State and USDA foreign animal diseases (FAD) Full Scale Exercise.

AVMA Update

Cheryl Eia, Emergency Preparedness and Response

This presentation will provide an update on the American Veterinary Medical Association (AVMA's) Strategy Management Process and the Advisory Panel Pilot program. The Advisory Panel Pilot program model is being tested as a way to increase the efficiency, effectiveness and engagement in the AVMA's policy-making process by integrating the operations of nine councils and committees supported by the AVMA's Division and Animal and Public Health within an Advisory Panel System.

Livestock Emergency Response Plans

Ken Burton, National Agricultural Biosecurity Center (NABC), Kansas State University (KSU)

Craig Beardsley, National Agricultural Biosecurity Center, KSU

The Livestock Emergency Response Plan (LERP) toolkit is part of an effort by the United States Department of Homeland Security (DHS) to develop a seamless system of foreign or emerging animal disease (FEAD) emergency response planning between state, tribal, territorial, and federal jurisdictions. The LERP toolkit is designed to assist state, tribal, and territorial government entities in developing an Emergency Operations Plan (EOP) for responding to a livestock-related emergency such as an infectious or highly contagious FEAD affecting poultry, exotic, and domestic livestock. The LERP can be in the form of a stand-alone document or as an appendix or Emergency Support Function (ESF) supporting an existing all-hazards plan. In whichever form it is applied, it will be a critical component of a State Emergency Operations Plan (SEOP). For states that already have FEAD plans prepared, this toolkit can be used to review existing documents for completeness and to provide a universal format to follow when updating. The toolkit can also be utilized to frame areas for continuing education within an agency or department. Using the toolkit to guide their efforts, a planning entity might address individual sections of the LERP to identify areas of need for further discussion or training. In any of these applications, this toolkit will assist planners with determining how a state will respond to all stages of a livestock disease emergency management cycle: prevention, protection, mitigation, response, and recovery.

The LERP toolkit has been compiled from the review of numerous existing plans, documents and templates addressing livestock and FEAD emergency response. All formatting for the LERP template is based on the FEMA Comprehensive Preparedness Guide 101 (CPG-101), version 2 “Developing and Maintaining Emergency Operations Plans” and the National Response Framework, Food and Agriculture Incident Annex. LERP integrates concepts embodied in the National Preparedness Guidelines released in September 2007 and is aligned with the 31 Core Capabilities outlined in the first edition of the National Preparedness Goal issued in September, 2011. The LERP toolkit consists of five (5) components: the LERP template, LERP Supplemental Guide, LERP Participant’s Guide, LERP Facilitator’s Guide, and a PowerPoint presentation. The LERP template provides formatting, descriptions, and points to consider for each section of a FEAD response plan. The Supplemental Guide provides additional information for developing each section of the plan along with representative text derived from existing state FEAD plans. The Facilitator’s Guide provides useful checklists and assistance to make the facilitator’s job easier as they lead the planning and development sessions. The participant’s guide follows the LERP template format and contains information which will assist the participant in understanding their role in LERP development. And finally, the PowerPoint presentation is a listing of all of the discussion questions for each section of LERP development. The questions are to lead discussion in certain areas but do not represent all issues that might need to be addressed. Each section can be edited as needed so that each entity can address specific issues that are unique to their FEAD plan. The LERP toolkit is not meant to be a “cookbook approach” to FEAD response planning. It is a tool to be used alongside the many other FEAD response

reference documents as state, local, tribal, and territorial government entities develop or update their FEAD response plans.

The LERP toolkit is currently housed and accessible within the library of the FoodShield.org website, the Institute for Infectious Animal Disease (IIAD) “Preparedness and Response” resource page, and by request to K-State’s National Agricultural Biosecurity Center (NABC).

Committee Business:

One resolutions submitted by committee members were adopted through motions made, seconded, and passed by voice vote, entitled “National Foot-and-Mouth Disease Preparedness.”

The meeting was adjourned at approximately 1:05 p.m.

REPORT OF THE USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS

Chair: Marie Culhane, MN
Vice Chair: Marianne Ash, IN

Sara Ahola, CO; Bruce Akey, TX; James Averill, MI; Rich Baca, CO; Karen Beck, NC; Karen Becker, DC; Tammy Beckham, KS; Lisa Becton, IA; Charlie Broaddus, VA; Dwight Bruno, NY; Stan Bruntz, CO; Craig Carter, KY; Mal Cartwright, AB; Matt Cochran, TX; Anita Edmondson, CA; François Elvinger, VA; Tam Garland, TX; Joseph Garvin, VA; Alicia Gorczyca-Southerland, OK; Kristin Haas, VT; Patrick Halbur, IA; Neil Hammerschmidt, MD; William Hartmann, MN; Charles Hatcher, TN; Kristi Henderson, IL; Ashley Hill, CA; John Huntley, WA; Marv Jahde, KS; Annette Jones, CA; Jamie Jonker, VA; Ellen Kasari, CO; Diane Kitchen, FL; Elizabeth Lautner, IA; Donald Lein, NY; Anne Lichtenwalner, ME; Janet Maass, CO; Kevin Maher, IA; Rodger Main, IA; Stu Marsh, AZ; Michael Martin, SC; Rose Massengill, MO; Patrick McDonough, NY; Shelley Mehlenbacher, VT; Gay Miller, IL; Roger Parker, TX; John Picanso, MD; Barbara Porter-Spalding, NC; Margaret Rush, MD; Mo Salman, CO; David Scarfe, IL; Stacey Schwabenlander, MN; Marilyn Simunich, ID; David Smith, NY; Patricia Stonger, WI; Jessie Trujillo, IA; James Watson, VIC; Patrick Webb, IA; Steve Weber, CO; Michelle Willette, MN; Nora Wineland, MO.

The Committee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 3:00 to 5:45 p.m. There were ten members and 34 guests present.

Presentations and Reports

Update from the Subcommittee on Data Standards

Mr. Michael McGrath, and Dr. Sara Ahola provided a report on the Subcommittee on Data Standards. This summary can be found immediately following the Committee Report.

Update from the National List of Reportable Animal Diseases (NLRAD) and the National Animal Health Reporting System (NAHRS) Reportable Diseases List

Stanley Bruntz, Science, Technology and Analysis Services (STAS), Office of STAS Interagency Coordination (OSIC), USDA-APHIS-VS

National List of Reportable Animal Diseases (NLRAD) will help us meet international reporting obligations and required export certification; it's been available for comments via USDA, and it should improve disease reporting in the USA. Many comments and feedback on the NLRAD Concept Paper have been received from industry, veterinarians, laboratories, gov't and the international community. In general, there has been broad support but a few questions on how new diseases will be added or how the list will be edited need answers. A joint NAHRS-NAHLN group was formed to address laboratory implementation issues of the NLRAD, but a lot of activity on that has been delayed due to re-directed personnel time going to the Highly Pathogenic

Avian Influenza (HPAI) outbreak. Plans for 2015/2016 are to continue working to finalize recommendations for implementation, continue to review the NLRAD, continue to develop standard operating procedures (SOPs), and we may initiate the regulatory implementations process in late 2016 – but all of these need stakeholder input. Steve Hoosier mentioned that toxicants could be listed and Dr. Bruntz responded they are seeking toxicology expert input and there needs to be a standard process to review toxicants included.

The Swine Health Information Center (SHIC) - An overview of how SHIC can help move the information on diseases of swine to the right people
Paul Sundberg, Swine Health Information Center

Swine Health Information Center (SHIC) formed in July 2015. Prior to the formation of SHIC, ad hoc committees of pork producers (National Pork Board (NPB) and swine veterinarians (American Association of Swine Veterinarians (AASV) were formed to address different outbreaks as they occurred. SHIC is a separate 503C corporation. This is a swine focused effort to bring multiple parties together to do targeted research. Example, for Seneca Valley Virus (SVV) outbreak, the SHIC helped get diagnostic assays up and running by funding veterinary diagnostic laboratories via the Swine Disease Matrix Project. SHIC also funds the Swine Health Monitoring Project (SHMP) and voluntarily shared disease data through researchers at the University of Minnesota. It's important in that the goal is to increase the health of the US Swine Breeding Herd. SHIC also seeks input of vets in development of research and preparedness needs. Communication efforts are also key activities.

Ag-Connect and Its Use in Approving Swine Movement Permits Based on the Criteria from the Secure Pork Supply Plan
Keith Biggers, Texas Center for Applied Technology

AgConnect integrates data from disparate data sources with the goal of continuity of business. Continuity of business plans are actively being developed at the national, regional, and state levels. These plans are tailored and specific for the disease agent, industry, and/or commodity in question. They provide a framework and set of guidelines to help manage the movement for uninfected premises in a regulatory Control Area, and to facilitate movement out of the Control Area during an outbreak. A summary of AgConnect work was described. A demonstration of how AgConnect would help support the Secure Pork Supply plan was displayed and it included maps of animal movements (traceability) and veterinary diagnostic laboratory results. AgConnect is a decision support tool Emergency Management Response System (EMRS) will be the permitting tool but there should be an opportunity to distribute the information.

Panel Discussion on Permitted Movement of Animals Out of Control Areas During Outbreaks: Lessons Learned, Future Opportunities

Stacey Schwabenlander, Minnesota Board of Animal Health
Greg Onstott, Missouri Department of Agriculture
Julie Helm, Clemson University
Fred Bourgeois, USDA-APHIS-VS

A permit connects one origin to one destination for one item. A permitted movement document can be produced to cover more than one movement.

Dr. Schwabenlander provided the following summary of HPAI in Minnesota (MN):

- -MN is the nation's #1 turkey producing state
- -9,024,632 birds were affected in 23 counties and on 108 farms
- 5,236 square miles in 10 km control zones
- 1,872 premises in control area
- 1,599 backyard poultry premises
- 264 commercial poultry premises

Looking at MN EMRS2 data entry from March 29, 2015 (start date of first EMRS2 permit) through July 28, 2015 (the day all control zones were released)

- -Average of 7 FTEs needed (this does not include federal staff time or indirect state time)
- -931 permits (excluding feed and product) were entered into EMRS2 and 3,074 movements were entered against those permits
- -553 feed permits were entered and 5,587 movements were entered against these permits

Challenges

- -Verifying accurate poultry locations
- -Entering all poultry premises by hand into EMRS2
- -Knowing which premises were in control zones
- -Verification of permit conditions, testing requirements
- -Confusion over which state should issue interstate permits

Solutions

- -Interactive map pulling live data – used to verify control zone premises
- -Determine the time test results are needed
- -Dedicated email inbox and telephone lines
- -Common workspace
- -Streamlines permit request process

Unmet Needs

- Data Analysis: Data extracted from EMRS2 doesn't always match data within the corresponding tables within EMRS2; Limited abilities for QA/QC of data
- Knowledge: Were all appropriate items permitted? Were any items missed?
- Impact: Did permitting decrease disease spread? Did it contribute to disease spread?

Dr. Jon Zack asked for the audience to really consider the impacts and the database needs of having 1,872 premises that were under control zones and three plants under the control zones and permitting/ approving all those movements. Minnesota committed to Emergency Management Response System (EMRS) because a database is essential to permit that many movements.

Greg Onstott is from the Missouri Department of Agriculture; Missouri uses USA Herds and it proved to work well during their outbreak of HPAI. They issued over 500 permits in two months' time and they were one of the first states to have an outbreak of HPAI in 2015. The permitting process was labor intensive. They had a single staff member lead the permitting process and that would likely not have been sustainable in the long haul but it certainly gave the permitting process some continuity. They will streamline the process in the future to allow more than just one way to receive data.

Dr. Julie Helm is from Clemson University in South Carolina. South Carolina received poultry meat products from a processing plant and eggs as well. There were times when they didn't know who approved the permit and didn't have the test results. Dr. Helm recommends only allowing the state vet or his/her deputized authority to approve the permitted movement. Sanitary and Phytosanitary (SPS) and EMRS got better the more and more it was used but sometimes the sync or timing of data was off. It was noted that the data flow and messaging needs to be better.

Dr. Fred Bourgeois is a veterinarian with the USDA, APHIS, VS, Surveillance, Preparedness and Response Services (SPRS), National Preparedness and Incident Coordination (NPIC) staff

In order to promote a better understanding of how we managed the premises and associated information, test results and the permitting of product and live animals, Dr. Bourgeois shared some of the challenges they had the past year and where they have made improvements in the process from a USDA and EMRS perspective. Companies and Food Safety and Inspection Service (FSIS) do internal tracking for food safety purposes, and so the plants were not permitted one by one and it is low risk because it is not live product. Dr. Jon Zack mentioned that tracking the conveyance might be a better use of time and resources. It was different from exotic Newcastle disease (END) in California (CA) where during END most every bird or bird product stayed in CA. In contrast, during HPAI in 2015, there were 400 movements of poultry products out of a plant in one day (for example).

There was discussion that permits should be focused on high risk movements like live birds and hatching eggs. Dr. Bourgeois mentioned that EMRS tool provided a pipeline/conduit of data for state to state movements. Continuity of Business (COB) needs to run smoothly when birds are going from a diseased state to a disease free state. The home state has to be aware of a movement out of a control zone and the receiving state has to approve the

movement into the receiving state. We need approval from both sides. For multiple movements, there's a standing permit, so movement has to be verified and requirements have to be met, but there's no need to recreate a permit. Recording the movements however, is maintained.

Marianne Ash mentioned that there would be a need to integrate the laboratory data and the permit electronically. A question on the known/unknown status of a premise as to whether it was in a control zone came from the audience and was answered by Dr. Bourgeois that premise status will now be in EMRS2. In EMRS2, making changes to permits was originally not allowed once approved. However, there was discovery of necessary adjustments to the permits due to errors in input, attributable to the need for rapid response and just in time training. Therefore, some changes were allowed and those changes were then applied across all permits linked to the changed permit.

The validity of premises location and premise identification numbers (PINs) is perhaps the biggest issue. Data must be accurate or there is a delay in movements. There is a concerted commitment by industry to get the PIN and valid premises into EMRS2. Florida and South Carolina made it clear that only premises with a valid PIN would be allowed to move IF there was quarantine in place.

Committee Business:

RECOMMENDATION: There should be an Electronic Certificate of Veterinary Inspection (eCVI) working group and some sort of "laboratory cross-talk / laboratory epi data" working group within the Subcommittee for Data Standards.

The minutes/report from 2014 were approved via a motion by Bruce Akey, seconded by Pat Stonger and unanimous committee vote.

The actions of the Subcommittee on Data Standards were approved and the above recommendation was made for that subcommittee.

Dr. Marie Culhane has been serving as co-chair/vice-chair/chair of this committee since the 2012 meeting. She needs to be replaced by a member of the AAVLD. Kate Mueller (IA) expressed interest. AAVLD executives or board members should appoint a new co-chair from AAVLD membership.

REPORT THE SUBCOMMITTEE ON DATA STANDARDS

Michael McGrath, Trace First
Sara Ahola, USDA-APHIS-VS-STAS-CEAH

Summary: The Subcommittee on Data Standards was formed in 2012. In 2014-2015, the plan of the subcommittee was to test the schema for data standards so that there could be electronic transfer of health certificates; however, not a lot of testing has been completed. Currently there is no compelling reason to revise the data standards, the data standard was written but there is no pressure to adopt it and has yet to be widely adopted. There is a question of fit for purpose. There is a recommendation that this Subcommittee on Data Standards does exist so we can encourage standardized data wherever it is needed. Michael Martin supported the Data Standards and mentioned that Data Standards are being used and used well in his system. Marianne Ash mentioned that in Indiana they only approve Electronic Certificate of Veterinary Inspection (eCVI) vendors ONLY if they meet the Data Standards. The Data Standards are fair and easy to use. Bruce Akey mentioned there's a need for data standards for syndromic data, reason for submission, a catalog of tests and standardized Logical Observation Identifiers Names and Codes (LOINC) codes. All these are pieces that are needed for pulling data in from multiple laboratory systems and getting good epidemiological analyses. In general, the Data Standards Subcommittee could do a lot of these additional projects but others would need to be on the Subcommittee, in particular Subject Matter Experts (SME).

Recommendations: there should be an eCVI working group and some sort of "laboratory cross-talk / lab epi data" working group within the Subcommittee for Data Standards. Michael Martin stated that there is lack of consensus in industry for what data comes out of an ultra-high frequency electronic ear tag, so if the Traceability Committee needs help, there is consulting availability.

REPORT OF THE COMMITTEE ON ANIMAL WELFARE

Chair: Belinda Thompson, NY
Vice Chair: Chelsea Good, MO

Bobby Acord, NC; Jamee Amundson, IA; Chris Ashworth, AR; James Averill, MI; Deanna Baldwin, MD; Bill Barton, ID; Paul Brennan, IN; William Brown, KS; Tom Burkgren, IA; Beth Carlson, ND; Jim Collins, GA; Stephen Crawford, NH; Susan Culp, TX; Glenda Davis, AZ; Ria de Grassi, CA; Ron DeHaven, IL; Barbara Determan, IA; Leah Dorman, OH; Brandon Doss, AR; Mark Drew, ID; Brigid Elchos, MS; Dee Ellis, TX; Kathy Finnerty, MA; Glenn Fischer, TX; Katherine Flynn, CA; W. Kent Fowler, CA; Nancy Frank, MI; Mallory Gaines, DC; Julie Gard, AL; Robert Gerlach, AK; Eric Gingerich, IN; Chester Gipson, MD; Gail Golab, IL; James Grimm, TX; Paul Grosdidier, KS; Kristin Haas, VT; Thomas Hairgrove, TX; Rod Hall, OK; Steven Halstead, MI; Charles Hatcher, TN; Bill Hawks, DC; Carl Heckendorf, CO; Julie Helm, SC; Linda Hickam, MO; Robert Hilsenroth, FL; Sam Hines, MI; Heather Hirst, DE; Donald Hoenig, ME; Danny Hughes, AR; Dennis Hughes, NE; John Huntley, WA; Russell Iselt, TX; Regina Jensen, DE; Annette Jones, CA; Dena Jones, DC; Jamie Jonker, VA; Donna Kelly, PA; Diane Kitchen, FL; Michael Kopp, IN; Daniel Kovich, DC; Eileen Kuhlmann, MN; Mary Lis, CT; Pat Long, NE; Travis Lowe, MN; Janet Maass, CO; Bret Marsh, IN; David Marshall, NC; Chuck Massengill, MO; David Meeker, VA; Emily Meredith, VA; Antone Mickelson, WA; Mendel Miller, SD; Eric Mohlman, NE; Julie Napier, NE; Louis Neuder, MI; Sandra Norman, IN; Dustin Oedekoven, SD; Elizabeth Parker, TX; Boyd Parr, SC; Kris Petrini, MN; William Pittenger, MO; Jewell Plumley, WV; David Pyburn, IA; John Ragan, MD; Herbert Richards, HI; M. Gatz Riddell, Jr., AL; Keith Roehr, CO; Travis Schaal, IA; Shawn Schafer, OH; David Schmitt, IA; Dennis Schmitt, MO; Stacey Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Kathryn Simmons, DC; David Smith, NY; Harry Snelson, NC; Diane Stacy, LA; Matthew Stone, NZ; Nick Striegel, CO; Scott Stuart, CO; Manoel Tamassia, NJ; Robert Temple, OH; Beth Thompson, MN; Brad Thurston, IN; Tracy Tomascik, TX; Alberto Torres, AR; Bob Tully, KS; Jeff Turner, TX; Charles Vail, CO; Liz Wagstrom, DC; Patrick Webb, IA; Sherrie Webb, IA; Ellen Wiedner, FL; Michelle Willette, MN; Brad Williams, TX; Ellen Mary Wilson, NM; Ross Wilson, TX; Nora Wineland, MO; Richard Winters, Jr., TX; Cindy Wolf, MN; Ernest Zirkle, NJ.

The Committee met on October 28, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 8:00 a.m.–12:00 p.m. There were 65 members and 40 guests present. The meeting opened with a welcome and a review of the committee purpose and discussion of procedural rules. There were no prior year resolutions to discuss. However, a resolution of this committee from 2013, Resolution 33 in support of the Prevent All Soring Tactics (PAST) ACT, HR 1518/S1406 did not result in passage of the legislation by congress. Essentially the same legislation is before the current congress, PAST Act [S.1121 and H.R.3268], and this committee would like to urge the USAHA to renew its support of this legislation.

Time-Specific Presentation

USDA-APHIS National Veterinary Accreditation Program Module 22: **Animal Welfare: An Introduction**
Gail Golab, American Veterinary Medical Association (AVMA)

The National Veterinary Accreditation Program Module 22 titled “Animal Welfare: An Introduction,” included the following topics: (1) why animal welfare is an important part of an accredited veterinarian's regulatory activities; (2) how to define animal welfare in a comprehensive way; (3) how to assess and evaluate an animal’s welfare; and (4) examples of the opportunities and challenges that exist in protecting an animal’s welfare.

Accredited veterinarians are required to consider the well-being and humane treatment of animals in the course of their regulatory work. The regulatory activities guiding the work of APHIS Veterinary Services and accredited veterinarians are found in the Code of Federal Regulations (CFR), Title 9, Animals and Animal Products Chapter I--Animal and Plant Health Inspection Service, Department of Agriculture Subchapters B, C, D and J available at: http://www.ecfr.gov. [Select Title 9--Animals and Animal Products; then Parts 1-199--Animal and Plant Health Inspection Service, Department of Agriculture; then find the various Subchapters]. The authority supporting humane handling provisions required of accredited veterinarians is provided by the Animal Health Protection Act (AHPA), under the Commercial Transport of Equines to Slaughter Act (9CFR§88), and the Statement of Policy under the Twenty-Eight Hour Law (9CFR§89). In addition, many thousands of accredited veterinarians are involved with the enforcement of humane animal care within the regulatory provisions of 9 CFR Subchapter A, granted by the Animal Welfare Act.

Arrangements were made to provide certification to attending accredited veterinarians. The module is publicly available at http://aast.cfsph.iastate.edu/AWIC/index.htm.

Presentations and Reports

Ben Wileman, AgForte, presented “The Importance of Timely Depopulation in Response to Highly Pathogenic Avian Influenza.” A summary is included at the end of this report.

Eric Gingerich, Diamond V, presented “Use of Ventilation Shutdown for Mass Depopulation of Poultry in Emergency Situations,” which is included at the end of this report. A summary is as follows:

During the highly pathogenic avian influenza outbreaks during the spring of 2015 in the upper Midwest, many problems occurred that did not allow timely depopulation of turkey and layer flocks. USDA has stated that, if possible, a flock infected with HPAI should be put down within 24 hours after confirmation. This stops the shed of virus and does not allow the increase in shed rate of HPAI virus seen in the outbreaks if flocks are allowed to remain alive. An option to quickly cause death of all birds in a house is to shut off the ventilation

fans (variable speed drives - VSD) that will allow the heat from the birds to increase rapidly and result in hyperthermic death. Department for Environment, Food and Rural Affairs (DEFRA) set forth guidelines for VSD use in their document "Guidelines for Killing Poultry Using Ventilation Shutdown (VSD) in September 2009 (http://www.slideshare.net/charmkey5/operating-guidance-vetilation-shutdown-procedure-defra).

The VSD process as defined by DEFRA is to raise the temperature in the house to 104°F within 30 minutes and to hold this temperature for at least three hours. Water is not turned off during the process. Sealing the house is required to help hold heat in the house. Supplemental heat may be required and guidelines are being developed using predictive modeling in different scenarios. More research is needed to make this procedure as humane as possible.

Beef Quality Assurance – A Vital Program for the Cattle Industry
Josh White, National Cattlemen's Beef Association

Key points of this presentation included:

- Update on the Cattle Industry Long Range Plan, passed at 2015 Cattle Industry Summer Conference, and specific core strategies related to Beef Quality Assurance (BQA): http://www.beefusa.org/beefindustrylongrangeplan.aspx.
- Basic overview of the mission and structure of BQA. Reviewing resources available for producers and those that handle cattle – training, certification, and assessment tools (www.bqa.org).
- Consumer views on production practices - Focus on BQA Feedyard Assessment (www.feedyardassessment.org) and its role moving forward.
- Focus on cattle transportation:
- Existing training – Master Cattle Transporter program,
- 2015 Cattle Transportation Symposium – executive summary overview (http://beefresearch.org/beefissuesquarterly.aspx?id=5196),
- next steps

The presentation can be viewed in full on the Committee web page.

National Dairy FARM Program: Update
Antone Mickelson, FARM

The dairy industry, through National Milk Producers Federation (NMPF) with support from Dairy Management, Inc. (DMI), initiated a voluntary program named FARM: Farmers Assuring Responsible Management™ in 2009. The program is about to release version 3.0, which includes an updated database and a mobile app for data collection, and updated communications tools such as a new website, consumer video, and crisis drills.

Mr. Mickelson outlined some changes in program participation requirements that have been adopted, including mandatory Veterinary Client Patient Relationship, an accelerated timeline to the elimination of tail-docking,

and signed statements of cow handling responsibility. He also described the second and third party audit experience to date.

Committee Business:

The Committee considered and approved the resolution on protecting veterinarians' access to ketamine. There was no other new business.

The Importance of Timely Depopulation in Response to Highly Pathogenic Avian Influenza

Ben Wileman
AgForte

The spring of 2015 was a historic year for the turkey industry with the arrival of the H5N2 Highly Pathogenic Avian Influenza (HPAI) virus in the United States and specifically Minnesota. Previous epidemiology and research of HPAI from around the world has found that the two largest drivers of the size of an outbreak and the length of time of an outbreak are the delay from introduction to detection of the virus and then the delay from detection of virus to depopulation. During the first half of the outbreak of 2015 in Minnesota, the average days from sampling to completion of depopulation was approximately 5-10 days (Figure 1). This delay compounded over time lead to a large amount of viral production occurring on infected farms and allowed to release into the environment, via normal barn ventilation, of a poultry dense area leading to spread via windborne dust particles to neighboring farms. This lead to a large spike in cases which further diminished response times due to the saturation of response capabilities of both human and physical assets (Figure 2). The second half of the cases in the outbreak averaged 3-5 days from sampling to completion of depopulation which, in addition to fewer susceptible birds left in the geographic area, lead to a decrease in the number of additional cases in Minnesota (Figure 1). After meeting with industry stakeholders and state and federal officials there was agreement that depopulation should be completed within 24 hours of diagnosis regardless of size of the operation going forward. While prevention of even having a case is still the focus, if we are to see additional cases, this 24-hour goal should greatly limit the number of cases and the length of the outbreak.

Figure 1: Days elapsed from initial HPAI sampling to completion of depopulation activity of HPAI positive premises in Minnesota. One site shown was not confirmed by National Veterinary Services Laboratories (NVSL) and is shown as 0 days. There were 108 total HPAI positive premises in Minnesota. The large spikes in the graph correlate with large chicken egg layer sites that had significantly longer depopulation times.

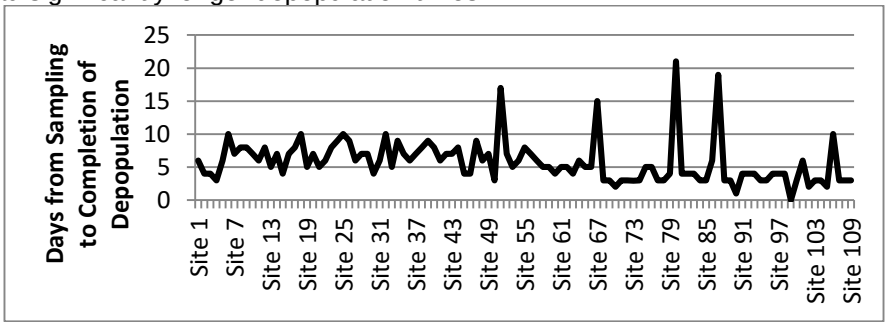
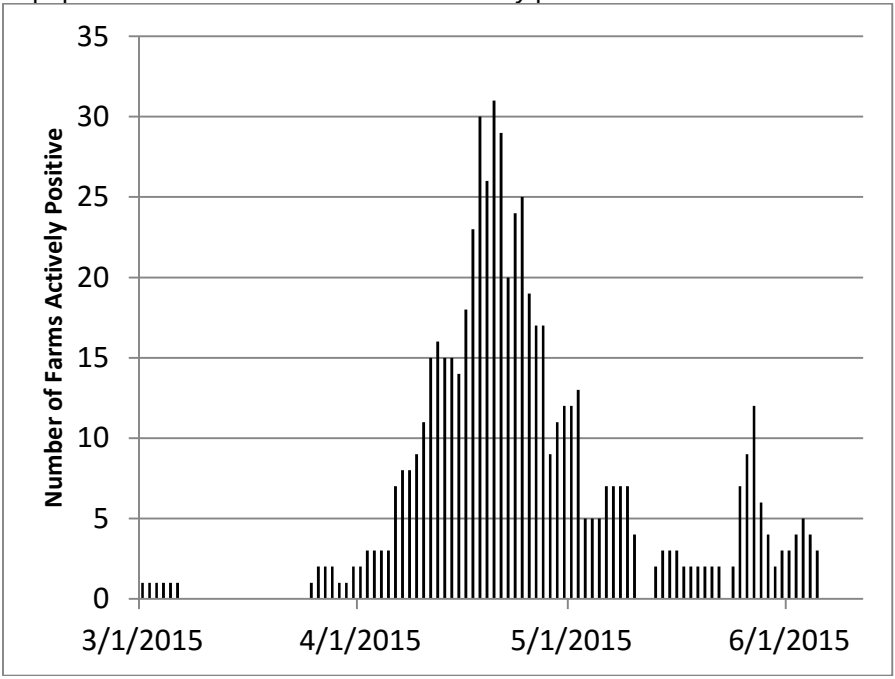


Figure 2: Cumulative number of farms that would be actively shedding virus by calendar date. Actively shedding means the farm is somewhere between a sample (later to be found positive) was taken and the completion of depopulation. So a farm that took 6 days (far left of graph) from sample to depopulation would be counted over a 6-day period.



Use of Ventilation Shutdown for Mass Depopulation of Poultry in Emergency Situations

Eric Gingerich
Diamond V

During the highly pathogenic avian influenza outbreaks during the spring of 2015 in the upper Midwest, many problems occurred that did not allow timely depopulation of turkey and layer flocks. USDA has stated that, if possible, a flock infected with HPAI should be put down within 24 hours after confirmation. This stops the shed of virus and does not allow the increase in shed rate of HPAI virus seen in the outbreaks if flocks are allowed to remain alive. Ventilation shutdown (variable speed drives (VSD)) is being considered as a possible solution should this problem arise again.

During the HPAI outbreaks of 2015, too many outbreaks occurred at one time and overwhelmed the ability to depopulate flocks on a timely basis using the approved methods of CO2 carts for layers or firefighting foam for turkeys. It is felt that many flocks could have been spared being infected with HPAI had flocks been put down in a timely manner and suppressed the high levels of virus shed from them.

An option to quickly cause death of all birds in a house is to shut off the ventilation fans (VSD) that will allow the heat from the birds to increase rapidly and result in hyperthermic death. A precedent has been set by the United Kingdom's Department for Environment, Food, and Rural Affairs (DEFRA) for use of this method in emergencies. DEFRA set forth guidelines for VSD use in their document Guidelines for Killing Poultry Using Ventilation Shutdown (VSD) in September 2009 (http://www.slideshare.net/charmkey5/operating-guidance-vetilation-shutdown-procedure-defra).

Besides the reduction in shedding of virus, other reasons for deciding to use VSD are 1) that it greatly reduces the time of exposure of the workers depopulating flocks using standard methods to possible zoonotic agents, and 2) reduces the amount of birds suffering from the disease during slower depopulation methods.

It is agreed that VSD is not the ideal method for mass depopulation as it results in longer periods of time for suffering compared to other methods. The decision to use VSD is only to be made after all other more humane methods have been considered and it has been determined that the time taken for other methods will allow the amount of virus to become excessively high and results in undue spread of the disease.

The United States Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) developed and announced its position on the use of VSD on September 18, 2015. This document contains a decision tree for determining if a particular depopulation situation should use VSD or not. This document is available at the USDA-APHIS website https://www.aphis.usda.gov/animal_health/emergency_management/downloads/hpai/ventilationshutdownpolicy.pdf.

The VSD process as defined by DEFRA is to raise the temperature in the house to 104F within 30 minutes and to hold this temperature for at least 3 hours. Water is not turned off during the process. Sealing the house is required to help hold heat in the house. Supplemental heat may be required and guidelines are being developed using predictive modeling in different scenarios. More research is needed to make this procedure as humane as possible.

The American Association of Avian Pathologist (AAAP), at their annual meeting in the summer of 2015, approved a position statement drafted by their animal welfare and management committee to approve the use of VSD, with appropriate veterinary consultation, in cases of emergency when deemed necessary in order to control the spread of a foreign animal disease (FAD). The AAAP position statement, FAQs, and background information are available to AAAP members on the website www.aaap.info under Committees/Animal Welfare/Emergency Mass Depopulation Guide and Avian Influenza Resources.

The American Veterinary Medical Association's (AVMA) Panel on Depopulation will be developing their guidelines for mass depopulation over the next two or more years. More information can be seen at the AVMA website https://www.avma.org/KB/Resources/Reference/AnimalWelfare/Pages/Depopulation.aspx.

REPORT OF THE USAHA/AAVLD COMMITTEE ON AQUACULTURE

Chair: Lester Khoo, MS
Vice Chair: William Keleher, ME

Sara Ahola, CO; Peter Belinsky, RI; Deborah Brennan, MS; Stan Bruntz, CO; Sandra Bushmich, CT; Beverly Byrum, OH; Lynn Creekmore, CO; Ria de Grassi, CA; Nancy Frank, MI; Richard French, NH; Jerry Heidel, OR; Donald Hoenig, ME; Hui-Min Hsu, WI; John Huntley, WA; Donna Kelly, PA; Bruce King, UT; Anne Lichtenwalner, ME; Tsang Long Lin, IN; Regg Neiger, SD; Jamie Ng, NY; Jenee Odani, HI; Lanny Pace, MS; Amar Patil, NJ; Kris Petrini, MN; James Roth, IA; David Scarfe, IL; Kevin Snekvik, WA; Robert Temple, OH; Kathy Toohey-Kurth, WI; Anna Wilson, WI.

The Committee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island at 12:30 p.m. There were 12 members and 20 guests present.

Presentations and Reports

Conserving the Nature of America: An Agency Introduction and Role in Disease/Pathogen Management

Joel Bader, United States Fish and Wildlife Service (USFWS)

Dr. Bader aimed to provide a better understanding of the USFWS. It is the federal resource agency tasked with conserving America's wildlife. It is housed within the Department of the Interior and has 11 different divisions including Law Enforcement, Endangered Species, Migratory Birds, Refuges, Wildlife and Sport Fish Restoration, International Affairs, External Affairs, and Fish and Aquatic Conservation. Their National Fish Hatcheries system includes 70 hatcheries, nine fish health centers, seven fish technology centers and the Aquatic Animal Drug Approval Partnership (AADAP) program. While USFWS does not have pathogen regulatory authority, they do have several tools to achieve their mission namely, science support, scientific leadership and expertise, partnerships (federal, states, tribes and non-governmental organizations) and in the most severe situations, specific regulatory authority to implement rules to protect the wildlife of the United States. He described the USFWS contributions to the National Aquatic Animal Health Plan. He also expounded on Aquatic Nuisance Task Force and how the agency ameliorates the threat of invasive species, the Lacey Act, how the Service lists injurious wildlife (and the use of listing injurious species and/or non-regulatory solutions to provide protection for America's wildlife), and the other Acts which provides the Service its authority.

The second part of his presentation was an update on the activities of the agency including:

A. National Aquatic Animal Health Plan (NAAHP) – Memorandum of Understanding (MOU – umbrella MOU and an export specific MOU) with the other agencies - the National Oceanic Atmospheric Administration and the United States Department of Agriculture (USDA). This was renewed for the next five years and better

defines the roles of each agency in the plan (i.e. USDA-APHIS – aquacultured animals; National Oceanic and Atmospheic Administration (NOAA) – wild marine animals, USFWS - wild freshwater animals). The export specific MOU defines who has the authority to sign for the health certificates required for exports.

B. Salamander chytrid fungus (Bsal - *Batrachochytrium salamandrivorans*)
This pathogen is in Europe and not in the United States (US) as yet and the agency was petitioned to prevent its entry to the US. The service is evaluating which salamander species should be listed as injurious wildlife to prevent the risk of Bsal's introduction into the United States, and expects to complete and publish its evaluation this Fall. This injurious wildlife evaluation is considered a Director's priority and intend to regulated this issue through the Lacey Act this fiscal year.

C. Amphibian chytrid fungus (batrachochytrium dendrobatidis - (Bd))
The Service received a petition in 2009 from the Defenders of Wildlife to list amphibians as injurious wildlife unless they are certified as free of *Batrachochytrium dendrobatidis* which lead to the Service publishing a Notice of Inquiry in the Federal Register on September 17, 2010, to announce a request for information on the petition. The public information period closed on December 16, 2010. It received approximately 450 comments and has reviewed the information, as well as other information we acquired. However, the Service has prioritized completion of other injurious wildlife evaluations at this time, such as salamander chytrid fungus, because of the goal of preventing that fungus's entry into the United States.

D. Risk Screening
The Service has developed three rapid screening tools, known as Ecological Risk Screening Summaries, Fish Risk Assessment Model, and Risk Assessment Mapping Program to help determine which species pose a high, low, or uncertain risk of invasion. It allows the use the most current scientific methods and databases to quickly gather and more efficiently analyze data. The Service has already performed hundreds of ecological risk screenings on aquatic animal species. The Service is providing the public with some of the summaries that synthesize the results of the screenings. Some of the reports are available on our website, which was created to serve a partnership with industry and the Association of Fish and Wildlife Agencies relating to animals not known to be imported. An additional website is planned, which will include summaries for species being imported.
More reports will be published as they are finalized. Many of these reports are for species that are not yet in trade or in the wild in the United States. If importers are contemplating using these species,

these reports can provide the live-animal-industry and the public with technical assistance as to whether the species would pose a high or low risk of invasiveness. Thus, industry could make an informed decision to refrain from importing high-risk species. Knowledge of both low- and high-risk species will provide industry, States, and consumers with valuable knowledge for deciding which species are more responsible choices to acquire and use. In addition, State natural resource and conservation agencies can use the summaries to aid their management decisions for potentially invasive species and to work with industry on their own agreements for risky species in their jurisdictions.

The National Aquaculture Association has expressed concern with some aspects of the screening process. Based on those concerns, the Service has pursued and completed peer review per Office of Management and Budget (OMB) policies for influential science. In June 2013, the Service signed a Memorandum of Understanding with the Pet Industry Joint Advisory Council (PIJAC) and Association of Fish and Wildlife Agencies (AFWA) to help prevent future ecological invasions caused by trade in live animals. It is expected that other parties will join the MOU. The MOU focuses on aquatic, nonnative species not yet in trade in the US and, therefore, should not affect the current economic status of the trade industry. The Service will provide technical assistance to the industry characterizing imported aquatic animals with their risk potential as invasive species. The Service also welcomes risk assessment for particular species of concern from partners and stakeholders. The Service is working with States, industry, and others through the Invasive Species Committee of the Association of Fish and Wildlife Agencies. Given numerous requests from aquacultural interests to States regarding the potential importation of African Longfin Eel (*Anguilla mossambica*), this committee is currently evaluating this species.

E. Legislation Modernizing Injurious Wildlife

While control and management of invasive species is vital, prevention is widely viewed as the most cost-effective means to avoid and minimize harm. The Service views the injurious wildlife provision of the Lacey Act is one of the strongest tools available to the Department of the Interior to manage the risks of invasive species within the trade pathway. Previous Congresses have introduced bills that would amend the injurious wildlife provisions of the Lacey Act, such as S. 1153 in the Senate and H.R. 996 in the House of Representatives in the 113th Congress. Earlier sessions of Congress have also introduced legislation, showing the interest by Members in this issue. S. 1153 would have significantly amended the injurious wildlife listing process, and would have given the Secretary of the Interior additional authorities

to prevent the importation of, and interstate commerce in, wildlife pathogens and harmful parasites. In testifying about the bill at a hearing on July 16, 2014, Fish and Wildlife Service Deputy Director Guertin indicated support for the intent and purpose of the bill. However, Deputy Director Guertin raised concerns about provisions that would undermine Fish and Wildlife Service's ability to implement and enforce the law's prohibitions on importation and interstate transport of injurious wildlife, such as a broadening of exemptions under newly created Injurious I and II categories for listing wildlife. Legislation may be introduced in this session of Congress but the Service has not received any updates on the status of an updated bill that could be introduced into this Congressional session.

F. Categorical Exclusion (CatEx) under National Environmental Protection Act (NEPA) for the injurious wildlife listing under the Lacey Act

The CatEx will allow the Service to list species more efficiently by allowing the Service to expedite the environmental review process for proposals that typically do not require more resource-intensive Environmental Assessments (EAs) or Environmental Impact Statements (EISs). Branch of Aquatic Invasive Species (BAIS) published the proposed CatEx in the Federal Register in July 2013, reviewed and addressed the more than 5,000 public comments, and composed a draft final notice. The Service, coordinating through the Department, has received approval from the Council on Environmental Quality for the new categorical exclusion under NEPA for future injurious wildlife listings. The Service will publish a final notice in the *Federal Register* that the new categorical exclusion takes effect upon publication. Target to the *Federal Register* is by late October.

G. Multi-species proposed rule

BAIS has prepared a multi-species proposed rule to list ten freshwater fish (Amur sleeper, crucian carp, Eurasian minnow, European perch, Nile perch, Prussian carp, roach, stone moroko, wels catfish, and zander) and one crayfish (yabby) as injurious species. All species have a high climate match in parts of the United States, a history of invasiveness outside their native ranges, and, with one exception (zander in Spiritwood Lake, North Dakota), are not currently found in US ecosystems. The Ecological Risk Screening Summaries help to obtain climate-matching and other information. This is the first rule the Service is proposing since it has signed a Memorandum of Understanding with Pet Industry Joint Advisory Council (PIJAC) and Association of Fish and Wildlife Agencies (AFWA) in 2013, which outlines an agreement regarding the voluntary refrain from importation of species not yet in trade in the United States. The draft rule,

environmental assessment, and economic analysis are under review with the Service. The USFWS anticipates being able to publish a proposed rule for public comment and peer review by end of October 2015. Publication of a final rule is expected in 2016.

H. Large Constrictor Snake final rule litigation
In 2010, Branch of Aquatic Invasive Species (BAIS) published a proposed rule to list nine species of large constrictor snakes as injurious species. In 2012, four species were listed (Burmese and two other pythons, plus the yellow anaconda). In 2014, the Service reopened the comment period on the five remaining constrictor snakes (reticulated python, green anaconda, Beni anaconda, DeSchauensee's anaconda, and boa constrictor). In March, the Service published the final rule to list the reticulated python and the three anacondas, but withdrew the proposal to list the boa. As soon as the second final rule published, the plaintiffs, the United States Association of Reptile Keepers (USARK), for the lawsuit against the first final rule filed an amendment to add the four newly listed species to their challenge. On May 12, 2015, the US District Court for the District of Columbia (Judge Randolph Moss) granted USARK's motion for a preliminary injunction finding that the plaintiffs were likely to prevail on the merits of the case that the Service lacks authority to prohibit interstate transport of species listed as injurious wildlife under Title 18 of the Lacey Act. Department of Justice's decision to appeal is pending. In the meantime, specific members of USARK may transport two species of large constrictors listed in 2015, the reticulated python and green anaconda, across state lines in the Continental US except into Florida and Texas.

The complete text of this presentation is included at the end of the report.

Practical Approaches to implementing Aquaculture Biosecurity Programs and Meeting OIE Standards and Regulations

David Scarfe, Aquatic Veterinary Associates

Facing progressively increasing risks and impacts of disease on aquaculture productions in all countries, over more than a decade at numerous conferences, symposia and workshops, a large number of individuals have discussed and debated what procedure that should be incorporated into biosecurity programs. A key feature has been determining which procedures will meet International Standards (i.e. processes and procedures in World Organisation for Animal Health (OIE) Codes and Manuals) and National regulations. In balancing these requirements with practical approaches that aquaculture producers can implement, and are effective and useful for all stakeholders around the world (from producers to governmental regulators), the following were recognized as priorities for all biosecurity programs:

a) be practical and economic;

b) focus only on infectious and contagious diseases;
c) include procedures that address disease prevention, control and eradication in definable epidemiological units;
d) be based on well-established, sound scientific-justifiable veterinary procedures;
e) incorporate internationally accepted standards in the OIE Code and Manual; and,
f) involve public-private partnerships and collaboration between producers, aquatic veterinarians and paraveterinary professionals, and governmental regulators.

In focusing on these principles, the International Aquatic Veterinary Biosecurity Consortium (IAVBC) has tested the procedures in Figure 1 with stakeholders at several conferences and workshops in Norway, South Africa, Chile, and elsewhere, that involve an integrated approach for developing, implementing, auditing and certifying effective aquaculture biosecurity program. At the core of a biosecurity program is defining an epidemiologic unit (EpiUnit), a well-defined geographical population of animals, on which all biosecurity steps or processes will be implemented.

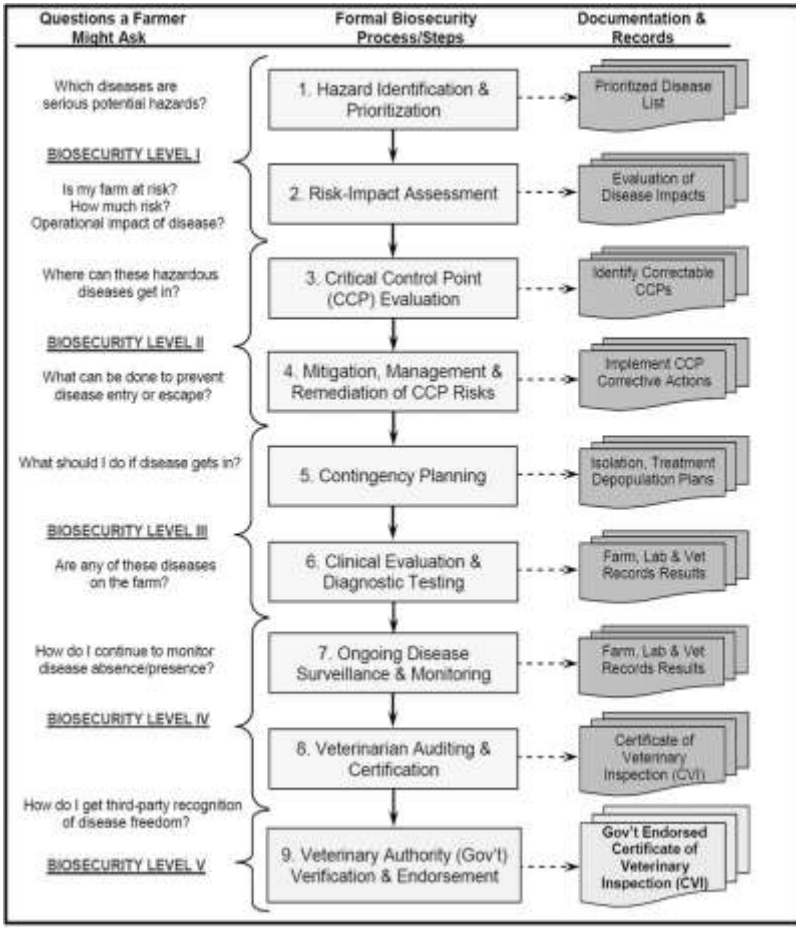


Figure 1. Integrated steps for developing, implementing, auditing and certifying an effective biosecurity program intended to prevent, control and possibly eradicate disease in any epidemiological unit (a defined population of animals, separated to some degree from other populations, in which infectious and contagious diseases can be easily transmitted – e.g. a tank/pond, farm, state/province, zone, region or country).

The complete presentation is available on the Committee web page.

Aquaculture/ Aquatic Animal Health Program

Kathleen Hartman, United States Department of Agriculture, Animal and Plant Inspection Service, Veterinary Services (USDA-APHIS-VS)

Dr. Hartman provided the update on the activities of the USDA-APHIS-VS as well as information on the Commercial Aquatic Health Program Standards.

As part of the update, Hartman spoke of the five-year business plan that is updated yearly which can be viewed at:

https://www.aphis.usda.gov/animal_health/downloads/vsbp/5_year_business_plan_aquaculture.pdf. The highlights of the activities included the renewal of the memorandum of understandings (MOUs) with United States Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA). The agency commitment to the National Aquatic Animal Health Program (NAAPH) has been reinvigorated with the signing of the MOUs. The agency has completed Phase 1 of integrating aquatics into the National Animal Health Laboratory Network (NAHLN).

Dr. Hartman provided updates of the efforts of Import/Export Division who have completed the pilot of the Veterinary Export Health Certificate System (VEHCS). This includes an almost completely electronic certificate of export of ornamental fish to Canada and there are ongoing discussions for completely electronic certificates. She reported that the Surveillance Collaboration Services – Core One database structure for aquatic animal entries has been completed. Also completed is the Comprehensive and Integrated Surveillance (CIS) plan for aquaculture and elements of plan have been incorporated into the Commercial *Aquaculture* Health Program Standards (CAHPS). Sample collection for the multi-agency Infectious Salmon Anemia Virus surveillance in the Pacific Northwest and all tests are negative. She also reported on the efforts of Dr. Lori Gustafson (Center for Epidemiology and Animal Health) and Dr. Christa Speekman (Import/Export) who worked with the East Coast Shellfish Management to try to integrate shellfish into CAHPS. She also reported on the collaboration with University of Arkansas-Pine Bluff (UAPB) on aquaculture-agriculture economics project. A graduate student under Dr. Carole Engle conducted a bait/sport fish survey to determine the economic burden of these bait/sport fish producers from 13 states for interstate commerce. The results of this will be published in December and will be reported at Aquaculture America 2016. There are thoughts of utilizing a similar type survey for salmon and trout producers. She then provided details on CAHPS including:

a. The concept of CAHPS (i.e. that is model framework for aquatic animal health; it implements portions of NAAPH; it is science based; it is needs based (voluntary); and is empowered and strengthen by partnerships with State, Tribal and Federal entities).
b. These standards will assist in:
    1. The culture and production of healthy animals for sale and trade;
    2. Demonstrating the health status of animal to minimize obstacles for animal movement which;
    3. Increase trade for less production costs.
c. Principles of CAHPS which are:
    1. Aquatic animal health team – which has the knowledge and skills and varies in composition depending on the needs of the individual producer; assists in the development of a site-specific health plan which is composed of 1. Communication plan, 2. Risk evaluation and Management plan; 3. Surveillance Plan, 4. Disease Management Plan and 5. Response plan

2. Risk evaluation
    i. Identification and characterization
    ii. Management – mitigation
3. Surveillance
    i. Defining the purpose and surveillance boundaries – i.e. establishing disease or pathogen status for establishment, compartment or zone
    ii. Types and strategies – it is observational, pathogen specific and risk based
4. Investigation and Reporting which includes disease investigation based on the mortality/morbidity threshold set by the aquatic animal health team and including the reporting to appropriate authorities.
5. Response – what to do when things do not go according to plan and to close the gaps
    i. Contingency planning
    ii. Continuity of business
    iii. Pathogen and impact of pathogen – determine if need to treat, vaccinate or depopulate
    iv. Debriefing

Hartman also provided the reasoning behind CAHPS as well as the benefits of producers/stakeholders implementing the standards.

The complete presentation is available on the Committee web page.

Aquatic Pathogen Testing in NAHLN Laboratories Update

Christina Loiacono, United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS)

Dr. Loiacono provided a brief review of the history of the National Animal Health Laboratory Network (NAHLN), its purpose and the partnership role between USDA (APHIS and National Institute of Food and Agriculture (NIFA), the American Association of Veterinary Laboratory Diagnosticians (AAVLD), and the NAHLN laboratories. A review of the founding principles and features of NAHLN including quality standards, personnel competency, standardized protocols and equipment, biosafety/biosecurity considerations, security of electronic communications and reporting, and assessment of preparedness through scenario testing were covered. Several slides were shown which presented the state of NAHLN laboratories. The original 12 NAHLN laboratories were presented then compared to the current expanded number of NAHLN laboratories covering swine, avian, bovine and aquatic pathogens. Laboratories approved to test for infectious salmon anemia (ISAV) and viral hemorrhagic septicemia virus (VHSV) under the NAHLN were shown.

There was discussion of the NAHLN including a new structure covered in a 2012 concept paper put out by the NAHLN Coordinating Council. Several major changes were proposed including laboratory designations (level 1-3, affiliate, and specialty), reassessments (annual reassessment for funding distribution and number of laboratories per level/every three years' full network

assessment to update capacity and evaluate use of matrix). It is anticipated that implementation will occur in 2016 with checklist process with funding adjustments to be made in 2016 funding cycles. Under the NAHLN restructure, laboratory designations will have the following:

Level 1	Level 2	Level 3	Affiliate Lab	Private Lab	Reference
Large test capacity	Similar Level 1 reduced capacity	Surveillance testing	Publically funded	Specific, needed capability	Oversight
Fully accredited	Provisionally accredited		Occasion. perform NALHN rel. testing	Rel. w/ NAHLN lab & SAHO	Training
BSL3 facilities	No BSL requirements			Written, approved plan to avoid COI	SOP's
LIMS/messaging					Reference material
Trainers					Proficiency testing
Test dev & validation					

Under the new structure plan, there will be three phases: 1) NAHLN Methods Technical Working Group (MTWG) will review and approve the standard operation procedures (SOPs) for ISAV and VHSV testing. Existing NAHLN laboratories will be invited to participate in Phase 1 by including ISA and VHS in their NAHLN testing capabilities, taking part in proficiency testing and reporting results as indicated in the SOPs. 2) The APHIS Aquatic Animal Health Program along with NAHLN will invite other Federal and State non-NAHLN laboratories (e.g., US FWS Fish Health Laboratories) and private aquatic animal health testing laboratories to consider applying for NAHLN approval and test for the approved aquatic diseases using standardized requirements. 3) Aquatic animal pathogens identified in the National Aquatic Animal Health Plan and the recently developed Commercial Aquaculture Program Standards will be considered for addition to the NAHLN disease testing list. The NAHLN Coordinating Council will evaluate and approve these prior to being added to the aquatic animal pathogen group within the NAHLN scope. The NAHLN MTWG will review the associated SOPs.

The NAHLN laboratory qualification checklist for membership of a veterinary diagnostic laboratory will require an annual renewal along with an agreement to meet the requirements of the NAHLN including quality management, foreign animal disease (FAD) assays and investigations, sample handling, communication and reporting, and administrative and financial requirements. The applicant will have to request any changes to the disease/agent approvals and obtain signatures needed from the state (State

Animal Health Official (SAHO), etc.) and federal representative (DD or AD). A list of current NAHLN laboratories was presented along with their specific request for aquatic pathogens (Infectious Salmon Anemia Virus (ISAV) and Viral Hemorrhagic Septicemia Virus (VHSV) to be added to their disease programs.

A progress update was provided on each phase. Under Phase I, NAHLN Methods Technical Working Group and other aquatic subject matter experts reviewed and approved SOP's for ISAV and VHSV testing. Existing NAHLN laboratories were invited to participate in Phase I including ISA and VHS in their NAHLN testing capabilities. Proficiency tests have been provided which included working with the NAHLN for PT registration through the NAHLN portal along with identifying the need for laboratories to have permits for shipping PT virus. Data will be presented to the NAHLN Coordinating Council. Results were provided from the PT testing. Eight laboratories took part in ISAV PT (RT-real time PCR) with all passing successfully. Eight laboratories took part in the VHSV PT (VI) with five successfully passing and three working towards becoming PT'd. Eleven laboratories took part in the VHSV PT (RT-real time PCR) with eight successfully passing and three working towards becoming PT'd.

Under Phase II, there is pending implementation of the NAHLN restructure including the incorporation of Federal and state non-NAHLN laboratories (e.g. USFWS Fish Health Laboratories) and private aquatic animal health testing laboratories. Phase III will include more aquatic pathogen assays. The future of aquatic pathogen testing in NAHLN laboratories will include the expansion of membership including private laboratories (2016) as well as quality management training and more aquatic pathogen assays.

The complete text of this presentation is included at the end of the report.

Committee Business:

In response to the presentation on Center for Animal Health and Productivity (CAHP), a motion from the floor for a resolution to help in the implementation of this program was made by Dr. David Scarfe and was seconded by Dr. Anne Lichtenwalner. After discussion, the motion passed unanimously.

The Committee also discussed the issue of which pathogens might be the added to the list of current pathogens to be included in NAHLN testing besides Infectious Salmon Anemia and Viral Hemorrhagic Septicemia. This included the process(s)/criteria by which these pathogens may be selected. Committee members are encouraged to provide feedback to Drs. Loiacono or Hartman or to the chair/co-chair.

REPORT OF THE COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY

Chair: Donna Gatewood, IA
Vice Chair: Joe Huff, CO

Gary Anderson, KS; Chris Ashworth, AR; Randall Berrier, CO; Barbara Determan, IA; Larry Elsken, IA; James England, ID; James Evermann, WA; William Fales, MO; Robert Fulton, OK; Larry Granger, CO; Keith Haffer, SD; Percy Hawkes, UT; Rick Hill, IA; Christine Hoang, IL; Elizabeth Lautner, IA; John Lawrence, ME; Randall Levings, IA; David Marshall, NC; Kent McClure, DC; Don Myers, KS; Julia Ridpath, IA; Kathryn Simmons, DC; Bob Tully, KS; Brad Williams, TX; Mary Anne Williams, TX; Ellen Mary Wilson, NM; Bereket Zekarias, KS.

The Committee met on October 27, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 1:00 to 5:00 p.m. There were nine members and 15 guests present. After attendees introduced themselves, the final APHIS responses to resolutions from 2014 were shared.

Presentations and Reports

What's New in the Serum Industry!

Rosemary Versteegen, International Serum Industry Association

International Serum Industry Association (ISIA) has been working hard to upgrade the business practices of the serum industry. This presentation reviewed the major programs being undertaken by the International Serum Industry Association in support of their customers.

The ISIA mission is focused on ethics, safety and safe use of serum and animal derived materials and education of customers and stakeholders. The key programs at this time include 1) Standardization of quality control (QC) testing methods and test reporting 2) The current state of the ISIA traceability program and recent upgrades to the program 3) The development of testing methods to determine the geographic origin of serum and the tantalizing results obtained to date 4) An update on the progress towards a detailed fact based document being prepared by a consortium of customers, manufacturers, irradiator facilities, and key scientists which will outline the requirements for validated gamma irradiation and results obtained.

Dual Jurisdiction Center for Veterinary Biologics (CVB) and Centers for Disease Control and Prevention (CDC) of Facilities Manufacturing Products Using Select Agents

Kent McClure, General Counsel for the Animal Health Institute

Select Agent (SA) use in the US is overseen by APHIS and the CDC. APHIS deals with animal agents; CDC deals with human agents, and there are overlap agents (see lists at www.selectagents.gov).

The overlap list includes both animal and human pathogens; both the CDC and APHIS have jurisdiction. Some strains may be excluded (e.g., vaccine strains). The list is currently under review and some organisms have been

proposed for removal from the list. There are regulatory exclusions in the regulations, and you can make requests for exemptions (attenuated strains).

Problems are associated with the overlapping jurisdiction. If a facility works with both human and animal SAs, both agencies have oversight. This presents the opportunity for conflicting requirements. For example, CDC say might require a sink in a particular room, and then an APHIS inspector says it has to come out. CDC fairly uniformly wants positive pressure in the rooms being used, and APHIS wants negative pressure. These conflicting requirements create difficulties for companies working under dual jurisdiction.

In 2012, CDC and APHIS entered into a joint memorandum of understanding to try to harmonize their approaches. Subsequently, Government Accountability Office (GAO) did a report in 2013 and reviewed the situation, looked at multiple entities and determined that many entities (university laboratories, commercial laboratories, etc.) were being inspected by multiple government agencies. It resulted in recommendations, including joint inspections with one set of findings. They also recommended that one agency should accept another agency's reports.

The situation could still be improved. A resolution will be presented during the business session of this Committee meeting.

Center for Veterinary Biologics (CVB) Activities and Initiatives

Steve Karli, CVB Inspection and Compliance

Larry Ludemann, CVB, Policy, Evaluation, and Licensing (PEL) Section Leader for Bacteriology

Budget: Operating under a continuing resolution. President's budget had a slight increase for 2016. Difficulties in filling vacancies due to budget constraints.

CVB has 91 total full time equivalents (FTEs) in the program positions, 38 positions in CVB that support National Centers for Animal Health (NCAH). Safety and Security, and Information Management are shared services.

There are 17 vacant program positions. Some positions have been filled, but others remain vacant. There are recruitment efforts underway for several positions including the PEL Director position.

Highly pathogenic avian influenza (HPAI) was a high priority, even for CVB this year. A number of personnel from CVB were deployed to the field for HPAI activities. In addition, other positions were virtually deployed, although they were able to remain at their duty stations.

Business Process Improvement (BPI) Plans: CVB has been involved in these projects for several years. Electronic submissions processes are moving forward and right now about 72% of submissions are coming in electronically (except for Outlines and Labels). Currently forming an internal working group to expand to Outlines and Labels.

Another project is notification of market release (part of the serial release process). Most were previously sent by overnight carrier, others by regular mail. Now there is an electronic notification for market release, which has

resulted in a significant time and money savings for the industry (up to $100K/day in cost savings).

Single tier labeling was also a BPI project and is in the implementation phase (see below).

Fourth project was for preparing the inspection reports. Historically, there were delays in getting the reports back to the firms. Now they're using a streamlined method of preparing the reports (46% increased efficiency). An analysis determined that the new process continues to indicate the same types of violations, so it appears that the reports are still effectively capturing the report findings.

Other activities: antigen overages, proposed rule on mandatory adverse event reporting (out for public comment), APHIS's plan to move all licensing systems to Certification, Accreditation, Registration, Permitting, and Other Licensing (CARPOL)—CVB is included in this initiative.

Single Tier Labeling: previously a 4-tier system in place, which was a significant resource drain on the firms as well as on CVB in evaluating data to qualify for the four different tiers. This is intended for all vaccines, bacterins, but not diagnostic test kits, allergenic extracts, antibody products, or autogenous. They're working to update 9CFR part 112.

The website will have generic information about efficacy and safety studies and there will be a user guide for the end user.

Final rule effective on September 4 and there will be a 4-year implementation process. Extenuating circumstances will be considered.

The first phase will be aquaculture, feline, immunomodulators this fall. Other species will fall on subsequent schedules.

In vitro assay for rabies to replace the NIH test: they're working with monoclonal antibodies (MAbs) from American Type Culture Collection (ATCC), also working on developing in house MAbs.

Anti-Rabies Monoclonal Antibody Post-Exposure Prophylaxis (PEP) for Veterinary Use

Eric Tsao, Synermore Biologics Co., Ltd.

We propose to use SYN023, a mixture of two anti-rabies monoclonal antibodies, for the post-exposure prophylaxis of rabies virus infection in unvaccinated domestic animals. The two monoclonal antibodies bind to distinct and non-overlapping antigenic sites on the rabies virus glycoprotein. SYN023 has been shown to neutralize more than 25 contemporary wildlife rabies isolates. Protection against virus challenges was demonstrated in three animal models. The development of the product as well as results from in vitro and in vivo studies will be presented.

Table 1. Broad spectrum neutralization against the North American strains

Rabies Virus Isolate	CTB011	CTB012	Cocktail	HRIG
E Pipistrelle	+	+	++++	++++
Eptesicus Fuscus	+	+++	++++	+
Tadarida	+/-	+	++	++++
Lasiurus Borealis	+	++++	+++	+
Lasiurus Cinerus	+	++++	++	++++
SW Eptesicus Fuscus	+/-	+++	++++	++
NC Skunk	++++	+++	++++	+
SC Skunk	++	+	++++	+
Texas Grey Fox	+	++++	++	+
Florida Raccoon	+/-	++++	+++	+
CVS-11	++++	+	++++	+

Table 2. Broad spectrum neutralization against the Chinese Strains

Rabies Virus Isolate	CTB011	CTB012	Cocktail	HRIG
HN10, Human	+++	++	+++	+++
HuBei, Dog	++	++	+++	+++
ZJ-QZ, Dog	++	++	+++	+++
SX-HZ-6, Dog	+	+	+++	+++
BD06, Dog	+	+	+++	+++
JX13-189, Ferret Badger	+	+	+++	+++
JX08-45, Ferret Badger	+	+	++	+++
JX13-235, Ferret Badger	+++	++	++	+++
JX12-234, Ferret Badger	+++	+++	+++	+++
JX09-17, Ferret Badger	+++	+	+++	+++
JX13-417, Ferret Badger	+	++	+++	+++
JX10-37, Ferret Badger	+++	++	++	++
JX13-228, Ferret Badger	+++	++	+++	+++
ZJ12-03, Ferret Badger	+++	+++	+++	+++
ZJ13-431, Ferret Badger	+++	+++	+++	++

Figure 1. PEP in Syrian Hamsters challenged with US Tadarida bat strain

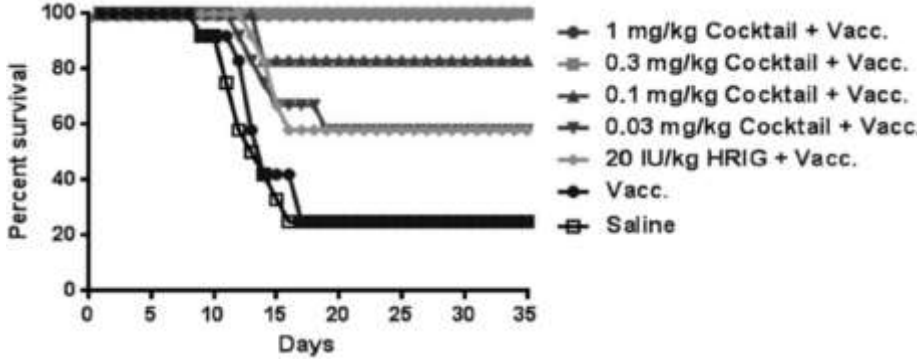
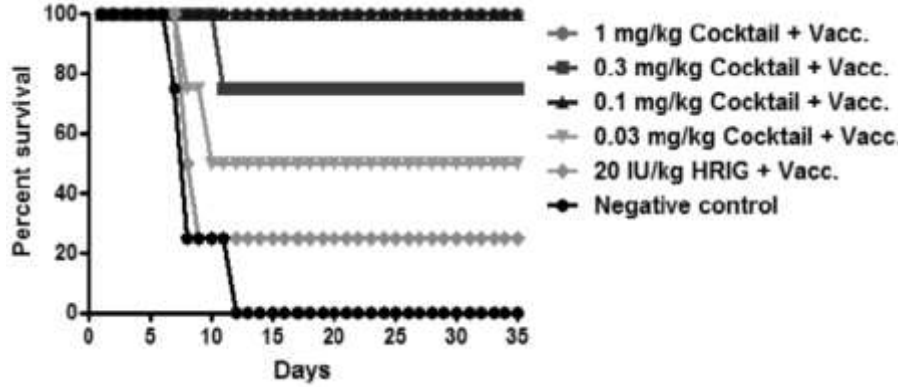


Figure 2. PEP in Beagle dogs challenged with Chinese BD06 dog strain



Panel on Vaccines for Use in Wildlife

Michael Miller, Colorado Division of Parks and Wildlife

Dr. Michael Miller opened our session on vaccines for use in wildlife. The broad needs and applications for wildlife vaccines include health and human safety, agricultural commodity protection, conservation, and national security. Dr. Miller emphasized the tremendous value in having more readily-available “hands-off” disease prevention and control tools for wildlife medicine and health management. (Specific examples of such tools in plague, Lyme disease, and rabies control were the topics of the presentations that followed.) Despite a growing need, wildlife vaccine development has lagged. This appears to be largely because such vaccines are “niche” products, with use (and thus markets) restricted to state and federal agencies and further limited by available funding and logistics. It follows that the cost-return imbalance for developing wildlife vaccines to the same regulatory standards as more traditional commercial vaccine products makes the former largely unattractive for private manufacturers. More flexible standards and expectations for efficacy

and delivery form, perhaps modeled after those used in conditional licensing of conventional products, could expedite progress toward the field evaluation and use of wildlife vaccines without compromising established purity and safety standards. Dr. Miller expressed hope that this session would bring more attention to this important aspect of biologics development & regulation, and encouraged further consideration of clear and achievable regulatory paths for wildlife products.

Sylvatic Plague Vaccine in Prairie Dogs

Tonie Rocke, National Wildlife Health Center, US Geological Survey

Sylvatic plague, caused by the bacterium *Yersinia pestis* is a zoonotic disease that causes frequent outbreaks in prairie dogs (*Cynomys* spp.) and other wild rodents. Scientists at United States Geological Survey (USGS) and University of Wisconsin (UW) developed a virally-vectored sylvatic plague vaccine (SPV), deliverable via oral baits to wild prairie dogs that has been shown to protect animals from plague in laboratory studies. Field safety and efficacy studies to assess the use of SPV as a preemptive management tool against plague began in 2012 and will continue through 2016 with the cooperation of numerous state and federal partners. If successful, these resource agencies are interested in using SPV to decrease the occurrence of plague epizootics in selected prairie dog populations as a means to stabilize grassland ecosystems, enhance black-footed ferret recovery, and achieve additional economic, environmental, and public health benefits. Regulatory challenges in developing baits for use in wildlife, testing the product in the field, and finding manufacturing partners were discussed.

Lyme Disease Vaccine for White-footed Mice

Linden Hu, Tufts University

The incidence and geographic distribution of Lyme disease in the US has increased steadily since its first description in 1977. Efforts to stem the spread of the disease through controlling the population of its tick vector and/or the mouse reservoirs of the disease have met with only limited success. The only approved human vaccine to protect against Lyme disease was removed from the market by its manufacturer further highlighting the need for new approaches to controlling the disease.

Tufts has developed an orally-available vaccine targeted towards the mouse and tick reservoirs of the disease. This vaccine is patterned after the successful Raboral vaccine for rabies and utilizes a vaccinia virus vector. They have shown that vaccination of mice with the vaccinia virus encoding the outer surface protein A of *B. burgdorferi* protects them against infection with *B. burgdorferi* by feeding ticks as well as protects uninfected ticks from acquiring infection from vaccinated but infected mice giving the vaccine two potential mechanisms for decreasing environmental persistence of *B. burgdorferi*. They have performed testing in simulated environments but have had a long path to approval for field testing of the vaccine. Important issues that will need to be resolved during a field trial include optimization of the vaccine and doses to

match animal feeding behaviors, accounting for the effects of prior infections with other agents and the effects of the release on the environment and non-target animals.

Overview of 35 Years of Use of an Oral Rabies Vaccine for Wildlife

Joanne Maki, Global Commercial Development, Merial, a Sanofi Company

RABORAL V-RG®, was first used in Europe during the 1980s to control and eliminate rabies in red fox populations in France, Belgium and Luxembourg. This year marks the 25th anniversary of RABORAL V-RG use in the United States for wildlife rabies control and prevention. The US regulatory path required of this first recombinant vaccine for use in three different rabies outbreaks in raccoon, coyotes, and foxes required a multi-disciplinary collaborative effort between researchers, manufacturer, field program managers and regulatory agencies. After 25 years of experience and data gathering, it is our opinion that wildlife vaccine efficacy is best demonstrated by scientific review of cumulative field data demonstrating uptake and effectiveness of the bait and vaccine in the target species. Product performance on a population level under circumstances which more accurately reflect intended use of the product have benefits that outweigh traditional individual animal cage challenge studies. The current regulatory path for approving veterinary vaccines does not clearly define standards for regulatory consideration of field data for wildlife vaccines which is cumulative over time and does not fit existing regulatory approval pathways. Merial is committed to supporting the evolving US wildlife ORV program as field parameters shift to eliminating raccoon and skunk rabies variants. To meet current challenges and best prepare for other emerging zoonoses, the animal health community must identify suitable methodology and standards for utilizing field data towards product licensing and/or adding species label claims to wildlife vaccines. The unique market niche for the majority of wildlife vaccines, (i.e., products used exclusively by government programs for public health risk mitigation) should be reviewed since unreasonable barriers to adding species claims have repercussions on multi-species disease control programs managed by state and federal agencies. The growing role of wildlife diseases in public health is well accepted globally. Adding label claims to wildlife vaccines used by government agencies include a growing body of products targeting a variety of diseases of public health importance. For these reasons, wildlife vaccines used for public health risk mitigation should have unique regulatory considerations. Thus, finding a rational consensus on how to best assess and regulate these products will broadly benefit the cost and efficiency of wildlife disease control efforts.

Novel Bait Matrices for Oral Vaccines

Steve Wisdom, Foodsource Lures

Over the past ten years, FoodSource Biotech has been developing Incortrix, a patented material that is for the oral delivery of active ingredients to animals in domestic, commercial and wild environments. Using Incortrix as a

foundation, FoodSource Biotech creates custom animal drug delivery solutions in solid, liquid, granular, paste, and gel forms. It also provides versatility in incorporating flavors, colors, scents and texture agents creating an end product capable of enticing the target animal with multiple sensory attractions. Incortrix is unique in that it offers a profound capability to incorporate active ingredients utilizing a low temperature process, which eliminates concern for degradation of live organisms or fragile compounds. Every product we develop is tailored to meet the needs of a specific customer and targeted animal. The Incortrix material is made with food ingredients which are biodegradable, environmentally friendly, and USDA, Food and Drug Administration (FDA), Environmental Protection Agency (EPA) friendly.

Our mission is to collaborate with manufacturers, universities, and government agencies to create innovative, environmentally friendly products for delivering beneficial and protective ingredients to animals in domestic, commercial and wild settings. Wildlife vaccine research, veterinary public health, companion animal, domestic aquatics, and commercial aquaculture are just some of the industries we are interested in serving. We are focusing on providing solutions for the oral delivery of vaccines, therapeutics, probiotics, parasiticides, nutritionals, and contraceptives.

Steven Wisdom @ steve@fsbiotech.com or 205-335-8778, website FoodSourceCorp.com

Committee Business:

Resolution: Select Agent Registration

The Resolution was presented by Dr. Kent McClure. This resolution asks APHIS to implement the findings of the Government Accountability Office (GAO) report of 2013 titled: Overlap and Duplication: Federal Inspections of Entities Registered with the Select Agent Program. Specifically, that APHIS and Centers for Disease Control and Prevention (CDC) accept each other's inspection results rather than conducting independent inspections. Further, that where Select Agent Registrants are already regulated and inspected by APHIS that the lead agency be APHIS.

A motion was made to accept as written. The resolution passed with a vote of nine to zero.

Resolution: Categorical Exclusions

The Resolution was presented by Dr. Kent McClure. This resolution urges APHIS to expeditiously respond to the Council on Environmental Quality request for information regarding APHIS' implementation of the National Environmental Policy Act, and to propose and finalize a rule to amend 7 CFR 21 § 372.5(c) to allow APHIS the ability to grant categorical exclusions for veterinary biologic products in appropriate cases.

It was noted that the original text referred to the "National Environmental Protection Act" rather than "National Environmental Policy Act". A motion was made to accept with the correction. The resolution passed with a vote of eight

to zero. Both resolutions were submitted to the Committee on Nominations and Resolutions.

There was no additional business. The Committee adjourned at approximately 5:00 p.m.

REPORT OF THE COMMITTEE ON BLUETONGUE AND RELATED ORBIVIRUSES

Chair: Paul Gibbs, FL
Vice Chair: D. Scott McVey, KS

Richard Breitmeyer, CA; Charles Brown II, WI; Stan Bruntz, CO; Alfonso Clavijo, KS; Matt Cochran, TX; Joseph Corn, GA; Edward Dubovi, NY; William Edmiston, TX; Anita Edmondson, CA; James Evermann, WA; Robert Fulton, OK; Donna Gatewood, IA; Robert Gerlach, AK; Chester Gipson, MD; Tony Good, OH; William Hartmann, MN; Percy Hawkes, UT; Richard Hesse, KS; Linda Hickam, MO; Thomas Holt, FL; Dennis Hughes, NE; Regina Jensen, DE; Bruce King, UT; Diane Kitchen, FL; Todd Landt, IA; Randall Levings, IA; Coleman Locke, TX; Travis Lowe, MN; N James Maclachlan, CA; David Marshall, NC; Daniel Mead, GA; Shelley Mehlenbacher, VT; Myrna Miller, WY; Eric Mohlman, NE; Igor Morozov, KS; Cheryl Nelson, KY; Dustin Oedekoven, SD; Eileen Ostlund, IA; William Parker, GA; William Pittenger, MO; Justin Roach, OK; Jonathan Roberts, LA; Shawn Schafer, OH; Charly Seale, TX; Laurie Seale, WI; Susan Tellez, TX; Brad Thurston, IN; Curt Waldvogel, OH; Mark Walter, PA; Skip West, OK; William Wilson, KS.

The Committee met on October 26, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 1:00 to 5:50 p.m. There were 20 members and 21 guests present.

Drs. Paul Gibbs and Scott McVey as committee chairs welcomed members and guests.

The first order of business was a discussion of the 2014 Resolution on surveillance for bluetongue. Brian McClusky and David Dargatz outlined the APHIS response to the 2014 Committee Resolution. Dr. McClusky is the Executive Director – Science, Technology and Analysis Services, APHIS, Veterinary Services. Dr. Dargatz is a Veterinary Epidemiologist at the Center for Epidemiology and Animal Health, APHIS, Veterinary Services.

APHIS Draft Plan Outline

1. Available Information
    - Large serosurveys using slaughter samples for brucellosis
        - Annual to biannual from 1977-2002
            - Determined low (always <2.0% positive samples with 95% CI) v medium/seasonal (>2.0% positive samples w/ 95% CI in some studies) incidence States- delineations that are still used
                - Low- ME, NH, VT, MA, RI, CT, NY, NJ, DE, MD, WV, PA, OH, MI, IN, WI, MN, ND, AK, HI, and Western WA
                - Medium/ seasonal- CO, ID, IL, IA, KS, KY, MO, NE, NM, NC, OK, OR, SD, TN, UT, VA, WA, and WY
            - Multiple subsequent small scale studies
                - ND/SD/NE

- IL/IN
- CA

- Gap Analysis Workshop 2013
  - Identified knowledge gaps
    - Redefine regional virus zones/ distribution

2. Proposing pilot study to begin to address 2014 USAHA combined resolution 6 and 11
   - Reassess historical regionalization/boundaries
     - Sentinel and vector surveillance
       - Sentinel- Start with herds in four states (MI, MN, WI, NY)
         - Low incidence and border medium/seasonal incidence states
         - Each herd 10-20 animals
           - Choose based on location and producer willingness
             - Ideal- all counties w/ cattle in each state represented (299)
           - Animals 6-12 mo at sampling (Reduce maternal antibody interference)
           - Bled once after vector season
           - Samples analyzed w/ BTV cELISA at state NAHLN lab
         - State considered positive if >2.0% of samples (+) with 95% CI
       - Vector surveillance
         - Centers for Disease Control blacklight traps
         - One trapping period (48h?) per operation per vector season
         - Trap at each establishment with sentinel herd
         - Samples analyzed in Manhattan, KS for vector presence/absence
         - +/- Pooled RT-PCR on catch samples for presence of Bluetongue Virus (BTV)
           - Questionable value
           - Complicates collection/shipping procedures
           - May not do polymerase chain reaction (PCR)

3. Other
   - Looking to be able to repeat this study for at least 3 years, if not longer

Time-Specific Paper

Bluetongue and Related Orbiviruses: A Global Update was presented by Chris Oura, The School of Veterinary Medicine, Faculty of Medical Sciences, University of the West Indies. The summary is included following this report.

Presentations and Reports

Bluetongue Virus (BTV) and Epizootic Hemorrhagic Disease Virus (EHDV) Isolations/PCR Positives - Calendar year 2014

Eileen Ostlund, USDA-APHIS-VS, Science, Technology and Analysis (STAS) National Veterinary Services Laboratories

Bluetongue virus or ribonucleic acid (RNA) was detected in 11 samples submitted or collected during calendar year 2014. The positive bluetongue virus isolation (VI) and polymerase chain reaction (PCR) test results from submissions to the National Veterinary Services Laboratories (NVSL) in 2014 are listed in Table 1.

Table 1. BT virus isolation (VI) / PCR positives, calendar year 2014

State	*No.*	*Species*	*PCR*	*VI*	
CO	1	Goat	BTV-11	BTV-11	
FL	1	White-tailed deer	BTV-18	BTV-18	SCWDS submission for typing; confirmed NVSL VI *(NVSL testing March 2015, collected October 2014)*
ID	1	Alpaca	BTV Positive	Not done	High Ct; insufficient virus for typing or VI
ID/WI	1	Cattle	BTV-10	BTV-10	In quarantine in WI, recently shipped from ID
MO	1	Cattle	BTV Positive	Not done	High Ct; insufficient virus for typing or VI
NE	2	White-tailed Deer	BTV-17	BTV-17	BTV-17 isolated from 1 deer
NE	1	Bighorn sheep	BTV-10	BTV-10	

State	*No.*	*Species*	*PCR*	*VI*	
NJ	3	White-tailed Deer	BTV-17	BTV-17	2 were SCWDS positive cases submitted for type confirmation

During calendar year 2014, six samples tested positive for EHDV by virus isolation and/or PCR. The positive EHDV isolation and PCR test results from submissions to NVSL in 2014 are listed in Table 2.

Table 2. EHDV isolation (VI)/ PCR positives, calendar year 2014

State	*No.*	*Species*	*PCR*	*VI*	
FL	1	Deer	EHDV-2	EHDV-2	
FL	1	White-tailed Deer	EHDV-6	EHDV-6	
NE	1	Bison	EHDV	Not done	Suspect Ct; insufficient virus for typing or VI
NC	2	White-tailed Deer	EHDV-6		Rollins Laboratory isolates submitted for typing
TX	1	Eld's Deer	EHDV-2	EHDV-2	

Part-year 2015 data for NVSL orbivirus identifications is shown in Tables 3 and 4. As of October 23, BTV has been identified in 38 samples from 8 states and EHDV has been identified in 13 samples from 5 states.

Table 3. Bluetongue virus (BTV) isolations/PCR positives during Calendar year 2015
(January 1 through October 23)

STATE	*NO.*	*SPECIES*	*PCR*	*VI*	
AZ	1	Bighorn sheep	BTV-10	Neg	
CA	5	Sheep	BTV-10	Pending	CAHFS-UC Davis BTV-pos PCR submission for typing
CA	1	Mule deer	BTV-17	Pending	WADDL BTV-pos PCR submission for typing
CA	2	Sheep	BTV-17	Not done	CAHFS-UC Davis BTV-pos PCR submission for typing; insuff for VI
FL	1	White-tailed deer	BTV-6	Pending	Also positive EHDV-6
FL	1	White-tailed deer	BTV-10	BTV-10	
FL	1	White-tailed deer	BTV-19	Neg	Bacterial contamination in cell culture
FL	1	White-tailed deer	BTV-22	Pending	TVMDL BTV-pos PCR submission for typing
FL	1	White-tailed deer	BTV-24	Pending	
ID	1	Cattle	BTV-17	Pending	WADDL BTV-pos PCR submission for typing
ID	4	Sheep	BTV-17	Pending	WADDL BTV-pos PCR submission for typing
ID	2	White-tailed deer	BTV-17	Pending	WADDL BTV-pos PCR submission for typing

ID	1	Yak	BTV-17	Pending	WADDL BTV-pos PCR submission for typing
NV	1	Cattle	BTV-13	Pending	WADDL BTV-pos PCR submission for typing
NV	3	Bighorn sheep	BTV-17	BTV-17	WADDL BTV-pos PCR submission for typing
OK	1	Sheep	BTV-13	Not done	High Ct, insufficient virus for VI
TX	1	Cattle	BTV-3	BTV-3	TVMDL BTV-pos PCR submission for typing
TX	1	White-tailed deer	BTV-3	BTV-3	TVMDL BTV-pos PCR submission for typing
WA	2	Mule deer	BTV-17	Pending	WADDL BTV-pos PCR submission for typing
WA	7	White-tailed deer	BTV-17	Pending	WADDL BTV-pos PCR submission for typing

Table 4. Epizootic hemorrhagic disease virus (EHDV) isolations/PCR positives during calendar year 2015 (January 1 through October 16)

State	*No.*	*Species*	*PCR*	*VI*	
FL	1	White-tailed deer	EHDV-6	Pending	Also positive BTV-6
IL	1	White-tailed deer	EHDV-2	Neg	
IA	2	Cattle	EHDV-2	Pending	
IA	5	White-tailed deer	EHDV-2	EHDV-2	Isolate from 1 case; 2 cases pending VI; 2 cases VI not done
KS	1	White-tailed deer	EHDV-2	Neg	Bacterial contamination in cell culture, no VI
OK	1	Elk	EHDV-2	Not done	Tissue autolyzed, no VI
OK	2	White-tailed deer	EHDV-2	EHDV-2	Isolate from 1 case; 1 case VI not done

Update - The Arthropod-Borne Animal Diseases Unit – *Orbivirus* and *Culicoides* Research

David Scott McVey, USDA-ARS, Plains Area (PA), Center for Grain and Animal Health Research (CGAHR)

The Arthropod Borne Animal Diseases Research Unit's (ABADRU) research mission is to solve major endemic, emerging, and exotic arthropod-borne disease problems in livestock. The Unit completed the move to Manhattan, Kansas in 2010 and now the ABADRU is well established at the Center for Grain and Animal Health Research (CGAHR). All ABADRU research falls under the Agricultural Research Service (ARS) National Research Programs: NP103 and Animal Health and NP104, Veterinary, Medical, and Urban Entomology. The areas of research range from vector biology to virus-host interactions.

The viruses that cause bluetongue (BT) and epizootic hemorrhagic disease (EHD) are of concern to livestock producers in North America because of 1) the emergence of new serotypes, 2) increased reports of spillover and clinical disease in cattle, and 3) increased spread and adaptation to new geographical areas. Current projects in ABADRU include virus genotyping of more recent isolates, virus transmission and related pathogenesis, development of fluorescent microsphere assays for detection of virus-specific antibody and

ribonucleic acid (RNA), EHDV infection and transmission of whitetail deer, vector genetics, vector proteomics, vector transcriptomics, vector ecology/biology and vector control.

The United States Animal Health Association (USAHA) passed Resolution 16 in October 2012 requesting the United States Department of Agriculture (USDA) and the United States Department of Interior (DOI) to organize a diverse panel of experts including industry stakeholders, university and federal researchers, and federal and state regulatory agency representatives to determine research needs and identify and prioritize intervention strategies. In response to USAHA Resolution 16, USDA in collaboration with DOI organized a gap analysis workshop composed of international experts on *Orbiviruses*. The workshop participants met at the Arthropod-Borne Animal Diseases Research Unit in Manhattan, Kansas, May 14–16, 2013, to assess the available scientific information and countermeasures to effectively control and mitigate the impact of an outbreak of an emerging *Orbivirus* with epizootic potential, with special emphasis given to bluetongue virus (BTV) and epizootic hemorrhagic disease virus (EHDV).

The report of this workshop can be obtained through:

Orbiviruses, Bluetongue and Epizootic Hemmorhagic Disease: Gap Analysis Workshop Report. 2013. US Department of Agriculture, Agricultural Research Service, Washington, DC. The work has been published in *Vector-Borne and Zoonotic Diseases*.

Report:
http://go.usa.gov/BJ5F
Journal:
http://online.liebertpub.com/toc/vbz/15/6#utm_source=ETOC&utm_medium=email&utm_campaign=vbz

SCWDS *Culicoides* Surveys Update

Stacey Vigil, SCWDS (Southeastern Cooperative Wildlife Disease Study), University of Georgia College of Veterinary Medicine

Since late 2007 the Southeastern Cooperative Wildlife Disease Study (SCWDS) has been conducting surveys for *Culicoides* biting midges, a group that includes vectors of bluetongue virus (BTV) and epizootic hemorrhagic disease virus (EHDV), across the Southeastern United States. From November 2007 – September 2015 *Culicoides* surveys were conducted at 318 sites across eleven states: Florida, Georgia, Alabama, Mississippi, Louisiana, Texas, Arkansas, Missouri, Tennessee, North Carolina, and South Carolina. These surveys account for over 6,900 trap-nights of insect collections. Surveys are conducted by deploying a series of eight to twelve CDC light traps (equipped with ultraviolet (UV) light and ethanol filled collection jars) at an individual site in the late afternoon. The traps run overnight, and are collected the next morning. Most surveys have been conducted in the late summer and early fall (August and September) to coincide with the peak BTV/EHDV virus transmission period.

At the SCWDS laboratory, insects from 6,600 traps have been sorted and over 276,000 biting midge specimens have been counted. Of those, over 4,200 individual *Culicoides* specimens have been slide-mounted, and over 8,500 individuals have been identified to species. Total *Culicoides* identified to date include representatives of 55 species. New county and/or state records have been recorded for 11 species; *Culicoides beckae, C. oklahomensis*, *C. alachua*, *C. hollensis, C. neopulicaris, C. butleri, C. insignis, C. sonorensis, C. barbosai, C. loisae, and C. kirbyi*. Of these species, *C. insignis* is of particular importance due to its implication in bluetongue virus transmission in the Neotropics. Since 2007, we have collected *C. insignis* from increasingly northern and western locations within the Southeastern United States. We have identified *C. insignis* from an increasing number of sites in Alabama and Georgia, and have recorded new state records for this species in Mississippi (2008) and Louisiana (2014).

Culicoides sonorensis, the primary North American vector of BTV/EHDV, continues to be a rare collection in light trap surveys across the Southeastern United States. Of the 318 sites surveyed, *C. sonorensis* was collected from ten sites. Of those ten sites, seven of them were associated with livestock and/or captive cervids. The remaining three sites were Wildlife Management Areas (WMA) (Louisiana, Alabama, and South Carolina). One sample of *C. sonorensis* was captured in one trap during one trapping year at both the Louisiana WMA and the South Carolina WMA. At the final site, a WMA in Alabama, *C. sonorensis* has been consistently collected during 2011, 2012, and 2013 surveys.

SCWDS Hemorrhagic Disease Update

During 2014, there were 27 viruses isolated from 114 virus isolation attempts made, representing 22 states and 6 species (98 white-tailed deer, 6 bison, 4 mule deer, 3 big horn sheep, 2 black-tailed deer, and 1 elk). Isolations were made from white-tailed deer in Florida (EHDV-6, BTV-18), Georgia (EHDV-2), Idaho (EHDV-2), Kentucky (EHDV-2), Louisiana (EHDV-2 and -6), Mississippi (EHDV-2), Montana (EHDV-2), New Jersey (BTV-17), and North Carolina (EHDV-6). In addition, EHDV-2 was isolated from a black-tailed deer in Oregon. The isolation of BTV-17 represents the first isolation of any BTV serotype from New Jersey.

As of September 30, 2015, there have been 40 viruses isolated from 113 virus isolation attempts made, representing 19 states and 5 species (103 white-tailed deer, 4 mule deer, 3 elk, 2 key deer, and 1 bison). Isolations were made from white-tailed deer in Florida (EHDV-1 and -6), Idaho (BTV-17), Indiana (EHDV-2), Kansas (EHDV-2), Kentucky (EHDV-2), Louisiana (EHDV-2), Mississippi (EHDV-2), Missouri (EHDV-2), Montana (BTV-17), and North Carolina (EHDV-6).

BTV8 Infection In France: Implications

Pascal Hudelet, Merial

Bluetongue and other Culicids-borne viruses have a track record of multiple introductions into Europe at remarkably unpredictable intervals. Since

1999 Southern Europe was subject to several introductions of the virus, with serotypes 2, 4, 9 and 16, that were linked to climate change. Between 2006 and 2011, large outbreaks of serotypes 8 and one broke out and spread over Northern Europe, in regions that had never been affected by the disease before. In 2014, Southeastern Europe reported an outbreak due to serotype 4. In August 2015, serotype 8 unexpectedly re-emerged in the center of France, in the Allier department. The country had been declared free of the disease on its mainland since 2012. The authorities have created a large restriction zone and are implementing wide spread vaccination. The origin of the re-emergence of the disease remains unclear. The unpredictability of BTV serotypes introduction and re-emergence in Europe has set a number of challenges for vaccine development and manufacturing:

- Each introduction of a new serotype means development of a new product that becomes available only after the first wave of infection
- The cyclical nature of the market represents a challenge for management of inventory and available capacity.

Cervidae Health Research Initiative

Dr. Gibbs presented information provided by Dr. Samantha Wisely about the Cervidae Health Research Initiative (CHeRI). This initiative seeks to promote interdisciplinary science, education and outreach that increase the health and production of captive cervids in a sustainable manner and promotes the health of native wildlife and the ecosystems in which they live. This program will include epizootic hemorrhagic disease as a focus of study.

Committee Business:

In light of Dr. McClusky's report, the 2014 resolution was amended by a unanimous vote of the committee to include Epizootic Hemorrhagic Disease and the need to include serotype identification as part of the surveillance program. Dr. Peter Kirkland provided a history and overview of the Australian surveillance program for bluetongue and discussed the financial structure much of which comes from the livestock industry.

A possible change in the name and mission of the committee to include other arbovirus diseases was discussed. The Committee decided that the committee's mission should remain as stated.

The meeting adjourned at 5:50 p.m.

BLUETONGUE AND RELATED ORBIVIRUSES: A GLOBAL UPDATE

Chris Oura
The School of Veterinary Medicine, Faculty of Medical Sciences, University of the West Indies

Historically bluetongue virus (BTV) has been confined to various parts of the world and its vectors (C*ulicoides* sp.) have been found in relatively distinct global ecosystems. In recent years however, the situation has become far more complicated with midge species moving to new areas of the world and BTV strains/serotypes appearing in new geographical areas, causing serious outbreaks of disease in naïve ruminant populations. Additionally, novel virulent strains of BTV have appeared which are pathogenic in cattle and have alternative transmission mechanisms (transplacental, oral and direct contact). This has transformed BTV into a potentially more virulent, reproductive pathogen, with more serious consequences for policy makers and international trade. It is clear that some strains of BTV are potentially more 'dangerous' than others, so countries need to be on their guard, through continued surveillance, in order to monitor which of the BTV serotypes and strains are present and circulating.

In this presentation, he provided some insights and lessons learned (or not) from this 2006-2010 BTV-8 outbreak in Europe and a summary of recent research-based findings related to BTV that may affect the current risk status for the USA. The recent emergence of two unique BTVs [BTV-8) and BTV-26] has changed scientific thinking related to the epidemiology and transmission of BTV. The research behind these new discoveries and the resultant consequences for international trade will be presented and discussed. Dr. Oura also provided an update of BTV circulation in Trinidad (West Indies) where he is currently working, as well as in Europe in 2014 and 2015, concentrating on the current outbreaks of BTV-4 in the South-Eastern Europe and the recent re-emergence of BTV-8 in France.

REPORT OF THE COMMITTEE ON BRUCELLOSIS

Chair: Marty Zaluski, MT
Vice Chair; Tony Frazier, AL

James Averill, MI; Bill Barton, ID; Randall Berrier, CO; Tom Bragg, NE; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Nancy Brown, KS; William Brown, KS; Beth Carlson, ND; Michael Carter, MD; Robert Cobb, GA; Michael Coe, UT; Jim Collins, GA; Walter Cook, TX; Joseph Corn, GA; Wendy Cuevas-Espelid, GA; Donald Davis, TX; Leah Dorman, OH; Mark Drew, ID; Anita Edmondson, CA; Hank Edwards, WY; Dee Ellis, TX; Philip Elzer, LA; Donald Evans, KS; Mallory Gaines, DC; Francis Galey, WY; Tam Garland, TX; Robert Gerlach, AK; Arnold Gertonson, CO; Michael Gilsdorf, MD; Linda Glaser, MN; Chelsea Good, MO; Paul Grosdidier, KS; Rod Hall, OK; William Hartmann, MN; Greg Hawkins, TX; Burke Healey, CO; Carl Heckendorf, CO; Linda Hickam, MO; Bob Hillman, ID; Bruce Hoar, WY; Dennis Hughes, NE; Noah Hull, WY; David Hunter, MT; Jamie Jonker, VA; Susan Keller, ND; Bruce King, UT; Diane Kitchen, FL; John Lawrence, ME; Brad LeaMaster, OR; Eric Liska, MT; Jim Logan, WY; Laurent O'Gene Lollis, FL; Travis Lowe, MN; Christian Mackay, MT; Bret Marsh, IN; Barbara Martin, IA; Chuck Massengill, MO; Paul McGraw, WI; Eric Mohlman, NE; Ernie Morales, TX; Sherrie Nash, MT; Cheryl Nelson, KY; Dustin Oedekoven, SD; Steven Olsen, IA; Elizabeth Parker, TX; Janet Payeur, IA; William Pittenger, MO; Valerie Ragan, VA; Jennifer Ramsey, MT; Jeanne Rankin, MT; Suelee Robbe-Austerman, IA; Keith Roehr, CO; Shawn Schafer, OH; David Schmitt, IA; Brant Schumaker, WY; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Kathryn Simmons, DC; Daryl Simon, MN; Marilyn Simunich, ID; Robert Stout, KY; Nick Striegel, CO; Lee Ann Thomas, MD; Tracy Tomascik, TX; Curt Waldvogel, OH; James Watson, MS; Margaret Wild, CO; Richard Willer, HI; Kyle Wilson, TN; Thach Winslow, WY; Mary Wood, WY; Ching Ching Wu, IN; Glen Zebarth, MN.

The Committee met on October 26, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 1:00 to 4:30 p.m. There were 45 members and 15 guests present. The agenda was affected by a canceled presentation by Dr. Steve Olsen due to unexpected travel delays. Dr. Olsen planned on presenting on RB51 booster vaccination in cattle.

Overview

The Committee on Brucellosis meeting was called to order by chair, Martin Zaluski, who introduced the vice chair, Tony Frazier. Subcommittee chairs, Phil Elzer, Scientific Subcommittee; Bill Barton, Brucellosis in the Greater Yellowstone Area (GYA) Subcommittee; and Joe Corn, Swine Subcommittee were in attendance. The committee heard subcommittee reports, state reports from the GYA states of Idaho, Montana, and Wyoming, and several presentations on relevant topics. The committee considered and passed one resolution dealing with the recently identified shortcomings of the Brucellosis Ring Test.

Presentations and Reports

National Brucellosis Program Update

Arnold Gertonson, USDA-APHIS, Veterinary Services (VS)

The quarantine was released on two beef herds in Montana's Designated Surveillance Area (DSA) for Brucellosis that were found to be affected with brucellosis in 2014. Three domestic bison herds (one in each GYA state of Idaho, Montana and Wyoming) remain under quarantine. All GYA States remain classified as Class Free for bovine brucellosis.

National brucellosis surveillance program facilities reported 1,726,675 head tested through the Market Cattle Identification (MCI) program. The GYA reported 123,506 cattle tested. Some cattle may have been tested through the MCI program and also in the GYA prior to entering slaughter channels. Brucellosis vaccination numbers are 861,138 Official Calfhood Vaccinates (OCV) and 228,866 Adult Vaccinates (AV). Certified Brucellosis-Free Herds number 513 which is an increase over the previous year.

The national slaughter surveillance program collects samples from nine cattle and two bison slaughter facilities. The primary surveillance laboratory for the national surveillance program is in Kentucky. The Texas state laboratory is part of the national slaughter surveillance program and samples from two slaughter facilities in Texas. The state laboratories in the three GYA States test samples that are collected within those states.

Montana Report Summary

Eric Liska, Montana Department of Livestock

Two cattle herds were found to be affected with brucellosis in the fall of 2014. Both herds underwent rigorous epidemiologic investigation and were released from quarantine following the third negative test completed at the time of calving in the spring of 2015. Currently, whole herd assurance testing is underway. One domestic bison herd, found to be affected in 2010, remains under quarantine. This herd undergoes whole herd testing with removal of suspects and reactors annually. Combined testing totals for these investigations required approximately 39,000 tests.

Based on elk surveillance findings in 2015, Montana adjusted the Designated Surveillance Area (DSA) boundary to include the area north of Hwy 84 between Norris and Four Corners (west of Bozeman).

Three hundred fifty Producers utilize Montana's DSA with approximately 80,000 cattle and domestic bison. In the State fiscal year 2015, approximately 80,000 brucellosis tests were performed.

Idaho Report Summary

Bill Barton, Idaho Department of Agriculture

Idaho currently has one herd under quarantine for brucellosis. The domestic bison herd, located well within Idaho's Designated Surveillance Area (DSA), was determined to be affected with brucellosis in 2012 following testing due to known interaction with wild elk. The herd was put under quarantine and

a herd plan implemented. Heifer and bull calves from this herd are being fed to slaughter only in an Idaho approved feedlot. The herd will remain under quarantine until three (3) consecutive negative whole herd tests have been achieved. The herd has completed two (2) consecutive negative whole herd tests with the next test scheduled for December, 2015.

In 2014, 8,220 head of cattle were tested to meet DSA testing requirements. This included; 137 in an affected herd, 619 for herd certification, 2,264 due to change of ownership testing and 5,198 returning from grazing in the DSA. This number does not include cattle in other areas of the state outside of the DSA that were tested to meet other states import requirements.

The Idaho State Department of Agriculture and Idaho's cattle producers remain committed to managing appropriately to prevent transmission of brucellosis form wildlife to cattle. Industry support and assistance with enforcement of Idaho's brucellosis testing requirements for cattle leaving Idaho's DSA are paramount to our success.

Wyoming Report Summary

Jim Logan, Wyoming Livestock Board

Wyoming currently has one herd of domestic bison under quarantine for Brucellosis. This herd was initially placed under quarantine in the fall of 2010 and it has been verified that the source of infection was wild elk. All suspect and reactor animals found on any herd test have been removed direct to slaughter or strict isolation for terminal feeding and conditioned for slaughter. This herd is within the boundaries of Wyoming's Designated Surveillance Area (DSA). With testing conducted in July 2015 being negative, the entire herd is at two-test negative status. Testing will be conducted during October and November 2015. If there are no positives found, then the release requirements will be met and the quarantine will be lifted with a hold order on any non-parturient females (heifers) until they undergo a post-calving test.

In 2013, the Wyoming Game and Fish Department (WGFD) found two Brucellosis sero-positive elk on hunter-killed elk surveillance (from the 2012 hunt season) about 30 miles east of the DSA. This represented the first time Brucellosis sero-positive animals had been found outside the boundaries of the DSA since Wyoming achieved Brucellosis-free status in 1985. Two (2) additional sero-positive elk were found during the 2013 hunt season in the same hunt area (HA 40). In 2014, three sero-positive elk were found; one from Hunt Area 39, one from Hunt Area 40, and one from Hunt Area 41, which are contiguous. The Wyoming Livestock Board (WLSB) responded to these findings by designating the area as a "Brucellosis Area of Concern," conducting testing on test-eligible, female cattle in two counties (Big Horn County and Sheridan County), which are in the vicinity of the elk herd units from which the sero-positive elk were found. According to National Agricultural Statistics Service (NASS), there are 64,000 head of cattle in these two counties. Testing of cattle from this area is being done on ranches/farms and at all Wyoming markets, along with two Montana markets, at WLSB expense. Additionally, risk assessments are being conducted on area herds to determine if cattle/wildlife

conflict exists that could cause exposure. The WGFD has also increased its elk surveillance activities in the area to determine the elk sero-prevalance rate in the elk herd unit. Elk movement studies will soon be conducted on radio-collared elk to determine movement patterns of area elk, and the WGFD will also be conducting vaginal implant transmitter studies in the area to verify elk calving locations to better clarify wildlife/cattle conflict probability. The WLSB will utilize cattle and elk surveillance data and study results to determine any rule changes of DSA boundary change proposals.

Wyoming requires calfhood vaccination statewide for all heifers that will remain in a breeding herd. All sexually intact female cattle that inhabit the DSA must be calfhood vaccinated or adult vaccinated. From July 1, 2014 to June 30, 2015 (state FY2015), 238,472 female cattle/bison were Brucellosis vaccinated – this includes calfhood, yearling booster and adult vaccinations. Many herds were adult and/or yearling booster vaccinated during the state fiscal year 2015, which accounts for 7,020 of the total head vaccinated statewide. The WLSB has a statewide identification requirement for sexually intact female cattle 12 months of age and over to be officially identified prior to any change of ownership. Additionally, all sexually intact female cattle, regardless of age, that are in the DSA at any time must be officially identified prior to moving from the DSA.

All female cattle from the DSA sold for breeding purposes (regardless of age) and all females 18 months and over are required to be tested within 30 days prior to change of ownership, movement from the DSA, and interstate movement. Between July 1, 2014 and June 30, 2015, 36,906 head of cattle were tested from Wyoming's DSA and the "Brucellosis Area of Concern". This figure represents cattle tested on farms/ranches, at market, and at slaughter. All cattle 12 months and over are required to be tested at Wyoming slaughter plants. Cattle numbers within the Wyoming DSA total approximately 85,000 head. We have 151 DSA Brucellosis herd plans and 22 herd plans for producers outside the DSA. Our test and identification requirements provide good surveillance, traceability and early detection. The WLSB Brucellosis requirements are well enforced through brand inspection since any change of ownership or inter-county and interstate movements must include a brand inspection clearance.

The WLSB is in the process of updating and revising its Chapter 2 Brucellosis rules to reflect changes in federal requirements and continue to protect our producers and our trading partner states.

National Research Council: Revisiting Brucellosis in the Greater Yellowstone Area

Dustin Oedekoven, South Dakota Animal Industry Board

In May 2015, the National Academies of Science, Engineering, and Medicine appointed a committee on revisiting brucellosis in the Greater Yellowstone Area. In an update to the 1998 report "Brucellosis in the Greater Yellowstone Area," the current committee will comprehensively review and evaluate the available scientific literature and other information on the

prevalence and spread of *Brucella abortus* in the Greater Yellowstone Area (GYA) in wild and domestic animals and examine the feasibility, time-frame, and cost-effectiveness of options to contain or suppress brucellosis across the region. As part of the committee's charge, it will also examine the increased occurrence of brucellosis transmission from wildlife to livestock, examine disease management activities and vaccination strategies, examine societal and economic costs and benefits of implementing various measures, and describe and prioritize further research needed to reduce uncertainties and advance the knowledge base on brucellosis vaccines, vaccine delivery mechanisms, and diagnostics. The committee held its first meeting in July 2015 in Bozeman, Montana, and its second meeting in September 2015 at the Jackson Lake Lodge, Wyoming. The third meeting will be held in November 2015 in Washington, DC. The committee welcomes any information or comments from the public, which can be submitted to the study director (Peggy Tsai Yih, pyih@nas.edu). A final report is expected to be released to the public in summer 2016.

Novel Applications of Whole Genome Sequencing
Suelee Robbe-Austerman, National Veterinary Services Laboratories (NVSL)

Whole genome sequencing continues to help resolve new cases of *Brucella* sp. diagnosed in the laboratory. The Center for Disease Control and Prevention (CDC) has teamed up with NVSL to identify and resolve cases at the human-animal interface. The agencies are working on implementing a harmonized database so identifying and investigating new cases with links in both food, wildlife or production animal and human health can be seamless. Preliminary data on genotyping using a metagenomics approach to sequencing and genotyping were shown. NVSL will continue to improve on this technique so that samples identified in the field that are not culture quality can still be tested.

Montana 5-year Summary of Elk Surveillance and Movement Study
Jennifer Ramsey, Montana Department of Fish, Wildlife and Parks

Montana Fish, Wildlife and Parks (MFWP) is conducting a multi-year targeted elk brucellosis surveillance project to 1) evaluate the prevalence and spatial extent of brucellosis exposure in southwest Montana elk populations, 2) evaluate the extent of elk interchange between infected and adjacent elk herds, and 3) evaluate the risk of seropositive elk shedding and potentially transmitting *Brucella abortus*. Since 2011, we have captured in areas adjacent to the previously documented distribution of brucellosis and tested elk for exposure to *B. abortus*. We have radio-collared a sample of elk in each study area to identify the timing and extent of herd interchange. We have outfitted seropositive, pregnant elk with vaginal implant transmitters to monitor birth events and sample for *B. abortus* at birth sites. We documented brucellosis in four areas beyond the previously documented distribution of the disease (Blacktail, Sage Creek, Northern Madison, and Greeley), found a higher exposure rate than previously documented in elk in the Mill Creek area, and

found no exposure to *B. abortus* in elk in two areas (Pioneer Mountains, Tobacco Root Mountains). Levels of exposure to *B. abortus* ranged from 0% in the Pioneers and Tobacco Roots to a high of 53% in Mill Creek. We deployed radiocollars on a total of 38 seropositive and 144 seronegative elk. We monitored 51 seropositive elk pregnancies during 2011 – 2015 and documented 3 abortions, 45 live births, and 3 unknown events. *B. abortus* was detected at all 3 abortion sites, and 1 of the 45 live birth sites.

Committee Business:

A motion was passed to accept the three subcommittee reports. One resolution was brought before the committee for discussion. Following discussion and amendments being made to the draft resolution, the resolution was voted on and passed unanimously.

REPORT OF THE BRUCELLOSIS SCIENTIFIC ADVISORY SUBCOMMITTEE

Phil Elzer, Chair
Louisiana State University

The Subcommittee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 12:30 – 5:30 p.m. Attending sub-committee members were: Don Evans (KS), Valarie Ragan (VS), Jack Rhyan (CO), Walt Cook (TX), Phil Elzer (LA).

Presentations

Wildlife/Livestock Disease Investigations Team Research Update

Jack Rhyan, USDA-APHIS-VS:

Current work pertaining to brucellosis in the GYA consists of two studies on immunocontraception as a tool to reduce abortion and *Brucella abortus* shedding in seropositive bison, development of a killed spray-dried *B. abortus* vaccine for oral use in elk, and development of a "dry dart" that delivers a vaccine payload approximately four times the volume of a biobullet at extended range with accuracy and is biodegradable. Additionally, analysis of volatile organic compounds from breath of animals is being tested as a screening tool for brucellosis infection. In two studies of *Brucella* seropositive and seronegative Yellowstone bison, different patterns of volatile organic compounds (VOCs) were detected between seropositive and negative animals by gas chromatography–mass spectrometry (GC/MS) and an electronic nose. Finally, a description of how the tools under development could be used in a strategy to eradicate brucellosis was given.

Fluorescence Polarization Assay (FPA) Update

Miladin Kostovic, Ellie LLC

Ellie LLC has been working on a fluorescence polarization assay (FPA) for milk which is tricky because milk is not a clear solution. Initially the milk FPA could only be used to detect individual animals but after a clarification step the FPA can be used to find a positive in milk samples from 100 animals.

USAHA Brucella Ring Test (BRT) Resolution 21 Update

Suelee Robbe-Austerman, USDA-APHIS, Veterinary Services (VS), National Veterinary Services Laboratories (NVSL)

Data was presented that the current antigen produced might not be appropriate to be used in large bulk tank samples. National Veterinary Services Laboratories (NVLS) commented that the Brucella ring test (BRT) is not performing as expected. The BRT antigen is difficult to make and it requires large amounts of quality control time and efforts to get a batch that might be viable in the current test.

In response to Resolution 21 regarding the validation of the Brucella Ring Test for large dairies, the committee cannot make a recommendation until NVSL provides a study design for 5,000 animals or a viable alternative. Currently the BRT is approved for samples containing milk from up to 1,500 animals.

The committee is concerned with the data that was presented in the meeting regarding the BRT. It appears that interpretation of the BRT in this study is not consistent with World Health Organisation for Animal Health (OIE) standards for interpretation.

After further discussion with NVSL the committee determined that the BRT issue of trying to get the test using 5,000 animals should no longer be pursued.

New Business

The Subcommittee recommends that Dr. Martin Zaluski solicits the state veterinarians primarily from Florida, Texas, Hawaii and any others to get data on the number of cattle which are positive on serological tests and if these positive reactions are known or thought to be due to *Brucella suis* exposure. This type of data will be important to have when asking companies to develop a test to distinguish between *B. suis* and *B. abortus* infections in cattle.

The Sucbommittee recommends that Wyoming, Montana and Idaho work with NVSL to culture any sheep that are serologically positive on the *B. ovis* test.

Charges from Dr. Zaluski - Examine the data on the on Sentry 2000S instrument.

Data from three instruments (Sentry 1000, Synergy 2 and Sentry 2000S) were compared. The specificity for all three instruments was 99.9% The calculated sensitivity for each instrument was 96.1% for the Sentry 1000, 99.0% for the Synergy 2 and 97.6% for the Sentry 2000S.

Recommendation: The Committee recommends that the Sentry 2000S instrument be approved as an equivalent to the previous instrumentation.

REPORT OF THE SUBCOMMITTEE ON BRUCELLOSIS IN THE GREATER YELLOWSTONE AREA (GYA)

Bill Barton, Chair
Idaho Department of Agriculture

The annual meeting of the Subcommittee was called on October 25, 2015 at approximately 12:30 p.m. by Chair, Bill Barton. Subcommittee members in attendance included Marty Zaluski, Bill Barton, Susan Keller and Dave Hunter. With no old business on the agenda, the chair introduced Dr. Dannele Peck, an economist at the University of Wyoming. Dr. Peck's presentation is included at the end of this report. Following the presentation, with no new business, the subcommittee adjourned.

Brucellosis Through an Economist's Lens

Dannele Peck, University of Wyoming, Dept. of Agricultural and Applied Economics

Cattle in the Greater Yellowstone Ecosystem occasionally contract bovine brucellosis from free-ranging elk. When an infected cattle herd is detected, it may be quarantined for several months until test-eligible animals pass three rounds of testing. The cost of this regulatory response depends on several factors: the index-herd's size, number and size of contact herds, length and timing of the quarantine (relative to the normal winter-feeding period), whether quarantine-eligible pasture exists, and if not, the price of hay. For a herd with 400 bred cows, 80 replacement heifers and 280 yearlings, the cost of a 12-month quarantine when no quarantine-eligible pasture is available is roughly $146,000, or $192 per head when spread across all 760 animals in the herd. This per-head cost is roughly the same whether the herd is smaller (200 bred cows) or larger (800 bred cows). However, it can be reduced to as little as $57 per head if the case is detected earlier in the winter feeding season, and quarantine can be reduced to six months. Once a producer knows the financial consequences of their herd contracting brucellosis, they could choose from a variety of prevention activities: (1) calling state agency personnel to haze elk off private land, (2) fencing haystacks, (3) administering adult booster vaccination, (4) spaying heifers, (5) altering the winter-feeding schedule of cattle, (6) hiring riders to prevent cattle–elk commingling, and (7) delaying grazing on high-risk allotments. The cost of these activities range from roughly $200 per year (for hazing) to $15,000 per year (for delayed grazing). Which of the activities are economically worthwhile depends on the baseline level of risk the producer faces, the cost of quarantine, the cost of the activity, and its effectiveness. Little is known about the effectiveness of most activities, so we instead estimate a "breakeven level of effectiveness." This allows us to identify activities that cannot possibly be effectiveness enough to justify investing in them. Producers who face higher levels of risk and higher quarantine costs can justify investing more in brucellosis prevention activities. A similar analysis is conducted for three elk management activities that aim to reduce seroprevalence among Wyoming's winter-feedground elk: test-and-slaughter,

strain 19 vaccination, and low-density feeding. None of these activities generate enough annual benefits to outweigh their annual costs. However, if the Wyoming Game and Fish Department wishes to invest in elk brucellosis management, low-density feeding on existing elk winter-feedgrounds generates the least negative net benefit of the three activities.

REPORT OF THE FERAL SWINE SUBCOMMITTEE ON BRUCELLOSIS AND PSEUDORABIES

Joseph Corn, Chair
Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia

The Subcommittee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island.

Reports

National Feral Swine Mapping System (NFSMS)

Joseph Corn, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia

Dr. Corn provided an update on the National Feral Swine Mapping System (NFSMS). SCWDS began producing nationwide feral swine distribution maps in 1982 by working directly with state and territorial natural resources agency personnel. In 1982, 17 states reported feral. With support from USDA-APHIS-Veterinary Services (VS) the SCWDS developed and implemented the National Feral Swine Mapping System (NFSMS) in 2008. The NFSMS is an interactive data collection system used to collect and display current data on the distribution of feral swine in the United States. The feral swine distribution maps are produced using data collected from state and territorial natural resources agencies, USDA-APHIS-Wildlife Services (WS), and other state/federal wildlife and agriculture agencies. Distribution data submitted by agency personnel are evaluated by SCWDS on a continual basis, and the distribution map is updated with verified additions on a monthly basis. Feral swine populations and/or sightings are designated either as established breeding populations, or as sightings, but only established breeding populations are included on the map and in the total of the number of states with feral swine. Over 600 additions have been made to the feral swine distribution map through the NFSMS since January 2008. The NFSMS internet address has changed; the new address is http://swine.vet.uga.edu/nfsms/. Additional data are provided to state/federal agencies and universities on request. Established feral swine populations currently are reported in 36 states.

USDA-APHIS-Veterinary Services (VS)- Update

Troy Bigelow, USDA-APHIS-VS

United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), provided an update on USDA-APHIS-VS programs on feral swine. USDA-APHIS-VS is working directly with USDA-APHIS-Wildlife Services (WS) on all feral swine issues, and supports the National Feral Swine Mapping System (NFSMS).

USDA-APHIS-Wildlife Services (WS) - Update

Thomas Gidlewski and Dale Nolte, USDA-APHIS-WS

Disease Surveys

Surveys for selected disease agents in feral swine being conducted by USDA-APHIS-Wildlife Services (WS). In 2015 the USDA-APHIS-WS-National Wildlife Research Center (NWRC), National Wildlife Disease Program sampled approximately 4,000 feral swine in 34 states and Guam for Classical Swine Fever, swine brucellosis, pseudorabies virus, influenza virus, Porcine Reproductive and Respiratory Syndrome, leptospira, toxoplasma, and trichinella. In addition to the national surveillance, the program continues to collaborate with scientists on local and regional projects. The feral swine serum archive now represents about 20,000 animals.

National Feral Swine Damage Management Program

APHIS serves as the lead federal agency in a cooperative effort with other federal, state, tribal, and local entities that share a common interest in reducing or eliminating problems caused by feral swine. APHIS' overall goal in conducting the National Feral Swine Damage Management Program (Program) is to reduce damage and risks to agriculture, natural resources, property, animal health, and human health and safety in the United States by reducing or eliminating feral swine populations in cooperation with others.

APHIS' strategy is to provide resources and expertise at a national level, while allowing flexibility to manage operational activities from a local or state perspective. The Program established a baseline capacity to address feral swine damage through WS programs at the state level. Baseline capacity is supplemented with designated national and local projects to achieve strategic accomplishments. National projects were implemented to enable comprehensive coverage of disease monitoring, risk analysis, and economic analysis, along with other research activities on feral swine. Local projects are generated annually by WS State Directors, in collaboration with partners, to address specific feral swine issues. WS established two regional helicopter teams in Tennessee and Texas to provide aerial support for operational programs. APHIS continues to seek partners in all aspects of feral swine damage management.

FY15 Accomplishments:

APHIS announced its Record of Decision for the Environmental Impact Statement - "Feral Swine Damage Management: A National Approach." APHIS selected the preferred alternative, to implement a nationally coordinated, integrated feral swine damage management program, in cooperation with other agencies at the international, federal, state, territorial, Native American tribal, and local levels, and the cooperation of private management interest.

Operations

- Collaborated with partners in each WS state program receiving feral swine funds to develop a task force and management plan
- Address feral swine concerns on more than 125.5 million acres through WS' agreements with landowners

- Conducting activities to reduce feral swine impacts to 103 Threatened and Endangered plant and animal species
- Changed status of four WS' programs to Detection (Washington, Idaho, New York, Maryland)
- Established efforts to use non-lead ammunition for feral swine removal from helicopters
- Developed a National Feral Swine Genetic Archive for monitoring absence of feral swine and tracking feral swine movements
- Established 18 WS' Local Projects in Arkansas, California, Florida, Georgia, Kentucky, Louisiana, Missouri, North Carolina, South Carolina, Tennessee, Texas, and Virginia worth $1,158,328
- Developed concept for three Pilot Projects in Mississippi, Missouri, and Alabama to confirm ability to reduce feral swine populations in heavily populated areas and collaborate with research to document resources saved

Disease Monitoring

- Through VS recommendation, monitoring of feral swine diseases of national concern will be reduced from five to three diseases in FY16 (classical swine fever, swine brucellosis, and pseudorabies)
- Conducted collaborative efforts with Food Safety and Inspection Service (FSIS) to assess zoonotic diseases carried by feral swine entering slaughter facilities in Texas
- Worked with SCWDS to develop a brochure on feral swine diseases and a 1-day course on feral swine diseases

Communication and Outreach

- Implemented approach using 1890 Institution extension agents to implement a feral swine damage survey and conduct outreach activities with Limited Resource Farmers
- Developing national outreach campaign materials for distribution across APHIS and collaborating partners (e.g., factsheets, brochure, display shades, and dedicated website)

Research

- Working with Mississippi State University in collecting information regarding public attitudes towards feral swine, conducting economic analysis, and developing a course on feral swine identification and damages for law enforcement officers
- Working with Texas A&M – Kingsville to assess feral swine impacts on wild turkeys
- Continue progress towards developing a feral swine toxicant and safe delivery system through NWRC
- Conducted National Agricultural Statistics Service (NASS) survey to assess damage to select field crops in 11 states
- Developed technique to detect feral swine presence through genetic markers in water

REPORT OF THE COMMITTEE ON CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK

Chair: Peregrine Wolff, NV
Vice Chair: Julie Napier, NE

Thomas Albert, VA; Paul Anderson, MN; James Averill, MI; Kay Backues, OK; Bill Barton, ID; Scott Bender, AZ; Warren Bluntzer, TX; Tom Bragg, NE; Rhonda Brakke, IA; Deborah Brennan, MS; Sarah Cannizzo, OR; Beth Carlson, ND; Susan Culp, TX; Donald Davis, TX; Barbara Determan, IA; Mark Drew, ID; John Fischer, GA; Nancy Frank, MI; Richard French, NH; Tam Garland, TX; Robert Gerlach, AK; Paul Gibbs, FL; Colin Gillin, OR; Michael Gilsdorf, MD; Chester Gipson, MD; Paul Grosdidier, KS; Keith Haffer, SD; Greg Hawkins, TX; Bill Hawks, DC; Kristi Henderson, IL; Terry Hensley, TX; Michael Herrin, OK; Linda Hickam, MO; Robert Hilsenroth, FL; David Hunter, MT; John Huntley, WA; Russell Iselt, TX; Donald Janssen, CA; Diane Kitchen, FL; Patrice Klein, MD; Todd Landt, IA; John Lawrence, ME; Charles Lewis, IA; Travis Lowe, MN; Mark Luedtke, MN; Bret Marsh, IN; David Marshall, NC; Chuck Massengill, MO; Robert Meyer, CO; Eric Mohlman, NE; Yvonne Nadler, IL; Jeffrey Nelson, IA; Sandra Norman, IN; Dustin Oedekoven, SD; Mitchell Palmer, IA; Janet Payeur, IA; William Pittenger, MO; Jewell Plumley, WV; Justin Roach, OK; Jonathan Roberts, LA; Keith Roehr, CO; Susan Rollo, TX; Shawn Schafer, OH; David Schmitt, IA; Dennis Schmitt, MO; Marc Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Daryl Simon, MN; Jonathan Sleeman, WI; David Smith, NY; Diane Stacy, LA; Kelly Straka, MO; Manoel Tamassia, NJ; Robert Temple, OH; Lee Ann Thomas, MD; Brad Thurston, IN; Jeff Turner, TX; Kathleen Turner, FL; Rick Wahlert, CO; Curt Waldvogel, OH; Ray Waters, IA; Steve Weber, CO; Skip West, OK; Ellen Wiedner, FL; Margaret Wild, CO; Kyle Wilson, TN; Nora Wineland, MO; Richard Winters, Jr., TX; Mary Wood, WY; Glen Zebarth, MN.

The Committee met on October 27, 2015, at the Rhode Island Convention Center in Providence, Rhode Island from 8:00 a.m. to 12:35 p.m. There were 39 members and 40 guests present. The one previous resolution from 2014 was addressed in the Annual update for the Cervid Health Team, Fiscal year (FY) 2015.

Charly Seale presented the report of the Subcommittee on Farmed Cervidae. The full report is found at the end of this report.

Presentations

Evaluation of a Novel Recombinant Protein Fusion Vaccine for CWD in Elk – Preliminary Data

Mary Wood, Wyoming Game and Fish Department

Chronic wasting disease (CWD) is a fatal neurologic disease of cervids which threatens both free-ranging and captive populations. Currently there are minimal management options for limiting spread of CWD. We evaluated a novel recombinant protein fusion vaccine developed by Pan-Provincial Vaccine

Enterprises (PREVENT), in elk. Thirty-eight female elk calves (*Cervus elaphus)* were captured on the South Park Feedground in Western Wyoming and transported to the Thorne-Williams Wildlife Research Center (TWRC). Calves were divided randomly into two groups, control (n=19) and vaccine (n=19). All elk were genotyped to determine Prnp codon 132 polymorphisms. Primary and booster vaccines were given intramuscularly six weeks apart approximately 2-3 weeks after arrival at the TWRC and yearly thereafter. Elk were challenged via natural environmental exposure to CWD at the facility. Elk were monitored daily for behavioral and physical signs of clinical CWD and were evaluated for CWD infection via rectal biopsy. All elk with clinical CWD were humanely euthanized and infection was confirmed via ELISA and immunohistochemistry. Both vaccinates and controls developed clinical CWD, with vaccinates showing a shorter survival time (p=0.014). This research is ongoing and further results are necessary before final conclusions are made.

Novel Approaches to Detection of Tuberculosis in African Wildlife

Michelle Miller, Centre of Excellence for Biomedical Tuberculosis Research, MRC Centre for TB Research, Division of Molecular Biology and Human Genetics, Faculty of Medicine and Health Sciences, Stellenbosch University
Additional authors: W. Goosen, R. McFadyen, T. Olivier, C. Clarke, E. Roos, L. Botha, P. van Helden, S. Parsons

Tuberculosis (TB), caused by members of the *Mycobacterium tuberculosis* complex (*M. bovis, M. tuberculosis, M. suricattae,* etc.) presents a significant threat to African wildlife, including free-ranging and captive populations. Infection has been detected in 21 different wildlife species in South Africa. The presence of this alien disease may impact conservation efforts by increasing animal morbidity and mortality, and restriction on animal movement for reintroduction and captive breeding. The lack of diagnostic tools for TB in wildlife seriously hinders efforts to understand the disease and development management strategies.

Novel biomarker discovery is an area of active research for TB in wildlife as well as livestock. Investigation of host immune responses provides potentially valuable tools for diagnosis and disease surveillance. Currently available assays for bovine interferon (IFN)-ɣ are being adapted and evaluated in African buffalo to develop more field-friendly techniques (Goosen et al., 2014). For example, the modified Quantiferon Gold In-Tube (QFT) assay (Qiagen) is being used to stimulate whole blood from a variety of wildlife species including lion, buffalo, and is being planned for use in antelope (i.e., greater kudu, sable antelope). Interferon-gamma (IFNɣ), in addition to other novel cytokines (including IP-10, MIG, and MCP-1) produced by stimulation with mycobacteria-specific peptides, appear to be useful in distinguishing *M. bovis* infection in African buffaloes (Goosen et al., 2014a, 2014b, 2015). Using mRNA extracted from stimulated blood, differences in cytokine gene expression have detected TB-infected and exposed lions (Olivier et al., manuscript in press). In addition to cell-mediated immune responses, humoral responses to TB in wildlife are being investigated using ELISAs and lateral flow

chromatographic assays (Miller et al., 2012). For example, antibodies to *M. tuberculosis* complex antigens have been detected in bovine TB-infected warthogs, buffaloes, and lions using species-nonspecific detection methods (Miller et al., 2015). Using knowledge gained from research on immunological responses of domestic animals and humans will provide advances in our ability to detect and understand the host responses of wildlife, improve detection of TB in individuals and populations, and apply this to disease management strategies.

We acknowledge the financial support of the National Research Foundation's (NRF) South African Research Initiative (SARChI), Morris Animal Foundation, AAZV Wild Animal Health Fund, and Harry Crossley Foundation.

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Rectal Biopsy as an Ante Mortem Assay for CWD: Diagnostic and Regulatory Considerations

Tracy Nichols, USDA Wildlife Services, National Wildlife Research Center

Summary:

- A considerable amount of research has been done in both deer and elk regarding rectal biopsy
- High quality rectal biopsies are needed to have reliable results
- Route and dose of CWD exposure likely influences disease incubation period
- Rectal biopsy has high specificity and moderate sensitivity that is dependent upon disease progression and genotype
- Disease progression and subsequent detection in the rectal mucosa is influenced by genetics at codon 96 in WTD and at codon 132 in elk
- CWD proliferates and trafficks faster in codon 96 GG WTD than in GS or SS animals, making detection by rectal biopsy less reliable in GS or SS deer
- Deer and elk with CWD prions present only in the retropharyngeal lymph nodes often do not have positive rectal biopsies

Annual Update for the Cervid Health Team, Fiscal Year (FY) 2015

Randy Pritchard, US Department of Agriculture, Animal and Plant Health Inspection Service, (APHIS) Veterinary Services (VS)

Voluntary Chronic Wasting Disease (CWD) Herd Certification Program

The APHIS National CWD Herd Certification Program (HCP) was implemented in 2014. It is a voluntary Federal-State-industry cooperative program administered by APHIS and implemented by participating States. The program provides uniform national herd certification standards that minimize the risk of spreading CWD in farmed cervid populations. Participating States and herd owners must comply with requirements for animal identification, fencing, recordkeeping, inspections/inventories, as well as animal mortality testing and response to any CWD-exposed, suspect, and positive herds. APHIS monitors the Approved State HCPs to ensure consistency with Federal standards through annual reporting by the States. With each year of successful surveillance, participating herds will advance in status until reaching five years with no evidence of CWD, at which time herds are certified as being low-risk for CWD. Only captive cervids from enrolled herds certified as low risk for CWD may move interstate. Currently, 30 States participate in the voluntary CWD Herd Certification Program; 29 have Approved HCPs and one has Provisional Approved status. VS is working with the remaining State to transition it to Approved status. FY2015 marks the second year that Approved States have submitted their CWD HCP annual reports to APHIS. APHIS is currently reviewing these reports.

Review of CWD Program Standards

The CWD Program Standards provide clarification and guidance on how to meet CWD Herd Certification Program and interstate movement requirements.

VS committed to an annual review of the Program Standards by representatives of the cervid industry and appropriate State and Federal agencies. VS planned to perform a review in FY2015; however, this did not occur due to the response to highly pathogenic avian influenza (HPAI). VS expects to conduct a review in FY2016.

CWD in Farmed and Wild Cervids

Retrospective Epidemiology of CWD in Farmed Cervids

In response to a 2014 USAHA Resolution, VS asked States to include a retrospective summary of the epidemiology of all positive herds with their annual HCP reports for FY2015. Unfortunately, the response to HPAI delayed completion of this summary. Five States reported information to date. A few States indicated that they did not have the resources to devote to this request. VS will continue to gather this data and to collect more comprehensive data in the future.

Summary of CWD detections

As of September 30, 2015, CWD has been confirmed in wild deer and elk in 21 US States, and in farmed cervids in 16 States. In total, 23 States have identified CWD in wild and/or farmed cervids. CWD has been reported in 70 farmed cervid herds in the United States. Confirmation of the disease in three free-ranging, wild white-tailed deer in Michigan in 2015 marked the first report of CWD in the wild cervid population in this State.

FY2015 CWD Detections in Farmed Cervids

In FY2015, CWD was identified in eight farmed cervid herds: one white-tailed deer breeding herd in Pennsylvania, one elk breeding herd in Utah (traced back from a hunting facility in Utah), one white-tailed deer (WTD) breeding herd and one WTD hunting preserve in Ohio (owned by the same producer), two WTD breeding herds in Wisconsin, one WTD and elk herd in Texas, and a second WTD herd in Texas (traced from the first positive herd in Texas). The positive animals in Utah, Ohio, and Texas represented the first reported cases of CWD in captive cervids in all three of these States.

White-Tailed Deer Breeding Herd, Pennsylvania

On October 6, 2014, the National Veterinary Services Laboratories (NVSL) confirmed CWD in a 6-year-old doe from a captive WTD breeding facility in Reynoldsville, Pennsylvania. The doe was euthanized and tested because she was classified as a CWD-exposed animal that had previously resided in ***two*** trace back exposed herds. This herd was assembled in 2013 through the purchase of 16 animals from other HCP-certified herds in Pennsylvania, and had been under quarantine for receiving exposed animals from a trace back exposed herd. The remaining herd of eight WTD was depopulated with Federal indemnity on February 18, 2015, and no additional positive animals were detected. USDA collected samples for research purposes.

Elk Breeding Herd, Utah

On December 23, 2014, NVSL confirmed CWD in 3-year-old captive elk. The elk had been at a hunting park located in northern Utah, where he had resided for approximately 3 weeks prior to being hunter killed. All hunter-killed animals at the hunt park are required to be tested for CWD, and this animal

was sampled through routine surveillance. The elk was traced back to its herd of origin, and that facility was quarantined. The herd was assembled in 1999 with bulls, and later elk cows, that originated from Colorado. Historical testing records for the herd were unavailable. The remaining 70 elk were depopulated using Federal indemnity funds on March 3, 2015, and an additional 25 elk were confirmed as CWD-positive. USDA collected samples for research purposes.

White-Tailed Deer Hunting Preserve, Ohio

On October 22, 2014, NVSL confirmed CWD in a buck taken from a captive WTD deer hunting preserve in Ohio. This was the first time that CWD had been detected in Ohio. The preserve was tested as part of Ohio's CWD monitoring program. The herd had been under quarantine since April 2014 because it was a trace-forward herd associated with a CWD-exposed herd in Pennsylvania. The positive animal was traced to its herd of origin, a captive WTD breeding herd in Pennsylvania, through DNA identity testing. On November 26, 2014, the Ohio State Veterinarian issued an Order of Destruction for animals on the hunting preserve. The State executed this Order on April 27-30, 2015. The herd of 224 WTD was depopulated and no other positives were detected. USDA did not provide Federal indemnity.

White-Tailed Deer Breeding Herd, Ohio

On March 31, 2015, NVSL confirmed CWD infection in a 5-year-old WTD doe from a captive breeding herd in Holmesville, Ohio. The index animal was received from a Wisconsin WTD farm in January 2013. The CWD-positive herd was owned by the same individual as the Ohio hunt preserve that was found to be CWD positive in October 2014. On May 22, 2015, NVSL confirmed a second positive case in the same herd - a yearling WTD doe that was a natural addition in the same breeding herd. The herd had been under quarantine since April 1, 2014 due to epidemiological linkages with two WTD herds in Pennsylvania – one a positive herd and the other a traceback exposed herd. USDA provided Federal indemnity and depopulated this herd on June 15 and 16, 2015. USDA collected samples for research purposes. NVSL confirmed CWD in 16 additional animals in the herd. Of the 16 positives, one was natural addition and the rest were purchased additions. The positive animals were purchased from February 26, 2013 through September 24, 2013, except for one purchased in 2012. Eleven purchased additions traced-back to three herds in Pennsylvania and four purchased additions traced to three other herds in Ohio.

White-Tailed Deer Breeding Herd, Wisconsin

On October 6, 2014, NVSL confirmed CWD in a 2-year-old doe born in June of 2012 that died on a Richland County farm. The facility is within the CWD management zone in Wisconsin. The remaining 51 deer were euthanized on November 20, 2014, and seven additional positives (all males born in 2012) were found. Two of these seven were purchased additions with the last added to the herd in January 2013. All sales from this herd were to shooting preserves. This premise was double fenced and had been compliant in a herd certification program for over ten years.

White-Tailed Deer Breeding Herd, Wisconsin

On June 19, 2015, NVSL confirmed CWD in a seven-year-old female WTD from a breeding facility in Eau Claire County. The doe was a natural addition to this breeding herd. This is the first positive CWD case, captive or wild, in this county. The doe was found dead and was showing no clinical signs of CWD at the time of death. Since 2003, this herd has tested 391 animals for CWD and all had "not detected" results. In addition, 317 animals have tested "not detected" from the associated hunting preserve over the same time period. A second positive natural addition doe from this herd was confirmed positive by NVSL on September 10, 2015. Several escape episodes have occurred from this herd. The herd is currently under quarantine and plans are underway for depopulation with State indemnity.

White-Tailed Deer and Elk Breeding Herd, Texas

On June 30, 2015, NVSL confirmed CWD in a 2-year-old WTD buck from a captive WTD and elk breeding herd in Medina County, Texas, approximately 500 miles from previously reported positive free-ranging mule deer in far West Texas. This was the first time that the disease had been detected in farmed cervids in the State. The index buck was born on the premises and found dead on June 18, 2015. Over 40 high-risk deer (i.e., pen mates, dam, others) were euthanized and tested after the index case was found. The NVSL confirmed CWD infection in two of those deer. Interestingly, all three of the positive deer identified to date on this premises have the same AI sire. However, the significance of this finding is unclear. In the past five years, records indicate that 130 WTD from 33 facilities moved into the positive herd and 838 WTD moved out of the positive herd to 147 different herds. One positive WTD was found in one of these trace-out herds (see herd description below). Additionally, 23 elk were also moved from this herd to another herd in TX in 2014. All trace-outs have been intrastate except for movements to two premises in Mexico. Premises that have received deer from the index herd are under movement restrictions. VS is collaborating with animal health authorities in Mexico. VS paid indemnity and depopulated this herd on September 30, 2015, and no additional positive animals were detected. USDA collected samples for research purposes.

White-Tailed Deer Herd, Texas

On September 14, 2015 NVSL confirmed CWD from tissues from a WTD in Lavaca County, Texas. This animal was a traceout from the first CWD positive herd from June 30, 2015. Additional epidemiology is ongoing.

Cervid Tuberculosis

The CervidTB Stat-Pak and Dual Path Platform (DPP) serologic tests were approved for use in captive and free-ranging North American elk, white-tailed deer, red deer, fallow deer, and reindeer effective February 4, 2013. In early 2014, the CervidTB Stat-Pak was discontinued by its manufacturer and an amended interim final rule was published in July 2014 making the DPP test both a primary and secondary test for TB in cervids. Animals that have two consecutive positive tests at least 30 days apart are classified as TB reactors, and APHIS provides indemnity for these animals to conduct further diagnostic testing.

In FY2015, 15,486 cervids were tested serologically for bovine TB, and 31,862 cervids have been tested since introduction of the serological tests in 2013. In FY2015, primary DPP serological testing identified 62 TB suspects of which 21 of these animals had negative tests when retested at least 30 days after the primary test. Twenty-three cervids were identified as TB reactors when tested positive to the secondary DPP test. Thirty-one necropsies have been performed on suspect and reactor cervids in FY2015. Mycobacterial culture results are available on 30 of these animal's tissues at this time. Twenty-six of the cultures were negative, two were identified as *M. avium* and two identified as *M. intracellular.* No cultures have been positive for *M. bovis* in FY 2015.

VS recently completed a statistical analysis of the DPP testing data, including optical density (OD) levels, for the previous three years of testing. The specificity of the first DPP test using the current cut-off OD value was 99.6% while the specificity after the second DPP test was 99.86%. The false positive percentage of 0.034% is considered very low. Based on this analysis, raising the OD cut-off value would increase the false negative percentage significantly (i.e. reduce test sensitivity) while having very little effect on the false positive percentage (i.e., no change in test specificity). As a result, VS does not intend to revise the DPP OD cut-off level for any species of cervids in 2016. We will continue to analyze these data to determine if changes are needed in the future.

National Animal Health Monitoring System Cervid Industry Study

Beginning early September 2014, VS, in cooperation with the National Agricultural Statistics Service, conducted the first national study of the US farmed cervid industry. The study surveyed 3,000 producers from all States that have farmed cervids. The survey response rate was 42.5%, which is exceptional for a mail survey. Responses indicate that the US captive cervid population is made up of 65.6% deer operations, 21.2% elk/red deer/sika deer operations, and 13.2% operations with both deer and elk. The study was initiated at the request of industry stakeholders. A report from the study is currently being finalized and should be available in 2015. The survey objectives are based on responses from a needs assessment that was conducted by VS in 2013. The study will provide baseline industry statistics, a description of current production practices and challenges, producer-reported disease occurrences, and an overview of health management and biosecurity practices.

Cervid Health Webpage

In 2015, the Cervid Health Team launched a new comprehensive webpage that consolidated all the cervid program disease and other information in one site. In addition to updating existing content, new information was also made available. The new Cervid Health webpage can be found on the APHIS website under the Animal Health and Animal Disease Information links on the left-hand menu.

Cervid Health Program Budget

The Cervid Health Program includes the CWD herd certification program and the cervid TB program. It is funded through the Equine, Cervid, and Small Ruminant Line Item. In FY2015, the Cervid Health Program was appropriated $3.0 million by Congress for cervid health activities. This funding was allocated as follows:

- **Indemnity**−$1.1 million for CWD and cervid TB. (An additional $230,000 was provided to support herd depopulation activities in Texas)
- **CWD Research**−$200,000 to support USDA, Wildlife Services (WS) research for development of CWD live animal diagnostic testing
- **Cervid Health Program**−$1.2 million for general program support (primarily field activities).

APHIS anticipates the FY2016 Cervid Health Program funding will remain at FY2015 levels.

Updates from ZAHP: The Zoo and Aquarium All Hazards Preparedness Response and Recovery Fusion Center

Yvonne Nadler, Zoo and Aquarium All Hazards Preparedness (ZAHP) Fusion Center

Dr. Nadler introduced the audience to the ZAHP Fusion Center which is a conduit of information on all-hazards preparedness response and recovery for the captive wildlife community. The Fusion Center's website has dozens of resources targeted for use for this stakeholders group. zahp.aza.org

Chronic Wasting Disease Risk Perception: Why Can't We All Just Get Along?

Krysten Schuler, Animal Health Diagnostic Center, Cornell University, College of Veterinary Medicine

Additional authors: Alyssa Wetterau, Elizabeth M. Bunting, and Hussni Mohammed

Chronic wasting disease (CWD) is a disease of concern to agencies, sportsmen, and businesses dependent on cervid species. However, disease risk perceptions may vary considerably between groups on wildlife and agriculture sides. We administered an online survey using Qualtrics survey software to the state wildlife agency (n=20), state agriculture agency (n=20), federal (United States Geological Survey (USGS), USDA) and other state agencies (n=9), academics (n=5), sportsmen (n=45), and captive cervid farmers (n=13) between March 2013 and 2014 to gauge attitudes toward potential hazards for CWD transmission to wild white-tailed deer or captive cervids. Of 15 hazards, the high-ranking risks were CWD existing undetected in the wild >1 year, decreased testing without subsidies, high wild deer densities, fence line contact, intrastate movement and importation of captive deer. State wildlife and agriculture officials ranked risks higher than other groups, with captive cervid farmers 50% below the average. Of six identified

hazard pathways, importation of live cervids and escaped cervids was the highest risk for the wildlife agency (72% probability of CWD introduction), other agency and academic professionals (45%), and sportsmen (43%,) while the agriculture agency was most concerned by wild deer migration with high deer densities (46%). Captive cervid operators were threatened by importation of wild deer parts and then infected carcasses or parts left on the landscape (29%). Professional groups ranked generalized risks similarly, particularly for wild deer, but varied on the most likely disease pathway scenario. These regulating agencies also ranked risks higher than those in the captive cervid industry. Recommendations from this study include reaching agreement that CWD is a problem and strive for prevention and containment. Adequate funding by state and federal agencies for wildlife health programs and stakeholder education, as well as improved wild deer surveillance, would decrease CWD risks. The captive cervid industry could investigate self-regulation or insurance options, in addition to the USDA program. This information could be used to further investigate risk management and communication strategies.

USDA TB Guidelines – Elephant Stakeholders Update

Kay Backues, Tulsa Zoo

In 2011, the Elephant Stakeholders group was formed at the request of USDA, Animal Care (AC) to address the concerns this group had with the erroneous and non-scientifically based information stated in the USDA's 2010 Elephant Guidelines for mycobacterium tuberculosis (Mtb). The group was comprised of approximately 100 individuals representing subject matter experts (SMEs) from a variety of fields and included zoo veterinarians, human epidemiologists, human pharmacologists, public health veterinarians, MDs, elephant managers and keepers, and private owners, among others. Meetings were held once a year from 2011 to 2014. In February 2015, The completed Elephant Stakeholder's Recommendations were given to USDA-AC. On October 16, 2015, the USDA announced they were going to continue to use the 2010 Guidelines and encouraged all involved to voluntarily comply with that document stating the assumption that it was the best document to address elephant Mtb. This presentation refuted that statement by demonstrating that the Stakeholder's Recommendations were compiled by elephant SMEs and were backed by peer reviewed scientific date. The USDA Guidelines were produced bya small group of individuals with no SMEs included, no transparency, and were not based on scientifically sound principles. The Stakeholder Guidelines were made available to any interested parties including state veterinarians and will also be distributed in the TB committee.

Summary of Recommendations for the Diagnosis, Treatment and Management of Tuberculosis, Mtb in Elephants in Human Care.

Modeling CWD Resistance in Vitro

Nicholas Haley, Department of Microbiology and Immunology, Midwestern University

A review of the current science involving in vitro amplification assays which can help predict transmissible spongiform encephalopathies (TSE) resistance and how this modeling strategy may be utilized to manage CWD through host resistance.

Committee Business:

The Committee received, discussed and voted on the following five resolutions. The first four were approved and forwarded to the Committee on Resolutions. The fifth did not pass.

1. Live Animal Testing for Chronic Wasting Disease
2. Chronic Wasting Disease Program Standards - Guidance on Responding to CWD Positive Herds
3. Chronic Wasting Disease Testing Protocol for Wild Cervidae
4. Tuberculosis Testing Protocol for Farmed cervidae
5. External Review of APHIS-VS CWD Program (not approved).

There was not further business, and the meeting was adjourned.

REPORT OF THE SUBCOMMITTEE ON FARMED CERVIDAE

Co-chairs: Charly Seale, Exotic Wildlife Association
Brett Marsh, Indiana Board of Animal Health
Paul Anderson, Minnesota Board of Animal Health

The Subcommittee on Farmed Cervidae met on October 26, 2015 at the Rhode Island Convention Center in Providence, Rhode Island. The following committee members were present: Shawn Schafer, ND; Eric Mohlman, NE; John Fischer, GA; David Hunter, MT; Collin Gillin, OR; and Glen Zebarth, MN. Warren Bluntzer, TX and Robert Meyer, WY were not able to attend. There were a total of 80 people in attendance at the meeting.

Reports

Dr. Tracy Nichols, USDA-Animal Plant Health Inspection Service (APHIS), Wildlife Services (WS), National Wildlife Research Center (NWRC) presented new information on Ante Mortem Testing for Chronic Wasting Disease (CWD).

Dr. Nathan Shotts, Veterinary Reproduction and Genetics PLLC and Tom Van Kleef, VERGE, presented on the Verge surgical procedure for Ante Mortem CWD-Testing-Options and Implementation.

Dr. Walt Cook, Texas A&M University, presented the results of his research on drug residues in white tailed deer.

Dr. Alecia Naugle and Dr. Randy Pritchard, USDA-APHIS-Veterinary Services (VS), presented on recent cases of CWD in the United States, issues surrounding the CWD Program Standards, protocols for dealing with CWD positive herds including trace forward and trace back, current status of developing an approved live test for CWD, and issues surrounding the use of the Dual Path Platform (DPP) tuberculosis test in cervidae.

Four resolutions were drafted, discussed, voted upon and passed out of the Subcommittee on Farmed Cervidae for subsequent consideration and possible action by the full USAHA Committee on Captive Wildlife and Alternative Livestock. These resolutions are as follows:

1. Live Animal Testing for Chronic Wasting Disease
2. Chronic Wasting Disease Program Standards - Guidance on Responding to CWD positive Herds
3. Chronic Wasting Disease Testing Protocol for Wild Cervidae
4. Tuberculosis testing protocol for farmed cervidae

REPORT OF THE USAHA/AAVLD COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT

Chair: Gary Anderson, KS
Vice Chair: Valerie Ragan, MD

John Clifford, DC; Karen Conyngham, TX; S. Peder Cuneo, AZ; Ron DeHaven, IL; James England, ID; Katherine Flynn, CA; Richard French, NH; Mallory Gaines, DC; Francis Galey, WY; Tam Garland, TX; Michael Gilsdorf, MD; Thomas Gomez, GA; William Hartmann, MN; Kristi Henderson, IL; Pamela Hullinger, CA; Annette Jones, CA; Elizabeth Lautner, IA; Randall Levings, IA; Gina Luke, DC; Andrew Maccabe, DC; Bret Marsh, IN; Barbara Martin, IA; Grant Maxie, ON; Terry McElwain, WA; Eileen Ostlund, IA; Donal O'Toole, WY; Kristy Pabilonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; Jewell Plumley, WV; Barbara Powers, CO; Valerie Ragan, VA; Willie Reed, IN; M. Gatz Riddell, Jr., AL; David Scarfe, IL; Marc Schwabenlander, MN; Kathryn Simmons, DC; David Steffen, NE; Richard Willer, HI; William Wilson, KS; David Zeman, SD.

The Committee met on October 24, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 3:00-7:00 p.m. There were nine members and 12 guests present. Attendees were welcomed and general overview and housekeeping comments were made.

American Veterinary Medical Association (AVMA), National Association of Federal Veterinarians (NAFC), Center for Public and Corporate Veterinary Medicine (CPCVM) Task Force – Update and Proposed Actions

Valerie Ragan, Center for Public and Corporate Veterinary Medicine
Michael Gilsdorf, National Association of Federal Veterinarians

Dr. Ragan provided an overview of how the veterinary profession has evolved in the US, including species of emphasis, gender of veterinary graduates, and societal needs. She referenced the Association of American Veterinary Medical Colleges (AAVMC) Foresight Report of 2007. Other surveys conducted in recent years and the CPCVM white paper also indicate that there are expanding opportunities in federal positions for veterinarians. Recommendations: 1) the classification standard for Veterinary Medical Officers (VMOs) should be expanded, 2) the Doctor of Veterinary Medicine (DVM), Veterinariae Medicinae Doctoris(VMD) degree should qualify applicants for a broader range of positions, and in many cases should be preferred, and 3) Doctor of Philosophy (PhD) research positions should be open to DVM/VMDs with appropriate academic and research experience. The recommendations have been presented and discussed with USDA leadership in multiple meetings since September 2014 where the exchanges have been consistently positive.

There are many global issues in which veterinarians could contribute, such as Ebola and others; however, there is little external awareness of opportunities in the federal workforce. In addition, it is estimated that currently there are 800 retirement eligible VMOs at the USDA (50% of workforce). The 701 series position description for federal veterinarians is too narrow in scope relative to the skills veterinarians possess.

The need for improvement in veterinary workforce planning is significant and well documented in the 2013 National Research Council, the USDA-FSIS recruitment plan and USDA Veterinary Services projections. An expansion of opportunities for the veterinary profession is necessary for the profession to step into the range of new areas needed by the world. It is suggested that each USDA program would identify mentors/adjunct faculty and develop standardized clerkships available to students from all North American veterinary colleges, as well as development of a shadowing or short-term internship for veterinarians interested in career transition. Offering a summer veterinary public practice institute for students from all veterinary colleges and interested veterinarians may be beneficial and effective.

Federal Workforce Initiatives – Recent Government Accountability Office (GAO) Report

Michael Gilsdorf, National Association of Federal Veterinarians (NAFV)

Dr. Gilsdorf provided highlights from the National Research Council/National Academies of Science report that pertain to veterinary public practice, including the GAO report, workforce management issues and emerging disease workforce, and collaborative initiative activities. Gilsdorf reiterated the need for improved planning for workforce development mentioned above.

The GAO report had three recommendations: 1) assess the veterinarian workforce needs under possible scenarios for an emergency response to a large-scale animal disease outbreak – number and type of veterinarians, resources required to have a sufficient workforce respond, and training needed to carry out their roles, 2) improve government-wide veterinarian workforce planning efforts by OPM, and 3) evaluate whether the need for government-wide direct-hire authority for veterinarians continues to exist and modify or terminate the authority as appropriate.

The September 2015 report on Drug Compounding for Animals determined that the Food and Drug Administration (FDA) could improve oversight with better information and guidance in this area. The FDA does not currently have final guidance directing its regulatory approach on drug compounding for animals and has not consistently document the basis for the actions it has taken to regulate such compounding in the past.

The GAO report addressed the topic of rehiring annuitants. The federal government has faced challenges in hiring and retaining talented workers, which are exacerbated by increased retirements in the federal workforce, and to address these challenges agencies have sought to rehire retired federal employees. The 2010 National Defense Authorization Act (NDAA) provides authority for agencies to grant waivers to re-employed annuitants on a temporary basis to fulfill functions critical to the mission of the agency. The agencies reviewed made very little use of the NDAA waiver authority.

The federal government is currently losing the battle of obtaining and retaining the best and brightest in the veterinary community. There is a collaborative working group (Talent Management Advisory Council (TMAC)

that has been developed for a more proactive, government-wide approach to address Veterinary Medical Officer (VMO) workforce issues: 1) assisting current state of the VMO workforce, 2) identifying key recruiting, hiring and retention issues, and 3) developing an action plan to prioritize and address specific workforce issues. The NAFV, VS, Food Safety and Inspection Service (FSIS), Department of Homeland Security (DHS), American Veterinary Medical Association (AVMA) and the VA are working together to address the VMO hiring needs by identifying gaps and resources needed to fill them. NAFV and AVMA will take those needs to Congress and request funding. Even though Office of Personnel Management (OPM) recognizes the need for a viable federal veterinary workforce, they have not taken the lead in this effort because they feel the cyber security workforce is higher priority.

Public Health Veterinarian Careers
Janet McGinn, Office of Policy and Program Development, Food Safety and Inspection Service (FSIS), USDA

Dr. McGinn provided an overview of the FSIS mission of protecting consumers by ensuring that meat, poultry and processed eggs are safe, wholesome and accurately labeled. There are approximately 1,000 public health veterinarians, 7,000 inspectors who inspect about 6,000 plants nationwide, over 9 billion poultry, 100 million swine, and 35 million cattle carcasses and 3.5 billion pounds of processed egg products per year. FSIS veterinarians ensure that the industry is preventing public health hazards and decreasing foodborne hazards in the food supply. Veterinarians and their inspection staff are the first line of defense for food security through knowledge and expertise in zoonotic diseases, microbiology, public health, treatment protocols, testing methodologies, and critical thinking. Employment opportunities exist and pathways via Internships, Recent-Graduate, Professional Management Fellows, FSIS Volunteer Student, and Third-Party programs all enhance the potential of meeting the needs. One to three percent of all new veterinary graduates are interested in public practice careers.

National Animal Health Emergency Response Corps (NAHERC)
Jon Zack, Preparedness and Incident Coordination Staff

Dr. Zack provided NAHERC vision, mission and history and then focused on the recent Avian Influenza situation. Veterinarians with a valid license and animal health/veterinary technicians with a diploma or equivalent experience are eligible to participate in NAHERC, and the program has recruited nearly 4,200 personnel (971 VMOs and over 3,000 AHTs) in all 50 states. Under NAHERC, animal health professionals are recruited, hired and activated as temporary Federal employees. The reasons to volunteer for NAHERC are to: defend US agriculture, help animals in need, expand career options, network within the veterinary community, learn emergency response procedures, and obtain professional development training. There is significant need to expand NAHERC, which also provides increased awareness and opportunity across the veterinary profession.

The Center for Animal Health in Appalachia – Modeling and Economic Impact in Rural Areas

Jason Johnson, Center for Animal Health in Appalachia CAHA and Lincoln Memorial University

Dr. Johnson provided an overview of Lincoln Memorial University's mission for veterinary medicine in the Appalachian region including that of CAHA, which is to improve animal and public health throughout that region. The CAHA believed animals were important to Appalachia, veterinarians were living and thriving with Appalachia, and those veterinarians were contributing to their communities economically, socially and professionally. Thus, CAHA set out to determine (model) the distribution of veterinarians in Appalachia, the animal composition and distribution trends, the impact of veterinarians on rural communities based on a Mixed Animal Practice Model. The project was done in partnership with the National Center for the Analysis of Healthcare Data (NCAHD).

The following points were learned from the modeling: 1) 7,178 in-state practicing veterinarians are within the Appalachian footprint, 2) the veterinarians provide a total employment impact of approximately eight people per practice and their practices serve as economic engines for their communities providing nearly $2.3 billion to the Appalachian economy, 3) the practices provide 57,424 jobs to the footprint, 4) of the 7,178 licensed veterinarians, approximately 11% are more than 60 years of age, 5) the veterinarians care for about 13.8M small animals and 13.7M large animals with an estimated herd size worth $14.2 billion. Based upon the modeling it may appear that Appalachia is well served with veterinarians; however, 75% of the rural counties within the footprint have an apparent veterinary shortage which translates into an estimated economic loss of $621M and 15,256 jobs.

It is believed that the modeling done in the Appalachian region can be used to advocate for the Veterinary Medicine Loan Repayment Program (VMLRP), Veterinary Practice Sales Group (VPSG), and other initiatives. It appears that the mixed animal practice model provides conservative estimates of what a veterinary practice would bring into any/most rural communities. Additional information can be found in the 2015 State of Animal Health in Appalachian Report, http://vetmed.lmunet.edu/caha/ and CAHA@lmunet.edu.

Paraprofessionals in Veterinary Diagnostics

Marc Schwabenlander, College of Veterinary Medicine, University of Minnesota

Dr. Schwabenlander provided an overview of a variety of examples where paraprofessionals are utilized in other medical fields and the benefits to both the medical practitioner and the paraprofessional, such as paramedics, nurse practitioners, physician assistants, dental therapists, etc. Currently there are non-veterinarians certified in veterinary medicine at the Associate's or Bachelor's degree, and Veterinary Technicians have a national examination and a professional society (National Association of Veterinary Technicians in America). Laboratory Animal Technician/Technologist certification occurs by

the American Association of Laboratory Animal Science (AALAS), there are a few online Master's degree options in Biomedical Sciences with an emphasis in Veterinary Medicine and Surgery geared toward certified Veterinary Technicians, and also a Master's degree in Veterinary Forensics for shelter medicine operations, animal control officers, etc.

Development of a parapathologist track requires a recognized need along with funding, faculty buy-in and appropriate workload, which becomes an opportunity for the right personnel. The parapathologist can become a trusted professional who is an extension of the pathologist so there may be better utilization of the pathologist, ie, may be a cost-effective way of producing high-level results in a reference laboratory setting. One would expect that training to be effective for a wide variety of applications in veterinary medicine ranging from high-volume production animal practices where postmortem exams are performed routinely in the field to clinical research facilities/projects and finally in diagnostic laboratories. Mr. Schwabenlander would be interested in hearing what other laboratories are doing in this paraprofessional arena. His contact is schwa239@umn.edu.

NBAF Workforce Development – Kansas State University

Dr. Raymond Roberts (Bob) Rowland, Diagnostic Medicine and Pathobiology

The National Bio and Agro-Defense Facility (NBAF) is targeted for completion in 2022 and will be the replacement for the Plum Island Animal Disease Center (PIADC). The personnel/scientific resources that will be required to fulfill the vision, mission and routine operations of the NBAF will be significant and will require a culture change regarding stakeholder connectivity and workforce development. NBAF will be the pivot point for many Kansas State departments/units (College of Veterinary Medicine, Biosecurity Research Institute, K-State Veterinary Diagnostic Laboratory, etc), private companies, other universities, and many state and federal agencies.

A major focus at K-State is to assist in preparing a workforce ready to function within NBAF, and the first–level goal is a dual DVM/PhD program. The strategy is to introduce and engage students as early as possible in the educational process and to selectively commit to the highest quality individuals for the DVM/PhD program. The cost per student is estimated to be at least $250K and a timeframe of approximately nine years for completion. There is considerable flexibility in the program regarding where research is done, including departments on campus, high-containment facilities (including PIADC), and international laboratories. The focus for workforce development is laboratory expertise and project leaders where there is understanding and unique hands-on experience in funding and coordinating high-consequence disease research. Diversity and new approaches to development of personnel capable of working and establishing flourishing careers in the NBAF and associated agencies and facilities across the globe are critical targets for this educational/training effort.

BSL-3 Training/Transboundary Animal Disease Summer Program

Steve Ellsworth, Center of Excellence for Emerging and Zoonotic Animal Diseases

Dr. Ellsworth provided an overview of the DHS funded Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD), and then highlighted the summer training program in high containment and for veterinary students. CEEZAD has four areas of emphasis regarding high-threat disease (foreign, emerging, zoonotic) and they are vaccines, detection, epidemiology/modeling and education and outreach. There is a wide range of activities encompassed in CEEZAD's education and outreach, including web-based courses, fellowships in infectious disease and pathology, minority serving institution support, DHS summer research for federal service academies, USDA Borlaug fellowship program, traditional undergraduate and graduate students, career development programs, ABSL-3 lab animal medicine residency training, and the summer program emphasized here.

The purpose of the BSL-3 Training/Transboundary Animal Disease Summer Program is to provide BSL-3 training to graduate students (MS, PhD, CVM/post-docs) interested in research and careers in the field of high-consequence transboundary animal diseases and to increase awareness of activities to be conducted at the future NBAF. The program is structured with a week of hands-on BSL-3 training at the Biosecurity Research Institute and a week where nationally and internationally recognized experts interacted with the students, as well as in-depth visits to companies located in the Kansas City Animal Health Corridor. The program objectives were to increase awareness of general biosecurity practices when dealing with select agents, expose students to the BSL-3/Ag research environment/careers, expose students to animal health industry activities, needs and opportunities, increase awareness of current practical and scientific aspects of select transboundary emerging and zoonotic diseases, and provide networking opportunities with peers and subject-matter experts in the field of high-containment research and transboundary diseases of animals.

Eligibility for the program is based on US citizenship, a GPA of at least 3.4/4.0 and currently enrolled as a full-time graduate student or post-doc at a CEEZAD-affiliated institution. The class size is limited to 10 students, applications are competitive and evaluated to an outside committee, and travel stipends may be available. More information and application are available at www.ceezad.org.

Diagnostic Medicine Internship Program – Kansas State University

Gregg Hanzlicek, Outreach and Field Investigation, K-State Veterinary Diagnostic Laboratory

Dr. Hanzlicek was not able to present due to time, but his presentation is included. The Kansas State Veterinary Diagnostic Laboratory (KSVDL) initiated a diagnostic medicine/sciences intern program three years ago with a goal of introducing veterinarians to the variety of disciplines involved in diagnostic medicine and laboratory sciences so the trainees might be prepared (and accepted) into programs of further training such as pathology or

microbiology residency or graduate programs. The program is open to any veterinarian, but the first-choice applicant is targeted to be a practicing veterinarian who has a desire for a career change.

There is a recognized workforce need for veterinary diagnosticians throughout North America, and the bias/experience at KSVDL is that there is tremendous need for technical personnel and diagnosticians who can understand clinical medicine and the nuances/issues of everyday practice. Thus, the objective of targeting former practitioners for the internship program whenever possible. Currently the challenge is providing adequate compensation to the intern who enters the program after practicing.

AAVLD Director Qualifications – "survey"

Gary Anderson, Kansas State Veterinary Diagnostic Laboratory, Kansas State University (KSU)

A survey/questionnaire was conducted among current directors of American Association of Veterinary Laboratory Diagnosticians (AAVLD) laboratories in an attempt to determine potential guidelines for young professionals interested in laboratory/diagnostic medicine and possible leadership roles. Dr. Anderson was not able to present due to time constraints, but the presentation is included.

All respondents to the survey indicated that the DVM degree should be required for the laboratory director position, with nearly all indicating that a PhD and/or board certification should be preferred for applicants. Considerable emphasis was placed on business experience and/or MBA and supervisory experience/management, as well as clinical practice experience, professional pubic manager/HR, leadership training, and a thorough understanding of quality management systems. Experience post-DVM recommended ranged from 2-15 years with the majority of respondents preferring greater than five years after veterinary school and other training.

Committee Business:

The Committee developed and passed a resolution entitled, "The federal classification standard of the Veterinary Medical Officer (VMO) -0701 series should be updated to reflect the expanded skills and abilities of veterinarians", which was forwarded to the Committee on Resolutions.

REPORT OF THE USAHA/AAVLD COMMITTEE ON ENVIRONMENT AND TOXICOLOGY

Chair: Larry Thompson, MO
Vice Chair: Tim Evans, MO

David Ailor, DC; A. Catherine Barr, TX; Adrienne Bautista, CA; Karyn Bischoff, NY; John Buchweitz, MI; Steven Ensley, IA; Michael Filigenzi, CA; Francis Galey, WY; Tam Garland, TX; Cynthia Gaskill, KY; Ramesh Gupta, KY; Kristin Haas, VT; Jeffery Hall, UT; Dwayne Hamar, CO; Brent Hoff, ON; Stephen Hooser, IN; Paula Imerman, IA; Sandra James-Yi, VA; Joe Kendall, AB; Patrice Klein, MD; Laurent O'Gene Lollis, FL; Randall Lovell, MD; Geraldine Magnin-Bissel, VA; David Meeker, VA; Mary Mengel, IN; Michelle Mostrom, ND; Gene Niles, CO; Eileen Ostlund, IA; Stephanie Ostrowski, AL; Robert Poppenga, CA; Renate Reimschuessel, MD; Wilson Rumbeiha, IA; Nick Schrier, ON; Dahai Shao, IA; Lori Smith, KY; Patricia Talcott, WA; Deon Van der Merwe, KS; Christina Wilson, IN.

The Committee met on Saturday, October 24, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 3:00 p.m. to 6:00 p.m.

Committee Business:
There were no resolutions submitted or other actions taken by the Committee.

REPORT OF THE USAHA/AAVLD COMMITTEE ON FOOD AND FEED SAFETY

Chair: Patrick McDonough, NY
Vice Chair: Craig Shultz, PA

David Ailor, DC; Chris Ashworth, AR; James Averill, MI; Deanna Baldwin, MD; Adrienne Bautista, CA; Richard Benton, MS; Karyn Bischoff, NY; Richard Breitmeyer, CA; Deborah Brennan, MS; Dwight Bruno, NY; Beverly Byrum, OH; Jim Collins, GA; Wendy Cuevas-Espelid, GA; Glenda Davis, AZ; Ignacio dela Cruz, MP; Kathy Finnerty, MA; Mallory Gaines, DC; Tam Garland, TX; Robert Gerlach, AK; Chelsea Good, MO; Laura Goodman, NY; Jerry Heidel, OR; Douglas Hepper, CA; Joseph Hill, GA; Susanne Hinkley, NE; Christine Hoang, IL; Donald Hoenig, ME; Clyde Hoskins, SC; Danny Hughes, AR; John Huntley, WA; Doreene Hyatt, CO; Ellen Kasari, CO; Susan Keller, ND; Joe Kendall, AB; Hailu Kinde, CA; Jennifer Koeman, IA; T.R. Lansford, TX; Dale Lauer, MN; Elizabeth Lautner, IA; Arthur Layton, MT; Tsang Long Lin, IN; Laurent O'Gene Lollis, FL; Bret Marsh, IN; David Marshall, NC; Katherine McNamara, VT; David Meeker, VA; Shelley Mehlenbacher, VT; Brenda Morningstar-Shaw, IA; Nicole Neeser, MN; Gene Niles, CO; Sandra Norman, IN; Ogi Okwumabua, WI; Kenneth Olson, IL; Stephanie Ostrowski, AL; Lanny Pace, MS; Elizabeth Parker, TX; David Pyburn, IA; John Ragan, MD; Lisa Ramsey, VA; Renate Reimschuessel, MD; Grant Rezabek, OK; M. Gatz Riddell, Jr., AL; Joni Scheftel, MN; David Schmitt, IA; Kathryn Simmons, DC; Harry Snelson, NC; Stan Stromberg, OK; Larry Thompson, MO; Bob Tully, KS; Shauna Voss, MN; Liz Wagstrom, DC; Doug Waltman, GA; Robert Wills, MS; Nora Wineland, MO.

The Committee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 1:30 until 5:30 p.m. There were 23 members and 24 guests present. Dr. McDonough welcomed the attendees and reviewed the purpose of the committee, i.e., "the purpose of the joint USAHA/AAVLD Committee on Food and Feed Safety is to provide a national forum to discuss current and emerging issues and information pertaining to all aspects of food and feed safety and related veterinary diagnostic testing of foods of animal origin. The Committee should recommend food and feed safety policies to protect animal and human health."

Salmonella in Dogs and Cats (Symptomatic/Asymptomatic Prevalence) 2012-2014: A Survey Conducted by 11 Vet-LIRN Laboratories

Renate Reimschuessel Veterinary Laboratory Investigation and Response Network (Vet-LIRN)

Some *Salmonella* outbreaks in humans have been linked to dog food according to the Centers for Disease Control and Prevention. The Food and Drug Administration (FDA) wanted to determine the impact of *Salmonella* on pets and also the background prevalence in dogs and cats. They developed a case definition for clinically ill dogs and cats as an animal with diarrhea presented to their veterinarian by their owner. The FDA enlisted eleven Vet-LIRN laboratories to participate in a project to explore *Salmonella* in

companion animals. First they harmonized a method for culturing *Salmonella* from companion animal feces. The study determined that the overall background prevalence for *Salmonella* was 2.5% for dogs (60 of 2422) and 0.6% for cats (3 of 542). Almost half of the *Salmonella* positive dogs were asymptomatic. The *Salmonella* serotypes found in cats were *S.* Javiana, *S.* I 4,5,12:i: -, and *S*. Infantis. While over 30 serotypes were found in dogs, the four most frequently isolated serotypes were *S*. Newport, *S*. Enteritidis, *S.* Javiana, and *S*. Infantis. When looking at the top seven *Salmonella* serotypes found in dogs (n= 2422 samples) versus humans (n = 49004 samples in 2012), they found similar serotypes, i.e., dogs (*S.* Newport, Enteritidis, Javiana, Infantis, Montevideo, Typhimurium, and Albany), and humans (*S.* Enteritidis, Typhimurium, Newport, Javiana, 1 4,5,12:1:-, Montevideo, and Infantis).

Most *Salmonella* isolates were pan-susceptible when antimicrobial susceptibility testing was performed.

Salmonella positive dogs were more likely to have eaten raw food or a probiotic than negative dogs, and very young dogs or very old (for breed) may be more at risk to become positive. When assessing temperature effects, they determined that during times of warmer temperatures (80F), there were a higher percentage of positive dogs.

Canine Urine Fanconi Panel Results in Association with Jerky Pet Treat Ingestion

Renate Reimschuessel, Veterinary Laboratory Investigation and Response Network (Vet-LIRN)

Since 2007, over 5,000 reports of pet illness associated with jerky treats. Clinical signs in dogs included vomiting, diarrhea, lethargy, decreased appetite, increased thirst and increased urination.

So what is Fanconi Syndrome (FS)? FS is a defect in a part of the proximal convoluted tubules of the kidneys. This defect is rare in dogs, i.e., it has a genetic component in Basenji's and in Labrador Retrievers. The patient often has a normal blood glucose but because of the kidney tubule defect, the dog will lose glucose in their urine or glucosuria. This is how veterinarians in practice usually diagnose Fanconi syndrome. The kidney tubule defect may also be acquired, i.e., common causes are exposure to ethylene glycol, grapes/raisins, Leptospira, drugs (Aminoglycosides-gentamicin, amikacin, expired tetracycline's, sulfonamides, polymyxins, chemo Rx-cisplatin, methotrexate, doxorubicin), and heavy metals (lead, mercury, copper, cadmium, and chromium).

In 2012, the Vet-LIRN began collaborating with owners and veterinarians across the country to collect diagnostic samples from dogs with a variety of illnesses (not just FS) following jerky pet treat (JPT) consumption. In other words, not just the 4-5% of dogs with reported FS. A variety of samples and tests were coordinated, e.g., serum chemistries, fecal cultures, urinalysis, urine Fanconi panel, Raman, Leptospira serology, DNA analysis. This list is not exhaustive, and they performed many other types of tests (EM, IHC, Heavy Metals, BGA, Alpha Amanitin) on the over 400 active cases that they currently

investigate. The results of necropsy exam of 82 deaths reported to FDA indicate that 42 of these were not related to jerky consumption. Thirty-three dogs died of renal problems, two of liver disease and four of gastrointestinal problems. They are having further diagnostics done on the renal cases to get a better idea about the nature of the kidney lesions and to better understand the etiologies that may be involved. In 2012, Vet-LIRN in collaboration with the University of Pennsylvania's PennGen Metabolic Genetics Laboratory, began testing a variety of dog breeds with various illness types using an established urine Fanconi panel. Their goal in using the PennGen panel is to better characterize the occurrence of FS associated with JPT exposure, determine the time course of recovery, and also potential predisposing factors to FS.

The Vet-LIRN tested seven times more dogs from breeds weighing less than 30 pounds based on reports FDA receives. Dogs form breeds weighing < 30 lbs. test positive at higher rates than dogs weighing more than 3 pounds for the first 3 Fanconi panel results. Of the 164 small dogs tested (75%) were positive first round (123) and almost that for the 77 dogs tested the second round (56 positive). Moreover the 1st Fanconi panel was performed on dogs with a variety of presenting clinical signs, not just those symptoms of Fanconi syndrome. Additionally, the 2nd and 3rd Round Fanconi panels were from dogs with a positive result on the previous Fanconi test. The Maltese, Poodle, and Dachshund test positive at ~86-89% approximately 2 months after the first positive Fanconi test and after the cessation of JPT consumption.

This trend continued for ~4 months after the first Fanconi positive result. They determined that the number of dogs with glucosuria was much lower than the number of dogs testing Fanconi positive. This is because clinically, the glucosuria resolves and is no longer detectable, but the dogs continue testing positive with the Urine Fanconi panel.

In summary, small dogs (<30 lb.) are more frequently Fanconi positive. The four most commonly affected breeds are Maltese, Poodle, Dachshund, Shih Tzu, and Chihuahua. Maltese and Poodle test positive at 86-89% about 4 months after the first Fanconi positive result. Glucosuria disappears before Fanconi positive dogs become negative.

Vet-LIRN and CARB – National Action Plan for Combating Antibiotic Resistance

Renate Reimschuessel, Veterinary Laboratory Investigation and Response Network (Vet-LIRN)

The Food and Drug Administration (FDA) Vet-LIRN is included as part of President Obama's plan to combat antibiotic resistance in the United States. The plan is called the National Action Plan for Combating Antibiotic Resistance Bacteria (CARB).

A number of goals have been described for CARB, and the Vet-LIRN is part of Goal 2 and 3:

- GOAL 1: Slow the Emergence of Resistant Bacteria and Prevent the Spread of Resistant Infections

- GOAL 2: Strengthen National One-Health Surveillance Efforts to Combat Resistance
- GOAL 3: Advance Development and Use of Rapid and Innovative Diagnostic Tests for Identification and Characterization of Resistant Bacteria
- GOAL 4: Accelerate Basic and Applied Research and Development for New Antibiotics, Other Therapeutics, and Vaccines

Goal 2- Strengthen National One-Health Surveillance Efforts to Combat Resistance -within one year:

The USDA and FDA will assess current capacities and protocols within National Animal Health Laboratory Network (NAHLN) and Vet-LIRN member laboratories and identify capacity development needs that would support nationwide antibiotic resistance surveillance for zoonotic pathogens and pathogens of importance to animal health. As part of this Goal, the American Association of Veterinary Laboratory Diagnosticians (AAVLD), NAHLN and the Vet-LIRN surveyed laboratories (27 of 37 Vet-LIRN laboratories completed the survey) and determined that 21 use Thermo-Fisher Sensititre system, 4 use bioMérieux Vitek, and 23 also use the Kirby-Bauer disk or broth methods.

By 2020, the significant outcomes are routine testing of zoonotic and animal pathogens for antibiotic susceptibility at ten to twenty NAHLN and Vet-LIRN member laboratories that are using standardized testing methods and data sharing practices.

Goal 3- Advance Development and Use of Rapid and Innovative Diagnostic Tests for Identification and Characterization of Resistant Bacteria:

By 2020, the expected significant outcomes for this goas are that the USDA and FDA will provide support for ten to twenty NAHLN and Vet-LIRN member laboratories for next-generation sequencing equipment and training on the use of whole-genome sequencing techniques and bioinformatics.

The FDA-Vet LIRN is waiting on funding to initiate these two goals as part of CARB.

Final Rule for Preventive Controls for Animal Food

Michael Murphy Center for Veterinary Medicine

The Food Safety Modernization Act (FSMA) created the regulatory framework that holds animal food manufacturers accountable for having a food safety plan, verifying it is working, and taking corrective action when it isn't. The actual title of the rule, slightly revised from the title in the proposed rule, is Current Good Manufacturing Practice (CGMP), Hazard Analysis, and Risk-Based Preventive Controls for Food for Animals. The rule is found in Part 507 of the Code of Federal Regulations. The original proposal was published in the Federal Register on October 29, 2013. FDA received more than 2,400 comments on the proposal. As a result of these comments, the FDA made substantial changes and issued a supplemental proposal on September 29, 2014. The FDA received more than 140 comments on the supplemental proposal. The final rule, that went on display September 10 and was published

in the Federal Register on September 17, 2015, is the result of careful consideration of all the comments received.

The Preventive Controls for Animal Food rule applies to facilities that manufacture, process, pack, or hold animal food for consumption in the US. These are facilities that are required to register with FDA under section 415 of the Federal Food, Drug, and Cosmetic Act. Facilities that are not required to register, such as farms, are not subject to the requirements of this rule. The rule does apply to both domestic and imported food. The final rule does provide some exemptions and modified requirements for certain facilities. Most of the exemptions were directed by Food Safety Modernization Act (FSMA) itself.

The final rule is a very complex rule and Dr. Murphy provided highlights of the Rule. He addressed two key areas: the first key area relates to establishing CGMPrequirements for animal food. The second of these is the FSMA-mandated requirement that facilities conduct a hazard analysis and implement risk-based preventive controls for hazards requiring preventive controls. Each facility would be required to implement a written food safety plan that focuses on preventing hazards in animal foods.

The first key area that Dr. Murphy covered related to establishing CGMP requirements for animal food. The original proposed CGMPs did not go over very well. We needed to take a step back in the supplemental to add flexibility because this rule has to cover a wide array of facilities (from small feed mills to large pet food facilities) that make food for many animal species. From the original proposal to the supplemental proposal, the original CGMP's were greatly modified. The FDA received a number of comments that supported the revised CGMPs that were proposed in the supplemental notice, but additional modifications were also requested. The FDA has revised the CGMPs based on comments and existing industry standards. The modifications were added to provide clarity and to provide additional flexibility and decreased prescriptiveness while still maintaining a baseline to protect against animal food contamination that would be harmful to public health. When we consider public health, this rule had to address both the health of animals who may eat the food and that of humans who may eat the edible animal products (such as meat, milk, and eggs) or handle food (such as pet food in the home). The added flexibility modifications were through use of language such as "when necessary" or "as necessary" or "adequately." The CGMP's address the following areas:

- Personnel
- Plant and grounds
- Sanitation
- Water supply and plumbing
- Equipment and utensils
- Plant operations
- Holding and distribution

- Holding and distribution of human food by-products for use as animal food

The first provision in Subpart C on hazard analysis and risk-based preventive controls is the requirement for a written food safety plan. There are several components to a food safety plan:

- Hazard analysis
- Preventive controls
- Supply-chain program
- Recall plan
- Procedures for monitoring
- Corrective action procedures
- Verification procedures

Although the rule becomes effective 60 days after publication, compliance dates are staggered by business size. Because the animal food industry will be implementing both CGMPs and preventive controls for the first time, the FDA has also decided to stagger the implementation of the CGMP requirements and the PC requirements by business size. For CGMPs, very small businesses, have three years to comply; small businesses, which are those with fewer than 500 full-time equivalent (FTEs), must comply in two years, all other businesses, have one year to comply. The compliance date for the preventive controls requirements will follow the CGMPs by one year. For preventive controls, very small businesses, which are subject to modified requirements, have four years to comply; small businesses, which are those with fewer than 500 FTEs, must comply in three years, all other businesses, have two years to comply. Separate compliance dates have been established for the supply-chain program provisions to accommodate compliance dates for suppliers of different sizes subject to different rules (e.g., Produce Safety Standards, Foreign Supplier Verification Program). Information on other dates can be found in Table 33 of the preamble to the final rule.

FDA is planning guidance documents to help industry comply with the requirements of the rule. The first guidance will be for implementation of the CGMPs provisions, closely followed by a guidance document on the use of human food by-products as animal food. Another guidance will address the hazards associated with different foods and how to apply preventive controls for hazards. And as with all rules, there will be a Small Entity Compliance Guide that explains the actions a small or very small business must take to comply with the rule. The FDA will consider additional future guidance, such as commodity-specific guidance.

FDA also recognizes that there will need to be industry and regulator training and there are likely to be many questions. They are collaborating with the Food Safety Preventive Controls Alliance to establish training and technical assistance programs. They are establishing a Food Safety Technical Assistance Network within FDA where industry can ask questions by submitting a form online and get answers from Subject Matter Experts within the agency.

More information can be found on FDA's FSMA webpage http://www.fda.gov/fsma , which has a subscription feature to receive updates. FDA has established a Food Safety Modernization Act (FSMA) Technical Assistance Network that is utilizing a web-form for people to submit questions and get responses. The web form can be accessed through the main FSMA page or through the long URL (http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm459719.htm). Additional updates can be found at http://www.fda.gov/animalveterinary/products/animalfoodfeeds/ucm347941.htm

Veterinary Feed Directive (VFD) Update

Michael Murphy, Center for Veterinary Medicine, FDA

The US Food and Drug Administration announced today the Veterinary Feed Directive (VFD) final rule, an important piece of the agency's overall strategy to promote the judicious use of antimicrobials in food-producing animals. This strategy will bring the use of these drugs under veterinary supervision so that they are used only when necessary for assuring animal health. The VFD final rule outlines the process for authorizing use of VFD drugs (animal drugs intended for use in or on animal feed that require the supervision of a licensed veterinarian) and provides veterinarians in all states with a framework for authorizing the use of medically important antimicrobials in feed when needed for specific animal health purposes.

The VFD final rule continues to require veterinarians to issue all VFDs within the context of a veterinarian-client-patient relationship (VCPR) and specifies the key elements that define a VCPR. These key elements include that the veterinarian engage the client (i.e., animal producer or caretaker) to assume responsibility for making clinical judgments about patient (i.e., animal) health, have sufficient knowledge of the animal by conducting examinations and/or visits to the facility where the animal is managed, and provide for any necessary follow-up evaluation or care. The final rule will require veterinarians to follow state-defined VCPR requirements; in states where the FDA determines that no applicable or appropriate state VCPR requirements exist, veterinarians will need to issue VFDs in compliance with federally defined VCPR requirements. All veterinarians will need to adhere to a VCPR that includes the key elements in the final rule.

"The actions the FDA has taken to date represent important steps toward a fundamental change in how antimicrobials can be legally used in food-producing animals," said Michael R. Taylor, FDA deputy commissioner for foods. "The VFD final rule takes another important step by facilitating veterinary oversight in a way that allows for the flexibility needed to accommodate the diversity of circumstances that veterinarians encounter, while ensuring such oversight is conducted in accordance with nationally consistent principles."

In December 2013, the agency published a guidance document, which calls on animal drug manufacturers of approved medically important antimicrobials that are put into water or feed of food-producing animals to

voluntarily stop labeling them as drugs that can be used to promote animal growth and change the labeling of their products for the remaining uses to require veterinary oversight of these drugs when they are used for therapeutic purposes. All of the affected makers of these drugs have committed in writing to participate in the strategy.

Additional Information as listed below, can be found on the FDA-CVM web site.

- Final Rule: Veterinary Feed Directive
- Notice of Availability of Draft Revised Guidance for Industry: Veterinary Feed Directive Regulation Questions and Answers
- FACT SHEET: Veterinary Feed Directive Final Rule and Next Steps
- Placing Animal Drugs under Veterinarian Oversight: Questions and Answers with Michael Taylor and William Flynn
- Draft Guidance for Industry #120 Veterinary Feed Directive Regulation Questions and Answers (PDF - 133KB)
- Veterinary Feed Directive (VFD)
- FDA Voice: Veterinary Feed Directive Will Protect Both People and Animals

Dr. Murphy addressed a number of topics in his presentation on the FDA's VFD:

- What changes are being made and why?
- What drugs are affected, which ones are not?
- What is a veterinary feed directive?
- What are key elements of VFD regulation?
- When will this go into effect?

Antimicrobial use is a driver of resistance

- All uses (human, animal, horticultural, other) are part of the picture
- Despite complexities and uncertainties steps can be identified to mitigate risk
- Intent is to implement measures that address public health concern while assuring animal health needs are met

Guidance #209 outlines the antimicrobial resistance policy. FDA's Judicious Use Strategy: Two key principles are outlined in Guidance #209:

1. Limit medically important antimicrobial drugs to therapeutic purposes (i.e., those uses considered necessary for ensuring animal health)
2. Require veterinary oversight or consultation for such therapeutic uses in food-producing animals

Guidance #213: Implementation - was finalized December 2013 and provides a more detailed guidance on implementing key principles in Guidance #209; it presents a timeline for implementation and defines drugs that are medically important. December 2016 is the target for drug sponsors to implement changes to use conditions of medically important antibiotics in food and water to withdraw approved production uses (such as "increased rate of weight gain" or "improved feed efficiency") because such production uses will

no longer be legal. However, therapeutic uses are to be retained such as for treatment, control, and prevention indications, and these require veterinary oversight.

Guidance #213: Veterinary Oversight: The Key principle is to include veterinarian in decision-making process but it

- Does not require direct veterinarian involvement in drug administration
- Does require use be authorized by licensed veterinarian
- This means changing marketing status from OTC to Rx or VFD
- Water soluble products to Rx – "medicated water"
- Products used in or on feed to VFD – "medicated feed"

Guidance #213: Scope/what drugs are affected and which ones are not?

Only affects antibiotics that are:

- Medically important
    - Administered in feed or drinking water; other dosage forms (e.g., injectable, bolus) not affected
- Includes antimicrobial drugs that are considered important for therapeutic use in humans
    - Guidance #213 defines "medically important" to include all antimicrobial drugs/drug classes that are listed in Appendix A of FDA's Guidance #152

Dr. Murphy gave examples of affected feed-use and water-use antibiotics.

Drugs not affected by Guidance #213 are antibiotics that are already VFD – avilamycin, florfenicol, tilmicosin; or Rx – Tylosin, and that are not medically important, for example:

- Ionophores (monensin, lasalocid, etc.)
- Bacitracin (BMD, bacitracin zinc)
- Bambermycins
- Carbadox

Other drugs (that are not antibiotics), including:

- Anthelmentics: Coumaphos, Fenbendazole, Ivermectin
- Beta agonists: Ractopamine, Zilpaterol
- Coccidiostats: Clopidol, Decoquinate, Diclazuril

What is a veterinary feed directive?

VFD drug – A 'veterinary feed directive (VFD) drug' is a drug intended for use in or on animal feed which is limited by a Center for Veterinary Medicine (CVM) approved application to use under the professional supervision of a licensed veterinarian. Use of animal feed bearing or containing a VFD drug must be authorized by a lawful veterinary feed directive.

Veterinary Feed Directive (VFD): a ''veterinary feed directive'' is a written (nonverbal) statement issued by a licensed veterinarian in the course of the veterinarian's professional practice that orders the use of a VFD drug or combination VFD drug in or on an animal feed. This written statement

authorizes the client (the owner of the animal or animals or other caretaker) to obtain and use animal feed bearing or containing a VFD drug or combination VFD drug to treat the client's animals only in accordance with the conditions for use approved by the Food and Drug Administration (FDA).

Existing framework for veterinary oversight of feed use drugs is the VFD. In 1996 Congress passed Federal Law stating that medicated feeds which require veterinary oversight are VFDs. In 2000 FDA finalized regulations for authorization, distribution and use of VFDs. Although a similar concept, (… by or on the order of a licensed veterinarian) VFDs are not Rx.

Changes made were intended to make the process more efficient while continuing to provide public health protections:

VFD Final Rule

- June 3, 2015 – VFD final rule published
- October 1, 2015 – VFD final rule became effective

The implementation timeline summary:

- October 1, 2015 – VFD Final Rule went into effect
    - Applies to current VFD drugs
- January 1, 2017 – Target for all medically important antimicrobials for use in or on feed to require a VFD
    - December 2016 – Target for drug sponsors to implement changes to use conditions of products affected by Guidance for Industry (GFI) #213

More information:
http://www.fda.gov/AnimalVeterinary/NewsEvents/CVMUpdates/ucm448620.htm

Supply Chain Contamination Event Case Study: 2014 Incident Management Response (Case Study- Michigan Feed Contamination/Adulteration with Lasalocid)
2014 MDARD Lasalocid Investigation Summary
James Averill, Michigan Department of Agriculture and Rural Development

MDARD investigation is the most complex animal feed investigation in recent memory

A cooperative effort by Michigan Department of Agriculture and Rural Development (MDARD) staff from the Pesticide and Plant Pest Management Division (PPPMD), Laboratory and Animal Industry Divisions (AID) and MDARD's Rapid Response Team (RRT) resulted in the largest investigation that affected livestock and Michigan's feed industry in recent memory. The investigation findings impacted numerous feed manufacturers and producers in this state and were linked to approximately 55,000 turkey deaths, disposal of 500 tons of feed and limited the movement of over 35,000 swine to market. The case turned into a nationwide investigation and traceback of a feed product involving the United States Food and Drug Administration (FDA), United States Department of Agriculture (USDA) and many other state feed and animal health programs.

On August 11, 2014, MDARD was notified by the index farm's veterinarian that the farm had experienced significant mortalities. Tissue samples as well as feed samples were sent to Michigan State University Diagnostic Center for Population and Animal Health (MSU-DCPAH), which identified lasalocid to be the cause of death in the turkeys and feed samples also tested positive for lasalocid. Lasalocid is an ionophore drug that is approved for use in poultry and other species of livestock at approved levels. However, at higher levels, it can become toxic. Lasalocid is not approved for use in swine and has been shown to be fatal to horses or dogs if ingested.

MDARD and FDA contacted the index farm to assist in determining the cause of the toxicity due to lasalocid. Lasalocid levels from feed samples taken on the farm were found at 4-6 times the feeding rate for turkeys. MDARD worked in cooperation with MSU, DCPAH to analyze samples of dozens of feed ingredients used on the farm to determine the source. The team discovered that lasalocid was present in the grease the farm uses in both its turkey and swine feed formulations. Grease is typically added to feed as a flavoring and to increase fat content.

MDARD and FDA investigated the sources of the adulterated grease and determined that a restaurant recycling firm in Michigan received an out of state industrial processing waste oil product called Lascadoil that was brokered as soyoil. Lascadoil was intended for non-food or bio-fuel uses, but crossed over to the feed ingredient stream. Feed manufacturers and farms in Michigan and several other states were directly impacted by this diversion. A nationwide recall of the adulterated grease was issued on October 23, 2014.

MDARD investigated and sampled at farms and feed manufacturers that may have received the adulterated grease to ensure the recall was effective. Due to the impact and scale of this event, MDARD utilized the Incident Command System (ICS) and set up a multi divisional Incident Management Team (IMT). With numerous divisions involved, management of such a large scale investigation was greatly needed and successful. The use of ICS allowed for transparent flow of communications and coordination of field and laboratory activities which involved many agencies, institutions and organizations that were impacted by this event.

In June 2015, MDARD, FDA Center for Veterinary Medicine and the FDA District Offices involved received a "Group Recognition Award" at the 55th Annual FDA Honor Awards Ceremony for their work on the response. This award recognizes superior achievement of the Agency's mission through teamwork, partnership, shared responsibility, or fostering collaboration and coalition to achieve FDA goals.

Review of Multistate Foodborne Outbreaks—United States, 2015
Megin Nichols, Department of Health and Human Services (DHHS), Center for Disease Control and Prevention (CDC)

Dr. Nichols presented a review of selected multistate foodborne disease outbreaks during 2015 in the United States.
Information on Listeria outbreaks:

(From: http://www.cdc.gov/listeria/outbreaks/index.html)

- Multistate Outbreak of Listeriosis Linked to Soft Cheeses Distributed by Karoun Dairies, Inc. http://www.cdc.gov/listeria/outbreaks/soft-cheeses-09-15/index.html
- Outbreak of Listeriosis Linked to Blue Bell Creameries Ice Cream Products http://www.cdc.gov/listeria/outbreaks/ice-cream-03-15/index.html

Dr. Nichols also provided information on a new CDC web site on food safety and raw milk: http://www.cdc.gov/foodsafety/rawmilk/raw-milk-index.html Back to nature is what many Americans are trying to do with the foods that we buy and eat. We are shopping at farmer's markets, purchasing organic food, participating in food cooperatives (or co-ops), and even growing our own food. In addition, many people are eating food with minimal processing. However, raw milk and products made from it (including soft cheese, ice cream, and yogurt) can pose severe health risks, including death. That's because raw milk has not undergone a process called pasteurization that kills disease-causing germs, such as Campylobacter, E. coli, and Salmonella.

She also discussed information for a new publication on increased outbreaks due to unpasteurized raw milk consumption from 2007 to 2012 in the United States: http://wwwnc.cdc.gov/eid/article/21/1/14-0447_article The number of outbreaks in the United States caused by nonpasteurized (raw) milk increased from 30 in 2007-2009 to 51 in 2010-2012. Most (77%) outbreaks were caused by *Campylobacter* and most (81%) occurred from consumption of nonpasteurized milk purchased from states where the sale of nonpasteurized milk was legal.

Dr. Nichols then presented overviews of select Salmonella foodborne outbreaks (from: http://www.cdc.gov/salmonella/):

- Multistate Outbreak of *Salmonella* Paratyphi B variant L(+) tartrate(+) and *Salmonella* Weltevreden Infections Linked to Frozen Raw Tuna
- Outbreak of *Salmonella* Enteritidis Infections Linked to Raw, Frozen, Stuffed Chicken Entrees Produced by Aspen Foods
- Multistate Outbreak of Drug-Resistant *Salmonella* Enteritidis Infections Linked to Raw, Frozen, Stuffed Chicken Entrees Produced by Barber Foods
- Multistate Outbreak of *Salmonella* Poona Infections Linked to Imported Cucumbers
- Outbreak of Multidrug-Resistant *Salmonella* I 4,[5],12:i:- Infections Linked to Pork

Food Safety Research in the USDA Agricultural Research Service (ARS)
Eileen Thacker, Food Safety and Animal Health, USDA-ARS. Presented by Robin Anderson, ARS

Administratively, based on 2013 data, a total of 64 appropriated research units located throughout the United States conducted research focused on understanding and modeling how foodborne pathogens and antimicrobial

resistant bacteria colonize and persist in their production environments and on learning how to develop strategies to prevent and eliminate their propagation and dissemination so as to reduce the risk of foodborne contamination. Project scientists are active participants to the President's Combating Antimicrobial Resistant Bacteria (CARB) research initiative, performing research on microbial ecology and alternatives to antibiotics and contributing significantly to the development of the USDA Antimicrobial Resistant Action Plan. The Project participates as a member of Transatlantic Task Force on Antibiotic Resistance. Examples of just a small amount of the research conducted by project scientists include microbial ecology and National Antimicrobial Resistance Monitoring System research on *Salmonella, E. coli, Campylobacter* and more recently, select virulent *Enterococcus* species, conducted by scientists at the Bacterial Epidemiology and Antimicrobial Research Unit in Athens, Georgia, the Environmental, Microbial and Food Safety Research Unit at Beltsville, Maryland and the Food and Feed Safety Research Unit in College Station, Texas. Interested parties are encouraged to visit the USDA, ARS website to review research objectives and recent accomplishments of all project Units and to feel comfortable in contacting participating scientists to obtain additional information on subjects of particular interest.

Committee Business:

Dr. McDonough conducted the Committee business meeting and since there were no Resolutions, he asked those present to consider the following items and to respond to the group via email:

- Creation of subcommittees to work on any action items that are identified
- Begin a quarterly conference call to keep the Committee engaged throughout the year
- There is a new AAVLD requirement: demonstrate the Committee alignment with the AAVLD mission, vision and goals by generating/submitting some basic strategies and actions for the Committee itself

REPORT OF THE COMMITTEE ON FOREIGN AND EMERGING DISEASES

Chair: Tammy Beckham, KS
Vice Chair: Alfonso Clavijo, KS

Helen Acland, PA; Bobby Acord, NC; Bruce Akey, TX; Gary Anderson, KS; James Averill, MI; Lyndon Badcoe, WA; Karen Beck, NC; Lisa Becton, IA; Peter Belinsky, RI; Philip Bradshaw, IL; Richard Breitmeyer, CA; Deborah Brennan, MS; Becky Brewer-Walker, AR; Charlie Broaddus, VA; Charles Brown II, WI; Bruce Carter, IA; Gregory Christy, FL; Jeein Chung, MN;; Matt Cochran, TX; Joseph Corn, GA; Paula Cowen, CO; Stephen Crawford, NH; Wendy Cuevas-Espelid, GA; Susan Culp, TX; S. Peder Cuneo, AZ; Donald Davis, TX; Glenda Davis, AZ; Ignacio dela Cruz, MP; Thomas DeLiberto, CO; Leah Dorman, OH; Brandon Doss, AR; Edward Dubovi, NY; Anita Edmondson, CA; Brigid Elchos, MS; Dee Ellis, TX; Steven Ellsworth, KS; Larry Elsken, IA; François Elvinger, VA; Conrad Estrada, VA; Anna Claire Fagre, CO; Joshua Fine, MD; Katherine Flynn, CA; W. Kent Fowler, CA; Richard French, NH; Mallory Gaines, DC; Susan Gale, AZ; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Paul Gibbs, FL; Colin Gillin, OR; Michael Gilsdorf, MD; Linda Glaser, MN; Timothy Goldsmith, MN; Jessica Green, KS; Paul Grosdidier, KS; Percy Hawkes, UT; Greg Hawkins, TX; Terry Hensley, TX; Richard Hesse, KS; Linda Hickam, MO; Rick Hill, IA; Donald Hoenig, ME; Thomas Holt, FL; Richard Horwitz, RI; Dennis Hughes, NE; Pamela Hullinger, CA; David Hunter, MT; John Huntley, WA; Carla Huston, MS; Wei Jia, NY; Annette Jones, CA; Ellen Kasari, CO; Darlene Konkle, WI; Charlotte Krugler, SC; Elizabeth Krushinskie, DE; Elizabeth Lautner, IA; John Lawrence, ME; Randall Levings, IA; Charles Lewis, IA; Tsang Long Lin, IN; Linda Logan, TX; Pat Long, NE; Margie Lyness, GA; Janet Maass, CO; Bret Marsh, IN; David Marshall, NC; Barbara Martin, IA; Michael Martin, SC; Sarah Mason, NC; Rose Massengill, MO; Thomas McKenna, MA; Sara McReynolds, ND; David McVey, KS; David Meeker, VA; Shelley Mehlenbacher, VT; Gay Miller, IL; Janice Mogan, IA; Igor Morozov, KS; Lee Myers, GA; Thomas Myers, MD; Sherrie Nash, MT; Cheryl Nelson, KY; Sandra Norman, IN; Dustin Oedekoven, SD; Kenneth Olson, IL; Kristy Pabilonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; Roger Parker, TX; William Parker, GA; Boyd Parr, SC; David Pyburn, IA; Jeanne Rankin, MT; M. Gatz Riddell, Jr., AL; Keith Roehr, CO; Susan Rollo, TX; James Roth, IA; Margaret Rush, MD; Mo Salman, CO; David Scarfe, IL; Shawn Schafer, OH; Jack Schlater, IA; David Schmitt, IA; Russell Shoberg, ME; Heather Simmons, TX; Kathryn Simmons, DC; Marilyn Simunich, ID; Jonathan Sleeman, WI; Rebecca Smith, IL; Harry Snelson, NC; Diane Stacy, LA; Nick Striegel, CO; David Suarez, GA; Manoel Tamassia, NJ; Belinda Thompson, NY; Beth Thompson, MN; John Thomson, IA; Brad Thurston, IN; Peter Timoney, KY; Sarah Tomlinson, CO; Fernando Torres-Velez, NY; Susan Trock, GA; Jeff Turner, TX; Kathleen Turner, FL; Paul Ugstad, NC; Liz Wagstrom, DC; Mark Walter, PA; Patrick Webb, IA; Steve Weber, CO; Margaret Wild, CO; Richard Willer, HI; Michelle Willette, MN; Brad Williams, TX; Ellen Mary Wilson, NM; William Wilson, KS; Richard Winters, Jr., TX; Ching Ching Wu, IN.

The Committee met on October 27, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 8:00 a.m. to 5:30 p.m. There were 47 members and 70 guests present. The Committee chair reviewed the purpose of the Committee and the Vice Chair reviewed the response from the 2014 resolutions.

Time-Specific Paper

Dr. Chris Oura, University of the West Indies, School of Veterinary Medicine presented a time-specific paper entitled, “African Swine Fever - On the Move and Dangerous. Should the USA Be Worried?” The paper, in its entirety, is included at the end of this report.

Presentations

DHS S&T’s Agricultural Defense Program Overview

Michelle Colby

Department of Homeland Security, Science and Technology Directorate,

An update of the activities of 2015 were provided to the Committee. An overview of the current program initiatives with milestones from 2015 was provided. The Agricultural Defense Branch within the Department of Homeland Security (DHS) consistent with the roles and responsibilities articulated in Defense of United States Agriculture and Food (Homeland Security Presidential Directive, HSPD-9). This includes a broad range of research in development efforts to enhance current capabilities and develop state-of-the-art countermeasures for high-consequence foreign animal diseases. This includes near- and long-term research and development for vaccines and diagnostics, in coordination with internal and external stakeholders. This consists of five main projects covering the breadth of an animal health response: Enhanced Passive Surveillance; Foreign Animal Disease Vaccines and Diagnostics; Foreign Animal Disease Modeling; Agricultural Screening Tools; and Livestock Decontamination, Depopulation and Disposal. The Agricultural Defense Branch funds most of their research through contracts, but there are multiple ways of working with agricultural defense projects within the Science and Technology Directorate including: 1) Grant; 2) Cooperative Research and Development Agreement (CRADA); and 3) Contract. The grant process is a competitive process with the deliverables to include publication, report, or completion of a project. The contract is also a competitive process in which the deliverable is a product or service. The CRADA is awarded by the Notice of CRADA intent, and either party may approach the other to initiate. The deliverable is a product or services agreed to on both sides, but no money is awarded from the Federal Government to the collaborator. More information is available at: http://www.dhs.gov/contract-opportunities.

Update: National Veterinary Services Laboratories
Beverly Schmitt, National Veterinary Services Laboratories, USDA, APHIS, Veterinary Services

Diagnostic testing at the National Veterinary Services Laboratories (NVSL) showed an increase in numbers compared to FY2014. During the time period between October 1, 2014 and September 30, 2015, NVSL received over 42,200 accessions and reported over 400,500 tests. NVSL confirmed the first highly pathogenic avian influenza (HPAI) H5N8 detection in a gyrfalcon in December 2014 and was heavily involved in the outbreak response throughout 2015. Confirmation testing and phylogenetic analysis was performed in the Diagnostic Virology Laboratory Avian Viruses Section and the NVSL Laboratory Resources Unit sent out over 139,000 BHI tubes and collection kits to the field. NVSL personnel were detailed to the outbreak or supported the outbreak control effort on site in Ames and a former NVSL/Center for Veterinary Biologics (CVB) building was converted to an Incident Command Post (ICP) for field activities in Iowa. NVSL has contributed to Veterinary Services planning for a possible fall outbreak in multiple flyways in the US. In May, NVSL confirmed a finding of vesicular stomatitis virus (VSV) infection (New Jersey serotype) in New Mexico. This was the 2015 VSV index case for the nation. Eight states have been affected and include Arizona, Colorado, Nebraska, New Mexico, South Dakota, Texas, Utah and Wyoming. NVSL provided laboratory support to a *Burkholderia pseudomallei* investigation related to non-human primates. NVSL provided bacterial culture of wildlife collected around the premises and all samples to date have been culture negative. NVSL's Pathobiology Laboratory, National Animal Health Laboratory Network (NAHLN) /CVB staff were involved in successfully addressing a transmissible spongiform encephalitis (TSE) kit failure. Pathobiology is looking into the possible use of another commercial TSE kit. NVSL successfully completed an ISO 17025 renewal audit in May and June. In October, 2014, NVSL received ISO 9001 accreditation for budget and contracting, procurement, user fees, warehouse, sample processing, media prep, glassware, human resources, training and the NAHLN.

Update: National Animal Health Laboratory Network
Beth Harris, National Animal Health Laboratory Network (NAHLN) USDA, APHIS, Veterinary Services (VS)

The NAHLN was partially activated this year as part of VS' highly pathogenic avian influenza outbreak activities. Activities included redirecting samples to available laboratories; placing laboratories on standby to support outbreak testing, and deploying technicians to help with high-volume testing. Additionally, our staff developed a process for funding overtime work for deployed personnel, and defined criteria needed to set up a mobile laboratory for NAHLN testing during an outbreak. Also as part of the HPAI fall planning efforts, the NAHLN Program Staff have assessed current laboratory testing capacity, equipment needs and laboratory operation; updated the NAHLN activation plan; developed a standardized laboratory submission form; and

communicated with NAHLN laboratories and commercial vendors regarding fall scenarios and planning needs.

The NAHLN is also providing laboratory testing for the ongoing vesicular stomatitis outbreak. This spring, NVSL validated and deployed a vesicular stomatitis virus (VSV) polymerase chain reaction (PCR) test to selected NAHLN laboratories. Once activated, NAHLN laboratories may test cases from clinically ill horses and other equids using both the PCR and the Complement Fixation assay. Laboratories are only approved for testing equines from their state. NVSL continues to provide confirmatory testing for new states, ruminants and any inconclusive results.

The NAHLN Coordinating Council met in April to assess information gathered as part of the final steps of the NAHLN Restructure planning. Earlier this year, a decision matrix was developed by the Council and NAHLN Program Staff to use in the decision making process. The main criteria of the decision matrix are based on the 2013 Concept Paper, self-assessment and key NAHLN mission factors. The decision matrix will be used to help determine the qualification level of each laboratory; APHIS and NIFA are now working through various funding options with the input of the Coordinating Council.

VS has been charged with implementing several activities related to Antimicrobial Resistance (AMR). A key objective is developing a standardized implementation plan for antibiotic testing in veterinary laboratories. As part of this, the NAHLN Program Staff has partnered with NVSL, Center for Epidemiology and Animal Health (CEAH) and Food and Drug Administration (FDA) to initiate a joint AAVLD working group that will address standardized methodology, data reporting and confidentiality issues. This group distributed a survey to laboratories this summer to gather baseline information on current antibiotic sensitivity testing and reporting activities, with preliminary results being reported at this year's AAVLD meetings.

Similarly, NAHLN has also partnered with the National Animal Health Reporting System (NAHRS) to form a joint working group to draft a laboratory implementation plan for the National List of Reportable Animal Diseases (NLRAD) which also includes emerging diseases. The group has developed a draft plan to be distributed for comment at this year's AAVLD meeting.

We continue to focus on support and training for quality management systems through collaboration with International Services, VS' Professional Development Staff, and AAVLD trainers for the annual Quality Management System (QMS) Training that was conducted August 3-7.

Expanding laboratory messaging capabilities continues to be a high priority for NAHLN, especially in preparation for a fall highly pathogenic avian influenza (HPAI) resurgence. The number of laboratories actively messaging HPAI has increased, as well as those prepared to message if needed.

The NAHLN Methods Technical Working Group (MTWG) met face to face in April. Other activities included reviewing several methods comparison studies, and the African swine fever (ASF) polymerase chain reaction (PCR) dossier, plus designing and conducting an equipment comparison/suitability study. The Exercise and Drills Working Group completed the 2-part

accessioning exercise and developed the AAVLD symposium that focused on HPAI lessons learned and laboratory emergency planning.

Foreign Animal Disease Diagnostic Laboratory
Fernando Torres, Foreign Animal Disease Diagnostic Laboratory, USDA, APHIS, Veterinary Services (VS)

The Foreign Animal Disease Diagnostic Laboratory (FADDL) is one of the National Veterinary Services Laboratories (NVSL), where many foreign animal disease (FAD) agents are diagnosed and studied. An overview of the years' diagnostic cases as well as diagnostic development efforts was provided to the committee.

Foreign Animal Disease Research Updates from USDA-ARS, Plum Island
Luis Rodriguez, Plum Island Animal Disease Center

During the past year the Foreign Animal Disease Research Unit at Plum Island Animal Disease Center (PIADC) has continued to focus research efforts on foreign animal diseases (FAD); foot-and-mouth disease (FMD), classical swine fever (CSF) and African swine fever (ASF). An overview of the Foreign Animal Disease Research Unit (FADRU) research activities for 2015 were provided to the committee.

Update: Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD))
Juergen Richt, Center of Excellence for Emerging and Zoonotic Animal Diseases, Kansas State University

The Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD), based at Kansas State University (KSU), recently implemented the sixth year of its Strategic Plan. As a co-lead with the Institute of Infectious Animal Diseases (IIAD) in the Department of Homeland Security's Zoonotic Animal Disease Defense (ZADD), it is our mission to develop countermeasures against high-priority transboundary, emerging, and zoonotic diseases that threaten animal and human health. Our goals are to develop vaccines and practical field-use detection assays, studying the epidemiology of these diseases and to train the next generation of researchers/first responders.

During the recently-completed Year 5, CEEZAD researchers successfully demonstrated the efficacy of its Differentiating Infected from Vaccinated Animals (DIVA)-compatible, subunit Rift Valley Fever (RVF) vaccine in a previously-developed RVF sheep model. For cattle, initial immunogenicity testing was completed, along with developing a challenge model to use for upcoming efficacy work. The RVF vaccine is undergoing final development and the USDA licensing process by our commercial partner. Vaccine development for US strains of highly pathogenic avian influenza (HPAI) is underway. Other initiatives include projects on novel vaccine approaches to African Swine Fever, point-of-need PCR tests for detection of various FADs, and development of a multiplex detection system based on MassTag polymerase chain reaction (PCR) technology. Additionally, in Year 5, CEEZAD

began co-funding, with the National Pork Board (NPB), several vaccine, diagnostic, and epidemiology/modeling projects. Work will continue on developing web-based FAD education courses for veterinarians, students, and homeland security personnel and workforce development initiatives, along with National Bio- and Agro-Facility (NBAF) transition projects.

Update: Institute for Infectious Animal Diseases (IIAD)

Gerry Parker, Institute for Infectious Animal Diseases

The Institute for Infectious Animal Diseases (IIAD) was awarded as a Department of Homeland Security Science and Technology Center of Excellence in 2004, with Texas A&M University as the lead institution and renewed as a co-lead with Kansas State University's Center of Excellence for Emerging Zoonotic and Animal Diseases (CEEZAD) in 2010. The mission of IIAD is to conduct research and education to protect the nation's agriculture and public health sectors against high consequence transboundary, emerging, and/or zoonotic diseases. To accomplish this mission, IIAD leverages leading experts, researchers, and resources within major universities, minority serving institutions (MSIs), national laboratories, federal agencies, international organizations, industry, and other Centers of Excellence (COE). IIAD's multidisciplinary teams address complex problems and challenges and are capable of rapidly addressing emerging issues and current gaps in the nation's ability to protect our agricultural and public health sectors.

IIAD focuses research priorities to help support and defend US agriculture as a critical infrastructure. Maintaining disease freedom is essential to protecting animal and public health and ensuring a robust economy. The IIAD mission helps support this goal through the development of research and education products that support our industries, state, and federal partners. The Institute has vigorous programs in zoonotic and emerging disease detection; information technology for enhanced decision support and and situational awareness; as well as in the development of knowledge products, and education and training curriculum.

IIAD is a multi-institutional organization, with partners in 48 states and the District of Columbia, plus collaborations or training programs established with 17 international organizations or countries. These partnerships are ctitical to developing new capabilities under the IIAD portfolio that will significantly impact the nation's ability to prepare for, detect, respond to and recover from a high consequence transboundary, emerging and/or zoonotic disease.

Session 2: Outbreak Reports, Analysis, and Implications: Special Session on Avian Influenza

The 2015 Avian Influenza Outbreak: Phylogenic Analysis of the H5N2 Influenza Virus

Mia Torchetti, National Veterinary Services Laboratories

Highly pathogenic avian influenza (HPAI) virus (H5N8 clade 2.3.4.4) originating from Eurasia (EA) spread rapidly along wild bird migratory pathways

in the Eastern Hemisphere during 2014. Introduction of this virus into the Pacific Flyway of North America sometime during 2014 allowed mixing with North American (AM) origin low pathogenicity avian influenza A viruses generating new (novel) combinations with genes from both EA and AM lineages (so called reassortant H5Nx viruses). To date, the H5Nx viruses have been detected in the Pacific, Central, and Mississippi Flyways. These findings are not unexpected as the H5Nx viruses continue to circulate.

The USDA, APHIS, National Veterinary Services Laboratories (NVSL) collaborated with the USDA, ARS Southeast Poultry Research Laboratory (SEPRL) and the Influenza Division of the Centers for Disease Control and Prevention (CDC) to generate the analyses for this report. Consensus data from whole genome sequence is used to monitor the virus evolution and assess risk to veterinary or public health based upon presence/absence of specific amino acid substitutions or protein motifs.

All viruses analyzed to date are highly similar, have an haemagglutinin (HA) gene derived from the EA H5 clade 2.3.4.4, and are highly pathogenic in poultry. Both H5N2 and H5N8 were implicated in recent poultry outbreaks. Where there is molecular evidence that independent introductions as well as “common source” exposures are occurring concurrently further field epidemiologic investigation is warranted. Poultry events in Pacific Flyway appear to be largely due to point source/independent introductions as were early Midwest events based upon network analysis and available epidemiologic data. Data for later Midwest events suggest point source as well as “common source” exposures occurring concurrently. States affected last appear to be largely due to common source/human activity.

Presently the risk to human health remains low; molecular markers associated with antiviral resistance or increased virulence and transmission in mammals have not been detected; however, virus monitoring continues with CDC.

This analysis includes samples collected between December 2014 to early June 2015 from 17 states (>240 viruses). While these viruses remain highly similar overall (>99% similar to the index viruses within subtype, as well as to the nearest Asian isolate (A/crane/Kagoshima/KU1/2014(H5N8)), analytical tools that identify substitutions along the HA, neuraminidase (NA) and internal proteins can improve our understanding of the virologic, antigenic, and epidemiologic features of the virus (refer to section on Diagnostics and Characterization for H5Nx viruses).

State Animal Health Officials Perspective of Avian Influenza Outbreak (Panel)

Dr. David Schmitt (State Animal Health Official, Iowa), Dr. Annette Jones (State Animal Health Official, California), Dr. Bill Hartmann, (State Animal Health Official, Minnesota). Moderator, Dr. Lee Meyers, Surveillance, Preparedness and Response Services (SPRS), USDA, VS.

State Animal Health Official Perspective of Avian Influenza Outbreak – 2015

David Schmitt, Iowa Department of Agriculture and Land Stewardship

Iowa experienced its first case of highly pathogenic avian influenza (HPAI) H5N2 in April of 2015 in a turkey farm. This was followed by additional cases of HPAI through the middle of June. There were a total of 77 HPAI infected premises, which consisted of 35 turkey commercial meat production flocks, 22 chicken commercial table egg production flocks, 13 pullet flocks, 1 breeding flock for a mail order hatchery, and 6 backyard flocks in Iowa confirmed with HPAI H5N2.

The Iowa Department of Agriculture and Land Stewardship requested the first USDA Incident Management Team for assistance at the time of finding HPAI in a large commercial layer operation. Control zones were established at the first HPAI case and State and Federal staff began area surveillance testing of all poultry within Control Zones. As additional cases of HPAI developed the Governor of Iowa issued an Emergency Declaration and the State Emergency Operation Center was activated to bring in additional state agency support.

The Iowa State University Veterinary Diagnostic Laboratory, which is a member of the National Animal Health Laboratory Network (NAHLN), was contacted at the time of the first diagnosed H5 positive premises and they provided avian influenza testing services operations seven days per week with all polymerase chain reaction (PCR) positive samples referred to USDA, National Veterinary Services Laboratory (NVSL), Ames, Iowa.

Permitted movements of all products within and out of Control Zones was performed by IDALS and additional staff. The Emergency Management Response System (EMRS2) database was used for management of the HPAI outbreak and assistance provided by USDA CEAH for entering of permits into EMRS2 database.

There were several challenges along the way, which expounds upon the essence of cooperation and patience to overcome the challenges and as recovery continues to restocking the importance of well-planned biosecurity practices for the future.

Lessons Learned in Minnesota

Bill Hartmann, Minnesota Board of Animal Health

Dr. Hartmann provided an overview of Minnesota “things that worked” and lessons learned: In summary, biosecurity is essential. 1). Biosecurity reviews for commercial poultry operations and Biosecurity protocols and monitoring for responders. 2). Depopulation of affected farms as soon as possible. To do this you need trained, medically cleared, fit tested personnel, Adequate options for depopulation, adequate equipment for depopulation, streamlined appraisal process, and laboratory capacity. 3), You must have predetermined carcass disposal options. Identify a location for an emergency management team to operate out of in the area where commercial poultry are raised.

Avian Influenza – Industry Perspective
John Glisson, US Poultry and Egg Association

The recent avian influenza outbreak provided an opportunity for the poultry industry to learn a great deal about those things that work well in such a large emergency and those things that need improvement. One of the largest difficulties was the depopulation and disposal of birds on infected farms. This was particularly problematic on large cage layer facilities. Simply removing the birds from the cages required a tremendous amount of hand labor. Disposal methods varied but were generally insufficient for the large layer farms. Both depopulation and disposal were generally much easier to accomplish rapidly on farms where birds were reared on the floor. Composting of carcasses and manure inside these houses proved to be a very effective method.

The diagnostic laboratory system worked well during this outbreak. The National Animal Health Laboratory Network (NAHLN) laboratories and National Veterinary Services Laboratory (NVSL) provided the timely testing results required to make confirmed diagnoses. Although things were not perfect in this regard, it is frightening to think of tackling an outbreak of this size without such a well prepared national diagnostic laboratory system. Both chickens and turkeys developed initial clinical signs relatively slowly following infection which provided a challenge to achieve as early diagnosis as possible.

One of the difficult issues involved the movement of poultry and poultry products out of the control zones for marketing. The control zones encompassed many non-infected healthy flocks and testing to confirm that the flocks are not infected and permits to move birds and products often involved multiple states, which can complicate the matter considerably. Interstate commerce during a widespread outbreak is disrupted to some degree. States having been working together to try to improve the permit process required for interstate movement.

The level and type of biosecurity used for many years on poultry farms proved insufficient in many instances during the recent outbreak. The whole poultry industry has focused its efforts to improve biosecurity at every level. Everyone realizes that this is the vital step in improved disease control.

The potential future use of vaccines during an outbreak of highly pathogenic influenza is controversial and opinions range widely in the poultry industry. The main point of agreement within the industry is that vaccination should only be used as a tool for eradication, not as a means to maintain the health of flocks.

National Bio- and Agro-defense Facility Updates, NBAF Outreach
Marty Vanier, Department of Homeland Security

Now under construction in Manhattan, Kansas, National Bio and Agro-defense Facility (NBAF) will be a state-of-the-art, biocontainment laboratory for the study of diseases that threaten both America's animal agricultural industry and public health. The laboratory is expected to be operational in 2022.

The NBAF Program Executive Office, along with its partners in USDA-APHIS and USDA-ARS are taking this opportunity to create a new way of

doing business by developing an innovation ecosystem around NBAF that creates new and different relationships with the local community, local and national stakeholders, collaborators, research universities, and the animal health industry. The goal is to leverage industry, university, and government partnerships to accelerate the development and commercialization of infectious disease diagnostic, therapeutic and protective technologies.

The Strategic Partnership Development program is developing plans at the local and national level consisting of specific activities and efforts to identify and reach out to existing and new partners.

NBAF Summit and Action Items

Keith Roehr, Colorado Department of Agriculture

Summary of purpose of National Bio and Agro-defense Facility (NBAF) Summit and Action items and takeaways from the Summit (Pioneering Partnerships) that was held in June, 2015 in Manhattan, Kansas.

Updates from USDA-APHIS, USDA-ARS, and USDA-DHS on Activities Related to NBAF Transition

Michelle Colby, Department of Homeland Security (**DHS**), Science and Technology Directorate (S&T)
Beth Lautner, USDA-APHIS-VS
Cyril Gay, USDA-ARS

Agency updates were provided on the progress of the transition of the research and diagnostic portfolios for NBAF. A review of the potential research and diagnostic portfolio and the enhanced capabilities and capacities at NBAF were provided.

Diagnostics, Surveillance, Modeling and Research: FMD Global Epidemiological Situation

Pascal Hudelet, Merial, France

Foot-and-mouth disease (FMD) virus is highly contagious, infects a variety of domestic and wildlife species and is divided into seven non-cross-protective serotypes. Its presence restricts trade opportunities for endemic countries and presents the greatest economic threat to US animal agriculture.

This presentation will review the latest global situation regarding circulation of foot-and-mouth disease (FMD) using reports of the past two years coming from the World Reference Laboratory for FMD and other laboratories from the OIE/FAO FMD Laboratory Network, focusing on transboundary movements of FMD virus that have caused outbreaks in Asia and Africa and an ever changing threat for FMD-free countries. Based on genetic and antigenic analyses, the distribution of FMDV in the world has been sub-divided into seven regional pools. Virus circulation and evolution within these regional virus pools result in constantly changing needs for appropriate vaccine selection.

Compulsory vaccination programs have proven to be a key component of any FMD eradication program, as long as the quality and the potency of the vaccines used has been closely and independently monitored. High potency

vaccines have proved their ability to overcome even significant antigenic drift, limiting the occurrence of new variants.

For the FMD-free North America, rapid access to sufficient stocks of the relevant vaccine is a critical component of its preparedness program to respond to an outbreak of FMD in the continent.

Continuity of Business in a Foot and Mouth Disease (FMD) Outbreak
Barrett Slenning, North Carolina State University

Dr. Slenning provided an overview of the continuity of business plans.

Syndromic Surveillance for Transboundary Animal Diseases, East Africa, A pilot project
Corrie Brown, University of Georgia
Thomas Graham, Veterinarians Without Borders

In most developing countries, arguably the weakest link in the chain of national animal health is awareness and reporting from the field. The African Union InterAfrican Bureau on Animal Resources (AU-IBAR) initiated a program on enhancing awareness in the field on the part of those who have daily contact with the animals. Collaborating with the University of Georgia and USDA-FAS, AU-IBAR produced a field-friendly, low-literacy, graphic-heavy field manual geared to enhance farmers', traders', transporters', and butchers' recognition of public good animal diseases, and to inform them of reporting channels necessary to maintain the national animal health and economy. Veterinarians Without Borders, working with AU-IBAR, secured funding from United States Agency for International Development (USAID) Farmer-to-Farmer to deliver training to this group of potential surveillors, using the manual. Two countries were selected for beta-testing this training. Through the grant, Veterinarians without Borders (VWB) volunteers are deployed to Uganda or Ethiopia to deliver a series of two-day trainings over the course of a month, working through eight government districts, in cooperation with agriculture ministries. This training serves to enhance awareness among those closest to the animals, strengthen connections between farmers and the district veterinary offices, and provide US-based veterinarians with knowledge of smallholder agriculture in the developing world and awareness of transboundary animal diseases in the field.

Farm Biosecurity: A Reassessment of Feasible Benefits in an Outbreak
Richard Horwitz, USDA-APHIS, Veterinary Services (VS)

The subject of this presentation is conventional wisdom among agricultural authorities on how to sustain livestock operations in an outbreak of contagious disease, such as foot and mouth disease (FMD). The evidence comes from official plans for permitting select farms to continue shipping milk from cows in Control Zones to processors and attendant research. The full report is available on-line, on the New England Animal Agricultural Security Alliance (NESAASA) website under Biosecurity, Infection-Control, and Continuity of Dairy Operations in FMD Response.

The report is also, in part, a justification for aspects of the New England Secure Milk Supply Plan that differ from other short message service (SMS) plans in the US, particularly in its emphasis on flexibility and feasibility of requirements. Key to that justification is a recognition of conflict in response aims and limitations in the feasibility and "the science" of response tactics.

Albeit for good reasons, much of that science is both thin and contestable (e.g., on effective emergency response, contagion in real-world contexts, and the risks-versus-benefits of particular biosecurity measures). Analogous research on infection control in human healthcare facilities is considerably stronger but still, by CDC measures, "weak." Nevertheless, that research as well as recent studies in agricultural science confound some of the conventional wisdom on farm biosecurity (e.g., on formal programs for training and certification of people who clean and disinfect, dwell times for disinfectants, and the preference for disinfectant over detergent in reducing environmental sources of contagion). A major lesson of this assessment is to shift the focus of remediation from indirect to direct transmission, from environmental microbicide to simple standard precautions.

Foreign Animal Disease and Emergency Preparedness Training
Paula Cowen, USDA-APHIS Professional Development Staff

Presenting an overview of training on Transboundary diseases in USDA, APHIS, Veterinary Services (VS) for the past year. We will also look at the training done in the face of the Highly Pathogenic Avian Influenza (HPAI) outbreak in 2015 as well as plans for the future under our Multiyear Training and Exercise Program which was initiated in 2012 and is now fully developed.

Committee Business:

There were no resolutions from the Committee. A recommendation was discussed to begin discussions on collaborations with Cuba as relationships open up with Cuba.

AFRICAN SWINE FEVER - ON THE MOVE AND DANGEROUS. SHOULD THE USA BE WORRIED?

Chris Oura
University of the West Indies, School of Veterinary Medicine

The major challenges faced in controlling and eradicating animal viruses include the complex and rapidly evolving nature of viruses, the complexity of the immune response to viruses, the lack of effective and available vaccines, the presence of insect and wildlife reservoirs and the rapid and uncontrolled spread of viruses within developing countries. These factors continue to affect the successful control/prevention/eradication of some of the most globally important veterinary viruses.

Probably the most worrying emerging veterinary virus currently threatening the global swine industry is African swine fever virus (ASFV). ASFV is an emerging veterinary virus currently posing a severe threat to the global swine industry. This virus spread from the South-Western corner of Africa to the Caucasus state of Georgia in 2007, where it was initially misdiagnosed, giving the virus the chance to spread far and wide before being correctly diagnosed. The lack of early detection and the implementation of ineffective control measures allowed the virus to spread across the Caucasus region and into the Russian Federation (RF), where it has been spreading for the past eight years (2007-2015). In 2014 the virus enterred the European Union (EU), probably though infected wild boar, and has continued to spread rapidly in both domestic and wild pig populations in the EU states of Estonia, Latvia, Lithuania and Poland into 2015. It seems that the virus is being maintained in the environment in these countries through circulation within the wildboar populations, although backyard and feral pigs may also be playng an important role in viral spread. One of the main reasons why ASFV has proved so difficult to control when it gets out of Africa is the lack of an effective vaccine. There are many reasons why the production of an effective vaccine has proved so ellusive, which will be discussed.

In this presentation I will give a brief background of the virus (ASFV) and the disease (ASF) and will explain how the virus has managed to spread out of its African heartlands on various occasions in the past, including to the Americas. I will explain how and why the virus is continuing to spread within the RF and westwards into Europe, where it is now posing a significant threat to countries in Central Europe with very large pig populations, as well as to the largest swine populations in the world in China.

From a USA perspective, I will address the threat currently posed by ASFV to the USA and will attempt to answer the question – should the USA be worried? Various factors need to be taken into consideration in assessing this risk of ASFV enterring the USA, including risks posed through the legal and illegal trade and movement of pork products between the USA and countries where the virus is currently circulaing. It goes without saying that, within the highly interconnected world that we currently live in, the more countries affected by ASF brings with it a higher risk that free countries like the USA will

become infected. Another equally important question to address is, if the virus did gain entry into the USA, is it likely to spread and become endemic, or would it be possible to rapidly control it. Many factors would contribute to this including the ability of the USA to rapidly recognise and respond to a disease incursion, the amount of feral and backyard pigs and their contact with wild boar, the population densities of wild boar in the country, the presence or absence of *Ornithodorus* soft ticks and the levels of biosecurty applied in domestic pig farms.

Stephen Crawford, NH; Barbara Determan, IA; Kristin Haas, VT; Christine Hoang, IL; Charlie Hatcher, TN; Annette Jones, CA; Bruce King, UT; Bret Marsh, IN; David Schmitt, IA; Michael Short, FL; Nick Striegel, CO Scott Stuart, CO; Manoel Tamassia, NJ.

The USAHA Committee on Government Relations met in Washington, DC, from March 16 to March 18, 2015. There were a total of 25 participants, including committee chairs and AAVLD leadership.

A group of Executive Committee members met with House and Senate Agriculture staffers to extend the relationship of USAHA as a resource on animal health issues. The meetings were well received and much appreciated the work of USAHA. Information was also provided to three veterinarians that are in congress about USAHA's mission and work.

On Tuesday the Committee gathered at the American Veterinary Medical Association (AVMA) Government Relations Office. The first meeting was with staff of AVMA and Association of American Veterinary Medical Colleges (AAVMC). An overview of current legislation, funding and Farm Bill programs was provided to the group. Antimicrobial resistance legislation and Food and Drug Administration (FDA) programs were discussed. Additionally, the group was informed of the veterinary caucus in Congress and provided information to the group.

Next, the Committee welcomed members of the Animal Agriculture Coalition. Participants included Allison Rogers, National Chicken Council; Jamie Jonker, National Milk Producers Federation; Dan Kovich, National Pork Producers Council; Jennifer Koeman, National Pork Board; Gatz Riddell, American Association of Bovine Practitioners; Ben Pendergrass, American Horse Council; Kristi Boswell, American Farm Bureau; Brigid Zeller, Animal Health Institute; Kevin Cain, AAVMC; Ashley Morgan and Gina Luke, AVMA. The AAC provided details of their budget priorities for the coming Fiscal Year, including APHIS-VS program funding, research support and Veterinary Loan Repayment Program. The AAC also discussed their structure and the participation of the various industry groups.

Drs. Bernadette Dunham, Bill Flynn, Roxanne Schweitzer, and David Rotstein with FDA-CVM joined the Committee next. Dr. Dunham gave an overview of the budget request, highlighting the increase for antimicrobial resistance work and veterinary feed directive (VFD) compliance. VetLIRN was discussed, including existing and new cooperative agreements across the country regarding food safety, pet food and human health.

There was discussion on the milk residue study, which were overall positive. The remainder of discussion centered around antimicrobial

assistance, Guidance 209 and 213, and rulemaking for VFD in the coming year.

USDA-ARS was the next meeting. Administrator Chavonda Jacobs-Young participated, as well as Dr. Cyril Gay. Their budget included $7 million for Antibiotic resistance research including improving understanding of ecology. Dr. Jacobs-Young mentioned that they have $3.7 billion in facility assets, making their repair and maintenance line item particularly important. They also have approximately 800 staff and manage 763 projects. When they ask for new money, they are also mandated to redirect and eliminate programs.

Funding to improve the Poultry Laboratory in Georgia is their number one building priority this year.

They discussed closing the sheep station in Idaho. They mentioned that one of the biggest problems in keeping that station open is that one of its most important and unique contributions, the ability to study co-habitation of domestic and wild sheep (long horn), has been eliminated via legal actions.

One of their current focuses is to look across programs and seek consolidation that will increase efficiency. They are adopting a “systems” approach as well to leverage projects to better understand wider implications.

By far, the largest investment is in plant related research. They are preparing a survey of stakeholders to better direct funding and service. It should be coming out within a month or so. They would like wide dissemination to stakeholders and would appreciate assistance.

They discussed the recent animal care investigation at the US Meat Animal Research Center (USMARC) facility. They could not say much because they would like the investigative report to speak to the issue, (http://www.ree.usda.gov/ree/news/USMARC_AWHR_Panel_Report_PrePublic_Hearing_030602015.pdf), but the bottom line seems to be that animal care is excellent but related administrative procedures can use tuning up. The initial report was released last week and they are currently taking comment.

Dr. Chester Gipson and Jerry Rushkin of APHIS-Animal Care (AC) met with the Committee in the afternoon. Internet Pet Sales was the first topic, with updates on the inspections and compliance with that program. For states with that jurisdiction, training could be made available. Elephant tuberculosis (TB) was the next issue, with AC updating us on the acceptance of the new test, and allowing industry to determine how best to move forward with that. Finally, canine brucellosis was mentioned as an issue to keep on the radar.

Department of Homeland Security (DHS), with Drs. Marvin Meinders, Larry Barret and Jamie Johnson participating, gave several updates on DHS projects. The National Bio and Agro Defense Facility (NBAF) status was given, with a video that had been produced to give an overview of how the facility would look. Expected completion will be in 2020, and estimated operating expense of $55 million. Dr. Barrett highlighted the recent successes with FMD vaccine research at Plum Island. Dr. Meinders provided information on

emergency preparedness programs and training over the past year. He highlighted Food Shield as a tool available.

The Committee then adjourned for the day.

The next morning, meetings began at the National Cattlemen's Beef Association (NCBA) office. The first meeting was with the Food Safety Inspection Service, represented by Mohammed Abraham, Bill Smith, Keith Payne, and Stephanie Wilkin. Discussion began with Food Safety and Inspection Service (FSIS) explaining their biggest role is in food safety. The biggest new initiative is the Modernization of Poultry Rule. FSIS has from online to more offline safety inspection checks and a focus on Salmonella and Camplylobacter. Their first deadline was February 23rd with about 50 plants signing on. Negotiations now looking toward summer to implement first wave.

FSIS discussed restructuring – there are currently ten district offices. They are coordinating and evaluating impact. Looking at performance, domestic imports, analytics and partnering with the Centers for Disease Control (CDC) on sharing information. In addition, FSIS working on automation of exports (200+ countries) early in 2016. Recently, FDA and FSIS had discussions (very early) on working together.

Dr. Abraham provided an overview of their procedures with animal identification collection, and their agreement with VS on that issue. The Committee encouraged continued focus on this effort.

Training programs were discussed and availability of those, including funding.

National Institute of Food and Agriculture (NIFA) representatives Gary Sherman, Meryl Broussard and Paraq Chintis next joined the committee for discussion. Overall they are pleased with NIFA funding in the President's budget. A summary was provided. In particular, $125M increase for NIFA Agriculture and Food Research Initiative (AFRI) line item. There are ongoing efforts to strategically and proactively address funding options similar to their plant programs. NAHLN funding continues to receive much focus, coming out of the Food Animal Defense Initiative (FADI) line. The Committee emphasized the importance of continued support for this program. Competitive funding for this was also discussed as a possible consideration.

Veterinary Medicine Loan Repayment Program (VMLRP) is in sixth year, 256 vets placed, should have data on success of retention soon. Five million in funding seems fairly certain to continue the program. All agreed that we need to make removing the 39% tax burden a priority. A mention that we need to watch for the Foundation for Food Agriculture Research Initiative for a federal-private match grant program.

The Committee moved into its next discussion on the National Animal Health Laboratory Network (NAHLN) and National Veterinary Services Laboratories (NVSL) with Sarah Tomlinson, Beverly Schmitt, and Beth Lautner.

Several updates on current NAHLN initiatives were provided by Dr. Tomlinson, NAHLN Coordinator. Highlights of the discussion include the following key points:

Laboratory Messaging –

- Define the issues around laboratory messaging
- Provide background
- Provide a status update on laboratory messaging
- Define our common goal
- Describe a way forward to reach that goal

Status of Laboratory Result Electronic Messaging:

- Currently 61 NAHLN laboratories-includes federal and branch laboratories
- 16 laboratories actively messaging now
- 13 others have successfully messaged some results in past (many AI)
- Among the 61 laboratories, 27 laboratories don't have any active, on-going surveillance testing that generate test results to message to VS

Going Forward:

Support and communicate THIS common goal: *Working towards the goal for all NAHLN laboratories to have capability to message diagnostic testing information to support VS program, regulatory and/or animal health emergency needs.*

Multi-prong, stepwise solution approach to achieving goal that integrates:

- NAHLN restructure and checklist requirements
- Comprehensive and Integrated Surveillance Planning
- VS IT architecture and roadmap approach
- Staffing and financial plans
- NLRAD and emerging diseases
- VS Electronic processes initiative-import/export testing

The Committee concluded its meeting with an afternoon session with APHIS-VS, including Dr. John Clifford and several of the VS Leadership Team and program managers. Lengthy discussion was held on a long list of topics. Key points include the following summary.

1. NALHN Budget Organization. The current budget development environment is commodity based, and VS does not want to move away from that methodology. VS acknowledges that there is not enough funding for NAHLN; there is no "new money" so any increases for NAHLN would have to come at the expense of other line items/commodities.

2. NAHLN IT and Messaging.- VS is supportive of continuing progress in these areas.
3. 2016 budget - There is a $10 million dollar VS request (through internal offsets and new money) for support of antimicrobial resistance initiatives proposed by the President.
4. Vesicular Stomatitis has been delisted, but ongoing surveillance is still important at the state level and Vet Services will be supportive of those efforts.
5. Brucella - select agent status - every two years, the select agent list is reviewed by Centers for Disease Control and Prevention (CDC) and APHIS - there is a current notice published in the Federal Register, and CDC has already proposed removal of *B. abortus, suis* and *melitensis*. APHIS is waiting to receive comments before coming out with a proposed rule; once that happens, there will be another comment period on the proposed VS rule. Current comment period closes on April 28, 2015. There is an opportunity for individual animal health experts to make proposals relative to the CDC list - e.g. Q Fever (because this is ubiquitous, might be reasonable to approach CDC about removal of this from the list).
6. USAHA Resolution 30 - VS' retrospective analysis of small ruminant surveillance testing resulted in an inadequate sample volume to determine definitively that the US is free of TB/Brucellosis; VS will be looking at other testing methodologies and is still open to the possibility of declaring small ruminant flocks in US free if they can document the testing results in support of that. APHIS would be conceptually supportive of language that would amend the Pasteurized Milk Ordinance (PMO) to allow decisions related to TB/Brucellosis testing of Grade A small ruminants to be made at the level of the state animal health official (SAHO)/assistant district directors (ADD) rather than mandated by FDA but would have to review the National Conference on Interstate Milk Shipments (NCIMS) proposal related to this before making a final decision. Dr. Amber McCoig is the FDA Center for Veterinary Medicine (CVM) representative who sits on the other species committee of NCIMS. VS cautioned that SAHOs should keep in mind the impact that changing testing requirements might have on our trade agreements with the EU. APHIS, VS, point of contact (POC) is Dr. Alecia Larew Naugle, Director, Sheep, Goat, Cervid and Equine Health Center - 301-851-3574; alecia.l.naugle@aphis.usda.gov.
7. FSIS/APHIS memorandum of understanding (MOU) regarding identification (ID) collection at slaughter – MOU-related pilot project involved APHIS' collection of ID after FSIS released them post-slaughter - results of that pilot project are not yet available. ID collection on TB-sampled animals: 55% of samples submitted to NVSL had official ID recorded; 24% of samples submitted had unofficial ID recorded; 20% of samples had no ID recorded. VS acknowledged that a true bookend approach to ADT is probably not possible at this time

due to the ADT rule flexibility that allows for wide diversity of ID types that are applied to slaughter animals. If all had radio frequency identification (RFID), process would be easier. It is too cumbersome, time consuming and expensive for FSIS personnel to collect and record and maintain ID data at the plants on non-sampled animals. It is VS' understanding that FSIS is collecting all ID of animals that are going through slaughter facilities and maintaining that ID during the time that the animals/carcasses are in the facility.

8. Highly pathogenic avian influenza (HPAI) - VS encourages all state animal health officials that we must recognize the surveillance zones that are being established in affected states and should not put restrictions on those states that are more aggressive as it is hypocritical to do this and then to ask the US' trading partners not to. Any states that have rules that are more restrictive are encouraged to change them.
   The current HPAI outbreak does not involve lateral spread so the quarantine zones do not change. APHIS is promoting wildlife surveillance as part of the response to this outbreak - samples will be sent to USGS laboratories and results will be reported to NVSL. Although there is no indication of lateral spread, excellent biosecurity practices must be maintained by animal health staff when they go to commercial flocks to do any sort of testing. Trade impacts - normally six billion dollars per year in trade of poultry and poultry products, but 11 countries have banned imports from the US, including China with economic impact from that country alone of $187 million; S. Korea is engaging in bilateral discussions regarding regionalization; approximately 35 other countries are willing to talk with the US regarding regionalization plans; Mexico is willing to discuss alternatives; EU is recognizing our regionalization; Japan has as well. Summary - tremendous amount at risk but some impact has been successfully mitigated; VS will host a global symposium in June 2015 on the issues around poultry trade as there is a worldwide impact to this outbreak.
9. Ebola **-** It has been demonstrated through studies that pigs can become infected with Ebola (Restin and Zaire), can shed virus, and can infect primates via an aerosolization route. So, if a human becomes infected by interacting with a pig at a fair, there is now a set of guidelines put out by VS that would speak to this. Dogs can become infected, but not a big concern from a disease transmission standpoint. Animal Care (AC) will be speaking with FEMA to determine whether in the event of an outbreak there would be any federal funding made available to states to handle the issue(s).
10. Tuberculosis in cattle and humans - *M. bovis* as a zoonotic issue. Better guidance is needed for dairy producers, especially for dairy workers that may be exposed or be a source of infection. VS is currently working on this issue with CDC and National Institutes of

Health (NIH) to determine whether there is the ability to trace a positive human with *M. bovis* back to dairy cattle. There are strong indications that there are infected humans transmitting TB to dairy cattle.

11. **USAHA Resolution 4 -** Risk assessment related to Classical and African swine fever in the European Union (EU). There is confidence that the EU will allow APHIS/pork industry members to visit the EU and conduct a follow up risk assessment/recheck in those member countries. FSIS has also recently conducted a risk assessment there relative to food safety.
12. **Resolution 15 - Establish an Equine Infectious Anemia (EIA) working group** - APHIS had planned to promulgate a rule regarding the EIA program this summer but made the decision at the end of last year to postpone or cancel that promulgation and seek non-regulatory solutions. A discussion group will be put together comprised of multiple stakeholders to look at the best way to achieve stated goals. (At this writing the group has been assembled, and held its first call on March 26, 2015). The group's charge is to evaluate where we are as a nation on EIA, set goals and objectives, and suggest options to achieve those goals. Deliverables: A short document to be presented at USAHA/AAVLD annual meeting in 2015.
13. **Equine Disease Forum** – In response to the recommendation from the Infectious Diseases of Horse Committee (IDOHC), USAHA and NIAA are planning to co-host the forum in December 2015. VS staff is working with IDOHC representatives and others to develop topics and structure for the forum. VS plans to authorize attendance of staff as travel budget allows.
14. **Resolution 14** – Contagious Equine Metritis (CEM) Post-Entry Quarantine and Testing Program
    a. develop benchmarks for annual evaluation of each state's approved CEM import program, along with annual report and inspection forms. VS response: Standards are in VS Guidance 13406.1. Oversight of facilities lies with state officials. Changing federal oversight would require change in regulation. VS will seek input from stakeholders on monthly National Equine conference calls.
    b. develop protocols for suspending or revoking state approval. VS response: State officials approve individual facilities. VS has the authority to revoke state approval.
    c. require states to have trained personnel who have completed a USDA CEM training course. VS response: It is the responsibility of the state to ensure facilities have appropriate training. APHIS cannot require training of personnel overseeing import facilities. Dr. John Clifford recommended requirements be put in place that a designated person in each state be trained every two years or some regular interval, and

that IDOHC describe the content of training and oversight. We do not want a repeat of the 2009 CEM outbreak.

d. develop a searchable repository for data on imported horses, and on CEM import facilities. VS response: Working on database since 2014. Currently collect 50-80 pieces of information on imported horses. Would like to have input on which of those pieces are critical for capture in the database.
e. provide an annual report of the CEM Import Program to SAHOs and equine stakeholders. VS response: This will be done at annual USAHA/AAVLD meetings.

15. **Resolutions 16 & 23 -** Requiring and electronically capturing radio frequency identification (RFID) on imported horses. APHIS will not require electronic ID on imports because this isn't required for interstate movements. Would need input from industry, as implementing such a requirement might result in reciprocal requirements on US horses being exported. Putting readers at all import facilities would be expensive.
16. **Addition of Caudal Fold (CF) test to entry requirements in Code of Federal Regulations (CFR)** - (Resolution 22 in 2011) In January 2015, importers were given notice of the policy requiring CF test. It is very difficult to change the CFR in the current environment.

Following the end of these discussions, the Committee adjourned.

REPORT OF THE COMMITTEE ON IMPORT-EXPORT

Chair: Mark Engle, MO
Vice Chair: Robert Blomme, IA

Bobby Acord, NC; Joyce Bowling-Heyward, MD; Charles Brown II, WI; Stan Bruntz, CO; Jess Burner, TX; Bruce Carter, IA; Ignacio dela Cruz, MP; Larry Elsken, IA; William Fales, MO; Katherine Flynn, CA; Mallory Gaines, DC; Julie Gard, AL; Donna Gatewood, IA; Paul Gibbs, FL; Chester Gipson, MD; Tony Good, OH; Kristin Haas, VT; Percy Hawkes, UT; Rick Hill, IA; Robert Hilsenroth, FL; Donald Hoenig, ME; Marv Jahde, KS; Annette Jones, CA; Elizabeth Lautner, IA; Travis Lowe, MN; Kevin Maher, IA; Brittany McCauslin, CO; David Meeker, VA; Gay Miller, IL; Eric Mohlman, NE; Sandra Norman, IN; Elizabeth Parker, TX; William Pittenger, MO; Herbert Richards, HI; Paul Rodgers, WV; David Scarfe, IL; Travis Schaal, IA; Shawn Schafer, OH; Charly Seale, TX; Laurie Seale, WI; Sheryl Shaw, WI; Kathryn Simmons, DC; Susan Tellez, TX; Peter Timoney, KY; Alberto Torres, AR; Paul Ugstad, NC; Charles Vail, CO; Mark Walter, PA; James Watson, MS; Patrick Webb, IA; Roger Weigle, WI; Brad Williams, TX; Mary Anne Williams, TX; Ellen Mary Wilson, NM; William Wilson, KS; David Winters, TX; Richard Winters, Jr., TX; Cindy Wolf, MN.

The Committee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 12:30 to 4:00 p.m. Dr. Liz Wagstrom chaired the Committee in the absence of Drs. Engle and Blomme. There were 19 members and 26 guests present. Response to three resolutions that were passed out of the committee last year were reviewed, and a decision to revisit one of the resolutions during the discussion period was raised.

Presentation and Reports

Import of Animal Products and By-Products

Tracey Butler, USDA
Summary:

- Some shell eggs from highly pathogenic avian influenza (HPAI) and exotic Newcastle disease (END) regions are allowed following pasteurization. US experienced a shortage of shell eggs following this summer's HPAI outbreak in US, and USDA allowed shell egg imports from those establishments already approved by Food Safety and Inspection Service (FSIS) to import liquid eggs. Mexico is only HPAI country importing shell eggs into the US. No whole eggs are being imported at this time.
- Bovine risk assessment of risk to US cattle health from importation of bovine fetal serum, bovine serum and bovine serum albumin. Risk assessment will allow protocol development for safe importation. Hazard analysis and pathways assessment is complete – finished risk assessment expected to be completed by January 31, 2016. Communication with the industry is ongoing on questions needed to complete the risk assessment (RA).

- Automated Cargo Environment (ACE) International Trade Data System (ITDS) goal is to create a single electronic window where required trade documents can be submitted to CBP. Due to be completed and become the single window for trade by end of 2016. Working on pilots with pet food, beef and pork from Canada.
- RegFlex – transparent way APHIS is able to exempt from enforcement parts of the regulations that no longer pose a risk without going through rulemaking. E.g. lactose from New Zealand. Allowing eCertification with Australia and New Zealand.
- Certification, Accreditation, Registration, Permitting, and Other Licensing (CARPOL) – eFile system that will communicate with ACE

The complete text of this presentation is included at the end of this report.

Import of Live Animals

Joyce Bowling-Heyward, USDA

- All information on Automated Cargo Environment (ACE) also applies to live animals
- Export – training courses on regular basis, some courses delayed or canceled due to highly pathogenic Asian avian influenza (HPAI).
- Export negotiations:
- Discussions with Canada and Mexico on digital signature and electronic certification
    - Trying to expand trade since US is negligible for bovine spongiform encephalopathy (BSE).
    - Support of poultry following HPAI outbreak. Facilitation of export of chicks that transit through HPAI regions prior to export. Negotiated 34 new export protocols, maintained protocols for 43 markets and expanded markets for 29 markets.
    - New project on Pet Export facilitation, improving access to requirements.
    - Veterinary Export Health Certificate System – working on a globally standardized certificate, including electronic processes. Working on pilot project with Canada, and also slaughter horses to Mexico. First step with other countries may be the acceptance of digital signatures.
- Import of Animals:
    - Construction of contingency inspection facilities at various Mexican facilities, and upgrades to others
    - Made changes to Import Tracking System Veterinary Services Process Streamlining (VSPS) to scan radio-frequency identification (RFID) or bar codes tags and capture to import database. Piloting this program at the Mexican border. Standardizing collection of equine identification (ID) from microchipped, tattooed and registered horses.

- Improved the contagious equine metritis **(**CEM) database to track horses that are required to complete CEM quarantine. Have completed a CEM report for 2014-2015 using data submitted by the state coordinators.
- All of APHIS working on new permitting system, hope to be completed by the end of 2016.
- Import summaries demonstrate an increase in most import categories.

Export of Animal Products

Bob Bokma, USDA

- National Import and Export Services (NIES) focus on animal products for human consumption, animal feeding, industrial, medical and pharmaceutical uses. Intent is for one certificate to be sufficient.
- Facilitate exports – negotiate protocols with trading partners. Meat and other audits, certificate language and consultations. BSE reclassification negotiations to expand markets.
- Manufacturing plant and other inspections done by district office/service centers and maintained in the data base. Keep information on over 1,000 facilities in the data base. EU is biggest area for which inspections are maintained.
- Highly pathogenic Asian avian influenza (HPAI) closed or reduced exports to a number of countries. Managed bans, certificate limitation and voluntary export restrictions. E.g. control zone vs county vs state vs country. Working to remove restrictions or bans. Entered agreements with Canada and Japan, working to refine them with the counterpart.
- Bovine spongiform encephalopathy (BSE) – goal to open more markets for bovine and non-bovine ingredients for various trading partners. E.g. Canada, Chile, China, Korea, Macao, Mexico and Peru.
- Pork products. Goal to remove restrictions related to Trichinae. Finalized with Peru. Negotiating on porcine reproductive and respiratory syndrome (PRRS), post-weaning multisystemic wasting syndrome (PMWS), and porcine epidemic diarrhea virus (PEDV) concerns.

African Swine Fever Control in Eastern Europe

Liz Wagstrom, National Pork Producers Council

- Overview of the situation in Latvia, Lithuania and Poland
  - European Commission (EC) regulations and zoning are rigorous. The countries are conforming to the EC regulations and adding some country specific additional restrictions.
  - Surveillance, animal identification and tracking, meat inspection, wild boar hunting and depopulation/indemnity are laid out in these regulations.

- State and federal veterinarians are auditing and enforcing them.
- Wild boar populations will likely prevent these countries

Committee Business:

The Committee discussed the resolution on a national strategy for bluetongue surveillance that was passed by the Committee and the USAHA membership last year. A motion to change the resolution was passed, and submit to the Committee on Resolutions.

National Import Export Services
Import Products/By-products: FY 2015 Activities

Tracye (Butler) Hernandez-Bynum
USDA-APHIS-VS-NIES

Import Animal Products

National Import Export Services (NIES) continues its mission to facilitate safe international trade of animal products and by-products, regulate the importation of animal products and by-products, prevent the introduction of dangerous and costly pests and diseases, promulgate animal product import regulations and policies, collaborate with other government agencies and issue import permits. During FY15, NIES Import Products staff issued a total of 9,354 permits for animal products. Of the total permits issued, 2,546 represents new permits, 5,127 were renewals of expired permits and 1,681 were amendments to existing permits. The total number of permit issued in FY15 was a significant increase over previous years, possibly due to increased trade as a result of finalization of the bovine spongiform encephalopathy (BSE) Comprehensive rule.

NIES Approval of Egg Breaking/Pasteurization Facilities

The USDA-APHIS Approved Establishment (AE) program allows consignment of restricted animal products to facilities in located the United States for processing to mitigate against diseases of concern. The majority of AEs are taxidermy facilities which receive trophies.
However, some AEs import shell eggs from highly pathogenic Asian avian influenza (HPAI) (and/or Newcastle disease (ND) regions for breaking and pasteurization.

As a result of the HPAI outbreak in the United States, millions of laying hens were depopulated. This resulted the United States experiencing a shortage of shell eggs. Therefore, interest in APHIS approved shell egg facilities increased and NIES responded. Normally, to become an approved establishment (AE), APHIS requires inspection by Veterinary Services (VS) field personnel. However, in response to the shell egg shortage, NIES added to the approved database, those stand-alone egg breaking/pasteurization facilities that are FSIS approved. Addition to APHIS' AE database is upon request and submission of establishment name, address, FSIS establishment number, and representative contact name and telephone number. Currently, Mexico is the only HPAI country from which shell eggs are being imported. Most of the pasteurized egg products are sold to the baking industry. Additional information regarding the importation of table eggs from HPAI regions can be found on our website at:https://www.aphis.usda.gov/import_export/animals/animal_import/downloads/importer_letter_shell_eggs.pdf

Bovine Serum Risk Assessment

In response to finalization of the BSE Comprehensive rule, the import regulations codified in the Title 9 Code of Federal Regulations, now allow for the importation of bovine serum from regions of Controlled risk for BSE (in

addition to Negligible risk regions). There is a lot of interest in importing commercial quantities of FBS, especially from Europe. A risk assessment (RA) was initiated to help APHIS develop a protocol by which bovine serum products may be imported safely.

The RA objectives are:

- Assess the risk to US livestock health through the importation of bovine serum, fetal bovine serum, and bovine serum albumin into the United States
- Evaluate the change in risk that would result from the use of risk-mitigation measures available to VS

The RA scope will consider foreign animal disease risks of significant concern posed by importation of the following types of serum into the United States from any country:

- Fetal bovine serum (FBS)
- Newborn calf serum (NCS)
- Calf serum (CS)
- Adult bovine serum (ABS) (from slaughtered animals 12 months and older)
- Donor bovine serum (DBS)
- Bovine serum albumin (BSA)

Additionally, the RA will consider potential pathways of introduction for the following hazards of concern:

- Food-and-mouth disease (FMD) – for countries that are free but still vaccinate
- Bluetonque virus (BTV)
- Schmallenberg virus (SBV)
- Akabane virus (AKAV)
- Bovine viral diarrhea virus (BVD)-3
- Bovine ephemeral fever virus (BEFV)
- RA will identify and evaluate mitigations available to VS to reduce the risk posed by the importation of bovine serum, fetal bovine serum, and bovine serum albumin.

Current status of the RA:

- The RA is delayed approximately four months due to APHIS HPAI response.
- The hazard identification and pathways development is complete
- Current focus is on evaluating risk along entry and exposure pathways for each serum type-pathogen combination
- Developed a list of questions and discussion topics for serum industry representatives to help to fill in information gaps
- Draft RA expected to be delivered to NIES no later than January 31, 2016

Automated Cargo Environment International Trade Data System (ACE/ITDS)

Automated Cargo Environment (ACE) is the result of a Presidential Executive Order to streamline the government's import/export processes. The goal of ACE is to create a single, electronic window where companies and customs brokers can submit required trade documents to the Department of Homeland Security's Customs and Border Protection (CBP). CBP is leading the effort by building and maintaining the Automated Commercial Environment (ACE). By the end of 2016, ACE will become the "Single Window" or primary system for trade.

Through ACE many manual processes will be streamlined and automated, and the international trade community will be able to more easily and efficiently comply with import requirements of APHIS and other regulatory government agencies. Brokers will be required to enter trade information into ACE, so industry will have to make sure all the required import information is given to the broker. If individuals act as their own broker, then they must be ACE certified by CBP.

There are three ways information gets into ACE. The first is through the "Message Set" which is all via data entry (electronic). The second way is via the "Document Imaging System" which are PDFs of all documents. The third way is by standard collection of paper documents.

To learn more about International Trade Data System (ITDS) and the Single Window for Trade, please visit: http://www.itds.gov
ACE/ITDS questions from trade can be sent to: ace.itds@aphis.usda.gov
ACE information can also be found on the APHIS homepage at: www.aphis.usda.gov

RegFlex Program

RegFlex is a transparent way that APHIS is able to exempt from enforcement, parts of the regulations that no longer pose a risk, without promulgating rule making. We are currently using RegFlex to address:

- Lactose, and
- eCertification with Australia and New Zealand for meat imports

Lactose is specifically addressed in our regulations. However, a risk assessment indicated that lactose is not a risk. Therefore, we are using RegFlex to de-regulate lactose without having to undergo formal rule making.

Since USDA, Food Safety Inspection Service (FSIS) has an electronic data exchange system in place, APHIS is exempting from enforcement the requirement that "official signed veterinary certificates" accompany shipments of meat from Australia and New Zealand. APHIS is allowing the use of eCertification in lieu of the paper veterinary certificate. In addition, eCertification fits the goals established within ACE's data set information gathering.

CARPOL

Certificates, Accreditations, Registrations, Permits, and Other Licenses (CARPOL) is the Agency wide information technology system. It will be a one-

stop shopping for numerous APHIS activities and is also referred to as “eFile.”
The CARPOL/eFile system will communicate with ACE.
APHIS is currently working on the “Permitting” piece in CARPOL.

REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES OF CATTLE, BISON AND CAMELIDS

Chair: Chuck Massengill, MO
Vice Chair: Pat Long, NE

Helen Acland, PA; Chris Ashworth, AR; Danelle Bickett-Weddle, IA; Charlie Broaddus, VA; Charles Brown II, WI; Beth Carlson, ND; Karen Conyngham, TX; Stephen Crawford, NH; Lewis Dinges, TX; Edward Dubovi, NY; William Edmiston, TX; Anita Edmondson, CA; Adam Eichelberger, SC; James England, ID; James Evermann, WA; W. Kent Fowler, CA; Robert Fulton, OK; Donna Gatewood, IA; Timothy Goldsmith, MN; Michael Greenlee, NV; Keith Haffer, SD; Thomas Hairgrove, TX; Rod Hall, OK; Timothy Hanosh, NM; Percy Hawkes, UT; Carl Heckendorf, CO; Linda Hickam, MO; Dennis Hughes, NE; David Hunter, MT; Annette Jones, CA; Paul Jones, AL; Bruce King, UT; Diane Kitchen, FL; Randall Larson, IA; John Lawrence, ME; James Leafstedt, SD; Scott Leibsle, ID; Rick Linscott, ME; Coleman Locke, TX; Janet Maass, CO; Patrick McDonough, NY; Shelley Mehlenbacher, VT; Emily Meredith, VA; Mendel Miller, SD; Richard Mock, NC; Igor Morozov, KS; Cheryl Nelson, KY; Kathleen Orloski, CO; Jewell Plumley, WV; Jeanne Rankin, MT; Grant Rezabek, OK; Herbert Richards, HI; Julia Ridpath, IA; Jonathan Roberts, LA; Keith Roehr, CO; Michael Sanderson, KS; Kathryn Simmons, DC; Ben Smith, WA; Justin Smith, KS; Nick Striegel, CO; Manoel Tamassia, NJ; Susan Tellez, TX; Robert Temple, OH; Brad Williams, TX; Ellen Mary Wilson, NM; William Wilson, KS.

The Committee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 12:30 to 5:30 p.m. There were 23 members and 38 guests present. The response to the resolution on Bovine Fetal Serum from 2014 was read and approved. Dr. Massengill announced that he was retiring as chair and the incoming president of USAHA would be appointing a new chair to work with Dr. Long.

Presentations and Reports

Dr. Julia Ridpath presented the Bovine Viral Disease (BVD) Subcommittee Report, which is included at the end of this report.

Dr. Carl Heckendorf presented the Trichomoniasis Subcommittee Report, which is included at the end of this report.

National Animal Health Monitoring System (NAHMS) Bison 2014 Study

Margaret Parker[1], Kelly A. Patyk[1], Steven Sweeney[1]
[1] Center for Epidemiology and Animal Health, USDA, Animal and Plant Health Inspection Service (APHIS)

Bison 2014, the USDA's first national study of the US ranched-bison industry, will increase knowledge and understanding about health management practices and other characteristics of the bison industry. The USDA's National Animal Health Monitoring System (NAHMS) is conducting Bison 2014, with assistance from the National Agricultural Statistics Service (NASS). Bison

industry members and other stakeholders provided input for the study needs assessment and process. This input was used to develop the following study objectives: 1) Provide a baseline description of the US bison industry, including operation characteristics, such as inventory, size, and type; 2) Describe current US ranched-bison industry production practices and challenges, including identification, confinement and handling, animal care, and disease testing; 3) Describe health management and biosecurity practices important for the productivity and health of ranched bison; and 4) Describe producer-reported occurrence of select health problems and evaluate potentially associated risk factors. All producers who reported having bison on the 2012 NASS Census of Agriculture were eligible to participate in the study and received a questionnaire in the mail in September 2014. A total of 2,891 questionnaires were mailed. Of those, 634 recipients returned completed questionnaires and 221 reported that they had no bison (response rate: 29.6%). As with other NAHMS studies, Bison 2014 is national in scope, collaborative in nature, and voluntary. The study is being conducted by NAHMS under its designation as a statistical unit under the Confidential Information Protection and Statistical Efficiency Act. Results focusing on health and disease will be presented. Full study results are expected to be available and distributed as descriptive reports, conference presentations, information sheets, and journal articles beginning in late 2015.

Tuberculosis Testing in Camelids—International Update

Sunny Geiser-Novotny, USDA-APHIS-VS

Details of past reports of tuberculosis (TB) in both Old World Camelids (OWC) and New World Camelids (NWC) along with clinical signs, routes of transmission and necropsy findings were presented. Current status of testing in other countries were presented. Details were given regarding sensitivity and specificity of serology testing options currently available in other countries. While there are very limited reports of tuberculosis in camelids in the US, there are many reports of TB in alpacas in the European Union (EU) and in OWC in the United Arab Emirates (UAE), Africa and Pakistan**.** Research is needed on naturally infected and non-infected camelids with known infection status to determine true sensitivity and specificity of available tests.

In the US risk of transmission to camelids is very low due to low prevalence of TB in cattle in the US and no wildlife reservoir (with the exception of Michigan). It is reportable to state veterinarians if signs are consistent with TB.

Alpacas in the Food Chain, Food Safety Concerns

Kristin Haas, Vermont Agency of Agriculture, Food and Markets

The desire by alpaca owners to have their animals slaughtered for sale in niche' markets and restaurants is increasing in the Northeast as fewer owners are interested in raising them for fiber and for exhibition/show. Alpacas are not amenable to the Federal Meat Inspection Act and they are not defined as exotic species by USDA, Food Safety and Inspection Service (FSIS). As a

result, the harvesting and processing of alpacas does not require state or federal inspection, but if that level of oversight is desired by the owner due to market demands, the processes fall under the regulatory jurisdiction of Food and Drug Administration (FDA). The FDA-Center for Food Safety and Applied Nutrition (CFSAN) is responsible for protecting consumers against impure, unsafe, and fraudulently labeled foods covered by the Federal Food, Drug and Cosmetic Act and for assuring consumers that foods are wholesome and produced under sanitary conditions.

The Vermont State Meat Inspection Program maintains an equal-to status and is one of the few in the country that provides state voluntary inspection for owners who wish to sell alpaca-origin food products to niche' markets or restaurants that require inspection. There is a lack of regulatory, diagnostic and best management practice guidance to support alpaca slaughter, and the lacking infrastructure has ramifications for all parties involved, including state meat inspection programs, accredited veterinarians, camelid owners, and the consuming public. Administration of all medications, including dewormers, to alpacas is considered to be an extra-label use and must conform to extra-label drug use (ELDU) requirements. There are no established meat withdrawal times for any of these medications, and there are no FDA-validated tissue residue tests available in the US for use with alpacas. Since alpacas historically have not been considered food animals and their owners often do not have an agricultural background, there is a high likelihood that alpacas slaughtered for meat have not been raised in a manner that minimizes violative tissue residues. Since there are no validated tests that can detect violative residues, it is likely that alpaca meat produced under inspection is entering the food supply with inappropriate levels of multiple medications present in the tissue. This activity constitutes a potential food safety concern.

This situation results in the potential for increased liability for any state meat inspection program that is providing voluntary inspection for the slaughter/processing of alpacas. The collective public assumption is that meat food products that are produced under inspection and offered for sale at retail or in restaurants are unadulterated, wholesome and safe to consume; this may not be the case with alpaca meat. It is imperative that organized industry counsel alpaca owners about this issue and educate them about best practices associated with raising alpacas for food production purposes. Additionally, veterinarians treating alpacas for illness or providing routine preventative care should take into consideration the fact that some alpacas may end up being slaughtered for human consumption and medicate accordingly. The development of FDA-validated tests for detection of alpaca tissue residues would be ideal.

REPORT OF THE SUBCOMMITTEE ON BOVINE VIRAL DIARRHEA (BVD)

Chair: Julia Ridpath, National Animal Disease Center (NADC) Agriculture Research Service (ARS), USDA

The pestivirus genus continues to expand with the discovery of a new virus that is associated with congenital tremors of pigs. This virus is the most genetically distant of the pestiviruses discovered to date. It is becoming increasing evident that other emerging pestiviruses may have significant impact on the health of wild and domestic ruminants. Surveillance studies of wildlife species in the state of Nevada has yielded evidence that the antelope virus is currently circulating in mule deer, mountain goat, big horn sheep and pronghorn antelope populations. The recognition of the prevalence of HoBi-like viruses continues to expand with reports from India and Bangladesh that HoBi-like viruses are more prevalent in those countries that BVDV1 or BVDV2. A serological survey, conducted using 2,000 serum samples originally collected in the course of the US brucellosis surveillance program, has been completed. Cross reactivity was seen between BVDV1, BVDV2 and HoBi-like viruses but differential serology indicates that HoBi-like viruses are not prevalent in the US. However, these results also suggest that the majority of cattle tested would not possess an adequate level of cross-reactive antibodies to provide against infection with HoBi-like viruses.

REPORT OF THE SUBCOMMITTEE ON TRICHOMONIASIS

Chair: Carl Heckendorf, Colorado Department of Agriculture
Bud Dinges, Texas A&M University

2014 *T. foetus* Quality Control (QC) Panel Report – Individual Polymerase Chain Reaction (PCR)

Background

With the absence of Federal oversight or a National Trichomonas Standardized Proficiency, there is an interest from The Western States Livestock Health Association (WSLHA) in assessing the consistency between laboratories in their ability to detect *T. foetus* infection in cattle. A group of laboratory diagnosticians present at the 2014 WSLHA meeting were tasked with conducting this assessment. Laboratory diagnosticians from California, Colorado, Kansas, New Mexico and Texas worked with Biomed Diagnostics to create a *T. foetus* PCR QC panel. Preliminary data was shared at USAHA during the Annual Meeting in October 2014.

Participants

Thirteen laboratories submitted results for 15 pouch panels and ten laboratories submitted results for 13 tube panels. Eighteen laboratories participated from 16 states including California, Colorado, Idaho, Kansas, Louisiana, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, Washington and Wyoming.

Panels

Panels were created at Biomed Diagnostics in White City, Oregon. Each panel consisted of 20 pouch or tube samples, all samples were inoculated with 0.5 ml each of pooled *T. foetus* negative smegma (collected from three laboratories). Ten samples in each panel were then inoculated with 11, 56, 112, 224 and 1120 *T. foetus* cells in duplicate. Samples were shipped overnight from Biomed Diagnostics to participating laboratories. All laboratories received the samples at room temperature although Laboratory 16 noted that they would have rejected the shipment based on their submission criteria which is a lack of hand warmer and insulated shipping container. Laboratory 18 did not receive their panel within 24 hours but results were still included in this report although this laboratory's data was not used in any final analysis. When submitting results back to Biomed, laboratories were asked to also provide incubation time, extraction method used and type of PCR used.

Results

The above QC *T. foetus* panel was the impetus for developing our approach to mitigate *T. foetus* infection in the US cattle population. Currently, 29 states have Trichomoniasis (Trich) Regulations, 11 States are harmonized with the recommendations of the subcommittee i.e. 18 month old bulls need to be Trich checked, the test is valid for 18 months, and the deoxyribonucleic acid (DNA) amplification tests are the tests of choice. Seven states are in the process of harmonizing, and four states will start to harmonize in the near future.

Given the above information, it was apparent that we needed some form of laboratory validation for quality control of trich testing. Laboratory personnel from a number of AAVLD laboratories met and discussed how this should be accomplished. Three topics were agreed upon 1). A quality control protocol would be developed; 2). The homogenicity of the samples would be validated before the samples were shipped; 3). There would be 3rd party validation. The focus was on the results of the test not how the individual laboratories performed the tests. The meeting participants agreed to have the protocol within six months.

In conclusion it is hoped that the laboratories will be communicating with each other to determine best practices and the laboratories will then communicate with the State Animal Health Officials (SAHOs).

REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES OF HORSES

Chair: Andy Schwartz, TX
Vice Chair: Katherine Flynn, CA

Helen Acland, PA; Sara Ahola, CO; Joyce Bowling-Heyward, MD; Becky Brewer-Walker, AR; Charlie Broaddus, VA; Stan Bruntz, CO; Craig Carter, KY; Stephen Crawford, NH; Wendy Cuevas-Espelid, GA; Glenda Davis, AZ; Brandon Doss, AR; Edward Dubovi, NY; Adam Eichelberger, SC; Dee Ellis, TX; Edward 'Rusty' Ford, KY; W. Kent Fowler, CA; Tony Frazier, AL; Robert Gerlach, AK; Paul Gibbs, FL; Nita Grause, IA; Michael Greenlee, NV; Kristin Haas, VT; Rod Hall, OK; Steven Halstead, MI; Timothy Hanosh, NM; Greg Hawkins, TX; Carl Heckendorf, CO; Terry Hensley, TX; Michael Herrin, OK; Marv Jahde, KS; Bruce King, UT; Don Knowles, WA; R. Lansford, TX; Donald Lein, NY; Charles Lewis, IA; Mary Lis, CT; Kevin Maher, IA; Scott Marshall, RI; Patrick McDonough, NY; Linda Mittel, NY; Kenton Morgan, MO; Lee Myers, GA; Cheryl Nelson, KY; Jeffrey Nelson, IA; Sandra Norman, IN; Eileen Ostlund, IA; Boyd Parr, SC; Jewell Plumley, WV; Jeanne Rankin, MT; Grant Rezabek, OK; Jonathan Roberts, LA; Keith Roehr, CO; Dennis Schmitt, MO; Michael Short, FL; Marilyn Simunich, ID; David Smith, NY; Justin Smith, KS; Diane Stacy, LA; Robert Stout, KY; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Peter Timoney, KY; Josie Traub-Dargatz, CO; Susan Trock, GA; Jeff Turner, TX; Charles Vail, CO; James Watson, MS; Ellen Mary Wilson, NM; Ernest Zirkle, NJ.

The Committee met on Monday October 26, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 1:00 to 6:00 p.m. There were 36 members and 28 guests present per the sign-in sheet, and numerous other attendees who may have not signed in. Chairperson Dr. Schwartz made introductions, reviewed the Committee's mission statement, and presented a brief overview of final responses to 2014 resolutions.

The Committee recognized the ongoing contributions to the mission by Dr. Kent Fowler. Dr. Fowler coordinates and leads the monthly National Equine Conference Call, focusing on current issues affecting equine and the equine industry.

The Committee also recognized the extensive contributions of Vice Chair Dr. Katie Flynn, who was not able to attend the meeting this year. Dr. Flynn led the efforts of the Equine Herpesvirus-1 (EHV-1) Subcommittee, and is to be credited for spearheading much of the work related to the accomplishments and activities of the Committee.

The Committee heard the EHV-1 Subcommittee report, and a presentation on Equine Herpesvirus Myeloencephalopathy (EHM) Incident Guidelines for State Animal Health Officials. This 49-page document is a product of a two-year concentrated effort by the subcommittee. Its contributors are nationally recognized experts and leaders in equine disease issues, particularly with EHM. The Committee recommends this guideline document be shared widely with State Animal Health Officials (SAHO), equine industry veterinarians,

equine related event organizers, and other interested parties as a resource to be utilized in preparation for and response to EHM incidents.

The Committee heard a summary of the upcoming Equine Diseases Forum, an event to be co-hosted by USAHA and National Institute for Animal Agriculture (NIAA). This forum is scheduled for January 19-21, 2016 in Denver, Colorado. State, federal, private veterinary practitioners, and equine industry organizations and leaders are invited to attend this forum. The facilitators of the discussion will present identified challenges in addressing equine health and proposed recommendations for advances in protecting equine health.

Time-Specific Paper:

Dr. Peter J. Timoney, Maxwell H. Gluck Equine Research Center, Kentucky, presented a time-specific paper on Epizootic Lymphangitis: Potential to Significantly Impact the Health and Well-being of Equids. The paper, in its entirety, is included at the end of this report.

Dr. Carl Heckendorf presented the report of the Subcommittee on Equine Herpesvirus-1, which can be found at the end of this report.

Dr. Michael Short presented the report of the Subcommittee on Equine Piroplasmosis, which is included at the end of this report.

Committee Business

The Committee approved reports from the EHV-1 Subcommittee, and the Equine Piroplasmosis Subcommittee.

One resolution directed to USDA-APHIS-VS was approved. The resolution urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to require USDA border personnel to electronically capture and record adequate official animal identification on all equids imported into, or returning to, the United States from Mexico. Adequate official animal identification, at a minimum, is the equid's name and any permanent identification present, to include Radio Frequency Identification (RFID) microchip number, and breed, sex, age, color, and all markings. Record of this information should be on all border crossing laboratory testing paperwork and be captured electronically in a searchable database accessible to animal health officials for use during a disease investigation.

Presentations and Reports

2014 and 2015 CEM Report Summary

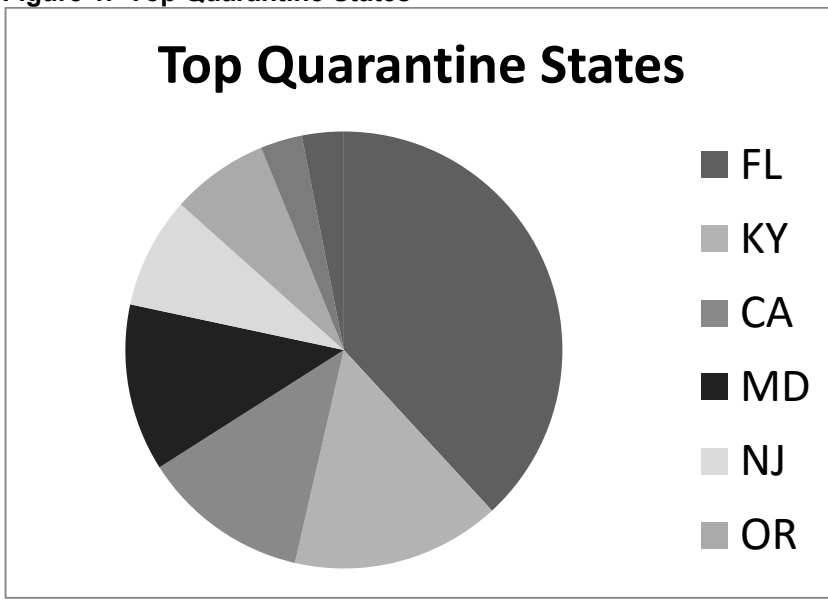
Joyce Bowling-Heyward, Import-Export Animals Staff, National Import-Export Services

This is the first Contagious Equine Metritis (CEM) report that has been done, based on information submitted from State comprehensive emergency

management (CEM) coordinators. Data being presented covers FY2014 and the first three quarters of FY2015 (Oct 2014-June 2015).

Currently there are 21 States approved to have CEM quarantine facilities. Seven of these states are inactive, and another three states receive horses sporadically (less than ten per year). Four States are doing the more than 75% of CEM quarantine; they are Florida, Maryland, California, and Kentucky.

Figure 1. Top Quarantine States



There are currently 39 countries considered affected with CEM. The top ten countries exporting horses that require CEM treatment are: Germany, the Netherlands, Belgium, the United Kingdom, Ireland, France, Spain, Poland, Denmark, and Japan.

Numbers of Mares and Stallions that go to CEM quarantine

Year	Number of mares	Number of Stallions	Total
2014	1336	147	1483
2015	1035	160	1195

APHIS received a 5part resolution in 2014 relating to CEM issues, and has been working hard to address these issues. This includes:

- Requesting input on CEM program from stakeholders through industry meetings, contact with individual State CEM coordinators, and conference calls with the Committee on Infectious Disease of Horses (IDOHC) CEM subcommittee, to determine if there is need for amendments to CEM program.

- Offering a CEM training course, that was held in October 2015, with approximately 30 participants.
- Modifying the initial spreadsheet used for reporting by the CEM coordinators.
- Manually collating the CEM reports provided for 2014 and 2015 in order to gather the data for this report.
- Completion of a new database for CEM information that is currently being tested with a plan of being implemented for FY2016 reporting.
- Plans for Animal Import Centers (AIC) to improve responses from States upon receipt of a CEM horse from an AIC facility.
- Amending the current Veterinary Services Process Streamlining (VSPS) import tracking database to allow for reporting of where CEM horses are sent to CEM quarantine.

APHIS plans to offer CEM training on a more regular basis in the future as well as organizing conference calls for CEM coordinators to share information once or twice a year as needed.

USAHA 2015 Equine Infectious Anemia Discussion Group Findings
Alecia Naugle, Surveillance, Preparedness and Response Services (SPRS), Veterinary Services (VS), USDA

State and Federal cooperative Equine Infectious Anemia (EIA) control efforts have existed for over 40 years. Reactors have declined in the tested population from 3.8 percent in 1972 to 0.00004 percent in 2014. State Animal Health Officials (SAHO) regulate most aspects of EIA control. Federal authority is limited to interstate movement and disposition of reactors and approval for testing laboratories and research facilities.

APHIS-VS convened the EIA Discussion Group in 2015. The group was composed of State, Federal and industry representatives. It was tasked to discuss the goals for addressing EIA in the US, examine current EIA strategies and regulations, identify gaps, and propose non-regulatory and regulatory options (or both) to address these gaps and to achieve the goals. The purpose of this group was to gain information or viewpoints from individual attendees. This group could not provide a collective recommendation or consensus statement since it was not an official Federal Advisory Committee.
Key observations of the discussion group included the following:

- There was considerable enthusiasm among many group members to strengthen EIA control efforts in order to capitalize on existing successes.
- Many group members believed that the goal should be eradication of EIA; however, they expressed concerns about the feasibility and ability to fully implement this goal.
- Several group members felt that the foundation of any increased EIA control or eradication effort should include Federal regulations.

- Although there is room for improvement, group members did not view current equine identification and documentation of EIA test status as barriers to EIA control.
- The group identified that reservoirs of infection exist in untested animals in the US and that targeted surveillance in these populations is needed. Stray animals and illegal movement of animals or blood products from Mexico may serve as potential sources of infection.
- Several group members supported a targeted approach to both surveillance and disease control. Members proposed a State-level status or regionalization as options to target resources and EIA control activities.
- Group members accepted current EIA testing paradigms as sufficient for control of the disease.
- Group members felt that limited Federal authority, variable State regulations and inconsistent enforcement have resulted in confusion, misinformation, and opportunities for avoiding regulations or fraud.
- To be successful, any increased efforts for EIA control or eradication will need to include an education campaign that builds broad industry support. Group members viewed industry support as lacking.
- New, cooperative funding streams, from Federal, State, and industry sources, will be required to proceed with any enhanced control or eradication efforts.

APHIS-VS plans to make the discussion group summary available on the VS webpage and to ask for feedback from stakeholders. Based on the observations from the discussion group and additional comments, APHIS-VS will identify options and make a decision about regulatory and non-regulatory actions to support EIA control efforts in the future.

APHIS-VS is in the final stages of approval for a revision to the EIA guidance document (formerly VS Memo 555.16). APHIS-VS expects to issue VS Guidance Document 15201.1 by the end of CY2015 and conduct webinars for approved laboratories and State and Federal animal health officials to highlight key changes, including:

- A requirement that non-negative (positive, discrepant, suspect or equivocal) samples be confirmed at NVSL.
- A definition of and requirement to use of official EIA test forms.
- Enhanced inspection requirements and a revised inspection checklist.
- Increased emphasis on reporting requirements and submission of summary data.
- Clarifies approval requirements and remove references to economic needs for laboratory approval.

New Approach to Vesicular Stomatitis and the 2015 Outbreak

Angela Pelzel-McCluskey, USDA-APHIS-VS

A summary of the ongoing 2015 vesicular stomatitis (VS) outbreak was presented with emphasis on the new national approach to control of VS in light

of World Organization for Animal Health (OIE) de-listing of the disease, which took effect January 1, 2015. The 2015 VS outbreak in the United States began April 29, 2015 and surpassed the 2014 VS outbreak in both number of affected premises and geographic scope. To date, a total of five hundred twenty-seven (527) VSV-affected premises (New Jersey serotype) have been confirmed or suspected in eight (8) US states; Arizona (36 premises in 3 counties), Colorado (270 premises in 27 counties), Nebraska (21 premises in 3 counties), New Mexico (48 premises in 12 counties), South Dakota (44 premises in 5 counties), Texas (3 premises in 3 counties), Utah (24 premises in 5 counties), and Wyoming (81 premises in 9 counties). At the time of this writing, there were 104 premises remaining under quarantine in 6 states (Colorado, Nebraska, New Mexico, South Dakota, Utah, and Wyoming). Weekly situation reports and maps from the incident are publically available on the USDA-APHIS website.

The OIE removed vesicular stomatitis from the international list of reportable diseases as of January 1, 2015. VS held a national-level VSV after-action review in January 2015 to review the response to the 2014 outbreak and to examine future VSV response actions in light of OIE's delisting of the disease. Overall conclusions from the meeting included: 1) a VSV control strategy is still needed to prevent movement of infectious animals and to secure both interstate and international trade during an outbreak; 2) VSV must remain reportable to State and Federal officials to implement this control strategy; and 3) while existing regulatory response protocols in cloven-hooved species must be maintained to rule out other diseases such as foot-and-mouth disease, response to equine cases can be appropriately modified to reduce the impact on State and Federal resources.

Based on these conclusions and other recommendations, USDA-APHIS-Veterinary Services and State Animal Health Officials (SAHO) employed a modified response in the 2015 outbreak. New measures included a reduction in the quarantine period based on viral shed from affected animals, activation of VSV-approved National Animal Health Laboratory Network (NAHLN) laboratories to assist in testing of affected equine species, and flexibility to use accredited veterinarians for sample collection in equine species and management of affected premises. Feedback from affected States on the modified approach was positive, especially with regard to the reduced quarantine period and the use of accredited veterinarians, both of which significantly reduced the impact on State and Federal resources while maintaining the necessary infection control strategy.

Use of Diagnostic Laboratory Accessions as Part of Enhanced Surveillance

Carolyn Johnson, USDA-APHIS-VS Center for Epidemiology and Animal Health

APHIS-Veterinary Services (VS) has been moving beyond traditional disease control programs and developing comprehensive, integrated surveillance systems. A comprehensive system utilizes multiple data sources,

and provides information about animal health beyond the presence or absence of a specific disease. Analysts at the Center for Epidemiology and Animal Health conduct regular monitoring of several data streams, and continue to evaluate new data sources, looking for potential value in regular monitoring of existing data that may characterize the health of animal populations.

A pilot project was initiated that explored the feasibility of monitoring laboratory accessions for health trends in horses in Colorado. Retrospective laboratory data was provided by Colorado State University Veterinary Diagnostic Laboratory; the data did not contain any identifiable information on the horse or horse owner. Equine tests were categorized into syndromes using expertise from the laboratory personnel and equine disease specialists, testing protocols, and literature on similar efforts. Syndrome categories that could provide a baseline when evaluated were included in the monitoring system Experts on biosurveillance monitoring from Johns-Hopkins University Applied Physics Laboratory provided subject matter expertise on the selection of monitoring algorithms for each syndromic category. The algorithms were tested to identify the best alerting method for the syndrome. Signals in the data were explored, but it was not always possible to clarify the signal cause. Further refinement will be done as the system is run on a real-time basis, and signals can be investigated in real-time.

OIE Recommendations for High Health Status Horse Subpopulation, October, 2015

Joyce Bowling-Heyward, USDA-APHIS-VS

The OIE is the World Organization for Animal Health, with 178 member countries. They work with member countries to set the standard for international movement and testing of live animals. APHIS represents the United States in OIE. The OIE has been working with the International Equestrian Federation (FEI) and the International Federation of Horseracing Authorities (IFHA) to create standards for temporary movements of high health, high performance horses (HHP) to international competitions. The process involves convening groups of equine experts to work on different phases of the project to develop draft documents. These documents are then normally circulated to the OIE member countries for comment, and are then revised based on these comments.

At this time, the main diseases of concern that have been agreed upon by various ad hoc groups are African horse sickness (AHS), equine infectious anemia (EIA), equine influenza, equine piroplasmosis (EP), glanders, and Venezuelan equine encephalomyelitis (VEE). The protocols require participating horse to have a passport defined as a unique identification document with harmonized information, records of vaccinations and results of laboratory tests. In addition to the passport, a separate veterinary certificate may be required by the importing country. These HHP horses must be registered in an international database.

Standards have been developed for routine testing and vaccination of these horses, based on the disease status of the country of origin. This information must be recorded in the passport that accompanies the horse.

The HHP horse concept is based on the maintenance of strict biosecurity control at all premises where they are kept, including the usual place of residence and venues of international competitions, as well as during transport by road and air. The establishment of an Equine Disease Free Zone (EDFZ) for an international equine event requires a plan for effective biosecurity. Guidelines for biosecurity have also been developed by OIE.

The current proposals are somewhat cumbersome, and there may not be a benefit for horses originating in zones that have already have good equine health status. It remains to be seen if there is going to be substantial international acceptance of proposals. Some of the explanatory documents are just being made available to member countries. Some concepts incorporated into the documents are not yet ready for complete implementation, such as African Horse Sickness polymerase chain reaction (PCR) testing (test has not yet been completely validated).

APHIS will continue to provide updates as stakeholders get feedback on proposals as they are made available.

Equine Disease Center Update

Cliff Williamson, American Horse Council

The Equine Disease Communication Center (EDCC) is being created to protect horses and the horse industry from the threat of infectious diseases in North America. The communication center is designed to seek and report information about disease outbreaks similar to how the Centers for Disease Control and Prevention (CDC) alerts the human population about diseases in people.

In 2010 the USDA approached the American Horse Council (AHC) to help the industry prepare an industry response to disease outbreaks. The American Horse Council working with the USDA initiated a draft of a National Equine Health Plan. Part of the plan addressed the need for communications within the industry to help in locating and preventing disease outbreaks. The plan remained a draft until April of 2011 when an outbreak of Equine Herpesvirus-1 (EHV-1), the neurologic form of the disease, occurred at a large cutting horse show in Ogden, Utah. Overall 2,000 horses were potentially exposed with 90 testing positive.

Quick work by veterinarians and State Animal Health Officials (SAHO) helped to keep the disease from spreading further, but because there was no effective communication system, horses left the show grounds without any knowledge of the problem or, more troublingly, owners left the grounds out of fear for horse safety once the problem was announced on social media. As a result, there were 242 exposed premises in 19 states. In California, of the 520 registered shows and events that year there were 142 canceled. During the outbreak the rumors via Facebook and Twitter caused panic and shut down horse movement and events across the nation although most were not actually

threatened by the disease. It is hard to estimate the economic impact from this outbreak, but suffice it to say there was a multimillion-dollar impact from loss of horses, horse use and the shutdown of industry activity.

Following the 2011 outbreak in Utah, an American Association of Equine Practitioners (AAEP) task force was convened to work on the communication and biosecurity components of the National Equine Health Plan (NEHP). The recommendations from the task force included:

- • Establish an Equine Disease Communications Center (EDCC).
- • Obtain industry funding for on-call personnel to staff the EDCC seven days a week.
- • Create an equine disease website for posting of information collected by the EDCC.
- • Collect information about equine contagious disease and biosecurity to be placed on the EDCC
- website.
- • Create links to state and USDA-APHIS-Veterinary Services (VS) websites to improve public access.
- • Develop a system at the EDCC to advise all state animal health officials and horse organizations of
- confirmed infectious disease outbreaks.

The AAEP Board of Directors and the Trustees of the AHC accepted these recommendations. Subsequent meetings with state and federal animal health officials and the leaders of numerous associations helped develop a plan for how the EDCC would be set up to respond to disease outbreaks as well as serve as a reliable resource about diseases, biosecurity, and disease prevention.

To this end the United States Equestrian Federation (USEF) has committed their call center to act as the hub for receiving and communicating information to the EDCC. USEF has also created and is hosting the EDCC website. Additionally, AAEP has donated an office for the EDCC communication specialist and will administrate donations and use of funds through the AAEP Foundation. Furthermore, the EDCC will have access to subject matter experts from AAEP member clinicians and scientists. These contributions are a significant commitment of time and resources and will make the EDCC functional and reliable.

SAHO have acknowledged there are challenges in communicating within their state and across the country. State departments of agriculture do not ordinarily provide information to other states and although they may share information, the list of reportable diseases is not the same in all states. A disease occurrence is frequently not shared with bordering states, as there is no protocol or directive to do so. Because the horse industry relies on horse movement, lack of information sharing creates a significant risk for the spread of disease during an outbreak. Real time information about current disease outbreaks will help prevent the spread of disease and allow unaffected segments of the industry to continue to function.

In response to this need for better communication SAHO working with the AHC and the AAEP established protocols for communications with EDCC that will allow rapid release of critical information about disease outbreaks so the industry does not have to rely on the media outlets or social media to get the information.

The EDCC business plan allows for a full-time communication specialist with equine experience and a veterinarian to serve as a consultant. The veterinarians and SAHO know how to handle the medical aspect of outbreaks, but there is currently no local or national communication system to help with dissemination of real time information needed by horse owners and event managers. Because the EDCC will have a full time communicator and support from subject matter experts (SME) from AAEP, information from the EDCC will be up-to-date and reliable.

In conjunction with reports of outbreaks, the EDCC will “phish” social media as well as national and international media looking for evidence of diseases or disease transmission and attempt to locate the source. If information about a disease outbreak is not confirmed, necessary communications will be sent to horse organizations to refute rumors that can cause panic and unnecessarily shut down horse activities.

The call center will be available to direct callers to information and to communicate questions to SME. The EDCC will communicate directly with SAHO and USDA to provide and receive information about current disease risks. Ultimately, timely and accurate information about disease outbreaks will improve horse welfare and help prevent movement restrictions or decreased horse use due to a fear of spreading infection.

EHV-1 was used earlier in my presentation as a potential outbreak, but it is only one of the infectious diseases that can adversely affect the industry. The EDCC is prepared with information about all infectious diseases including foreign diseases. Since April, the EDCC website has issued alerts on Equine Herpesvirus (EHV), Equine Infectious Anemia (EIA), Vesicular Stomatitis (VS), Strangles, Eastern Equine Encephalitis (EEE), Equine Influenza, West Nile Virus (WNV), and Anthrax. The EDCC has posted reports of disease in 24 states in just the last six months.

In addition to the Disease Outbreak Alerts for which the website was created, it also has dedicated pages that provide links to disease, vaccination, and biosecurity information, including videos and relevant links. The EDCC website also includes an interactive map of the US with contact information for SAHO and the mission statement for APHIS with a link to their website.

The EDCC is undoubtedly an industry driven endeavor, meeting the needs of all breeds and disciplines in North America. Without the support of the industry itself, none of this would be possible. That is why, with the donors’ permission, the website also includes a list of sponsors who have contributed to the EDCC. USAHA, has passed a resolution recommending formation of the EDCC. Similarly, USDA has recommended and committed to help the EDCC including a recent financial contribution. This is a unique opportunity for horse owners and allied industries to work together for the health and welfare of all

horses. We hope all organizations and horse owners will make a long-term commitment to help with this enterprise.

Update on National Animal Health Monitoring System (NAHMS) Equine Study

Josie Traub-Dargatz, Colorado State University and Equine Commodity Specialist at USDA-APHIS-VS Center for Epidemiology and Animal Health

The NAHMS Equine 2015 study objectives were developed based on a needs assessment process which is summarized in a report available on the NAHMS website.

The objectives for the NAHMS 2015 Equine study follow:

- Describe trends in equine care and health management for study years 1998, 2005, and 2015.
- Estimate the occurrence of owner-reported lameness and describe practices associated with the management of lameness.
- Describe health and management practices associated with important equine infectious diseases.
- Describe animal health related costs of equine ownership.
- Evaluate control practices for gastrointestinal parasites.
- Evaluate horses for presence of ticks and describe tick-control practices used on equine operations.
- Collect equine sera along with equine demographic information in order to create a serum bank for future studies.

The 28 States that participated in the NAHMS 2015 Equine study were primarily selected based on the size or density of their equine population. The shaded States in the map below illustrate the 28 participating States.

Equine 2015 Participating States

The original plan was to conduct the NAHMS Equine 2015 study in two phases. Phase I consisted of an in-person interview conducted by a representative from the National Agricultural Statistics Service (NASS) to collect questionnaire data regarding general equine health management. Data collection for Phase I was completed at the end of July 2015. Of the 3,997 equine operations selected to participate in the study, 2,482 (62.1 percent) completed the Phase I questionnaire; 700 operations (17.5%) refused to participate when contacted by NASS; 749 operations (18.7%) were inaccessible, despite multiple phone and in-person efforts to make contact with the operation; and 66 operations (1.7%) were on a NASS office hold list. Data from Phase I questionnaires are currently being reviewed by NASS and will be provided to NAHMS by the end of September 2015.

A total of 908 equine operations across the 28 participating States agreed to have VS contact them about participating in Phase II of the study, which was planned to begin in August 2015; however, VS leadership was forced to postpone Phase II of the study because of VS's ongoing and anticipated resource commitment to the highly pathogenic avian influenza outbreak. A memo from the director of the USDA-APHIS-VS Center for Epidemiology and Animal Health regarding the postponement of Phase II was sent to a point of contact at the American Horse Council (AHC), the American Association of Equine Practitioners (AAEP), the Coalition of State Horse Councils (CSHC), and the National Assembly of State Animal Health Officials (NASAHO). A letter explaining the postponement of the study was mailed to all equine operations that had agreed to be contacted about Phase II.

Phase II includes a second, more in-depth questionnaire; a biologics component; and the option to have a veterinary medical officer perform an operation-level biosecurity assessment. In addition, Phase II will collect data on equine inventory, parasite management, vaccination, lameness, tick management, and the cost of equine health care. The biologics component includes testing for internal parasites, a tick examination of equids with collection of ticks for identification, collection and banking of serum samples for future research and, for a subset of operations, the collection of feces from equids to be used to culture for *Salmonella* and *E. coli,* with subsequent testing of these isolates for their susceptibility to a panel of antimicrobial drugs.

Although VS postponed most parts of Phase II of the study, the 908 operations that had agreed to participate in Phase II were offered the option to participate in the parasite-testing portion of Phase II. As of September 23, 2015, 103 equine operations had completed the operation level internal parasite management questionnaire and were shipped kits for shipping of fecal samples for parasite testing. These operations are collecting a fecal sample on up to six equine on the day of deworming and then collecting a post-deworming sample 10 to 14 days after deworming. A fecal egg-count reduction test (FECRT) is being performed to determine efficacy of the anthelmintic administered.

NAHMS currently plans to begin the remaining components of Phase II in spring 2016, contingent on the availability of adequate VS personnel to conduct Phase II of the study at that time.

Update on Enforcement of EP Test at Bush Tracks

T.R. Lansford, Texas Animal Health Commission

Equine piroplasmosis (EP) was first diagnosed in Kleberg County, Texas in October 2009, as part of the diagnostic work-up on a clinically ill horse. Since that time, based on the high level presence of competent tick vectors and common equine movement practices of equine in counties around Kleberg County, the Texas Animal Health Commission (TAHC) has been conducting county-wide testing of equine in an effort to disclose positive equine. Most recently, Brooks County was designated as a high risk county for equine piroplasmosis in October 2014 and a county-wide test of all equine was conducted in late 2014/early 2015. A total of 689 equine on 218 premises were tested for both *Theileria equi* and *Babesia caballi*. The county-wide testing disclosed no positive equine.

The TAHC, through collaboration with the Texas Racing Commission, implemented required piroplasmosis testing of all equine entering sanctioned racing facilities in 2010. Testing between 2010 and 2014 disclosed 118 positive horses. To date in 2015, testing requirements have disclosed eight (8) positive racing Quarter Horses, many with links to racing in other States. Epidemiological investigations of positive horses showed infected horses are almost exclusively racing Quarter Horses. In January 2015, the TAHC amended the rule requiring EP testing to include all racing facilities, regardless of status with the Texas Racing Commission. Concurrently, the TAHC held the

requirement for testing Thoroughbred horses in abeyance. Since enforcement of the rule began, TAHC has cited owners of 86 horses that did not meet testing requirements.

2016 Equine Disease Forum Update

Katie Flynn, Planning Committee Chair
Presented by Carl Heckendorf

Over the last few years, animal health officials have been involved in an unprecedented number of equine disease incidents in the United States. These recent equine disease events highlighted the limited knowledge of the equine industry regarding equine regulatory diseases; specifically, the scientific laboratory advances and changes in disease epidemiology related to equine herpes virus -1 (EHV-1), equine infectious anemia (EIA), equine piroplasmosis (EP), equine viral arteritis (EVA), and contagious equine metritis (CEM). Additionally, the diversity and segmentation of the equine industry led to challenges as regulatory officials utilized traditional animal disease control methodologies. As demonstrated by the 2011 multistate EHV-1 outbreak, state animal health officials struggled with quickly controlling the disease while communicating with the segmented diverse industry. Protecting the future health of the US equid population will require implementation of new disease control technologies and enhanced communications and collaborations with all aspects of the equine industry at local, state and national levels.

To address these challenges, the USAHA, Committee on Infectious Disease of Horses (IDOHC) requested the USAHA in partnership with the National Institute of Animal Agriculture (NIAA) host an Equine Infectious Disease Forum for Equine Industry Stakeholders. In 2015, a planning committee was formed with members from the IDOHC and the Equine Committee of NIAA to move forward in the planning a 2016 Equine Disease Forum.

The intent of this forum is to bring together industry leaders to specifically discuss the equine health issues currently facing the industry. The objective of this unique forum is to provide latest updates on disease threats to equine health, to identify potential solutions for addressing current risks to equine health and to enhance equine industry communications regarding equine health issues. Through participation in this forum, State and federal animal health officials will gain unique insight into the views of the equine industry related to equine health which will ultimately enhance communications and future collaborations on equine disease control.

The proposed agenda includes an overview of the roles of federal animal health officials, state animal health officials, and private practitioners in protecting equine health; overview of the diseases of regulatory importance and diseases of industry importance; highlights of diseases of international threat; disease risks of international equine movement; role of equine traceability in protecting equine health; and the advances in equine biosecurity over the last 10 years. Upon completion of the presentations, participants will rotate through three breakout discussion sessions, specifically regulatory

diseases of equine infectious anemia (EIA), equine piroplasmosis, and equine herpesvirus-1, domestic diseases of influenza, strangles and pigeon fever and biosecurity and equine movement. The facilitators of the discussions will summarize and present identified challenges in addressing equine health and proposed recommendations for advances in protecting equine health.

The forum is planned for January 19-21, 2016 at the Double Tree Hotel in Denver, Colorado. A complete report of the forum will be presented to the IDOHC at the 2016 Annual Meeting.

A special thanks to the hardworking Equine Disease Forum Subcommittee members namely, Ellen Buck, USDA-APHIS-VS-NIES; Rory Carolan, USDA-APHIS-VS, Surveillance, Preparedness and Response Services (SPRS); Max Dow,Texas Animal Health Commission; Katie Flynn. California Department of Agriculture; Joe Fisch, Florida Department of Agriculture; Jessica Greene, NIAA; Carl Heckendorf, Colorado Department of Agriculture, Don Knowles, Agricultural Research Service (ARS); Lucas Pantaleon, Ogena Solutions; Angela Pelzel-McCluskey, USDA-APHIS-VS-SPRS; Kenton Morgan, Zoetis; Grant Rezabek, Oklahoma Animal Disease Diagnostic Laboratory; Peter Timoney, Gluck Equine Research Center; and Cliff Williamson, American Horse Council.

Review of Significant Equine Disease Events – 2015

Peter Timoney, Maxwell H. Gluck Equine Research Center, University of Kentucky

Endemic Diseases

Equine herpesvirus 1 myeloencephalopathy:

- In early 2015, outbreaks reported in Ohio, Minnesota, Virginia, and Michigan. Late spring/early summer further outbreaks in California, Iowa, Illinois, Maryland, Oregon, Pennsylvania, Virginia and most recently, again in Pennsylvania.
- Disease tended to be seasonal in occurrence.
- Quarter horses primary breed involved.
- Majority of outbreaks associated with non-neuropathogenic strains of EHV-1.

Influenza:

- Disease endemic in USA.
- No evidence of seasonality in occurrence.
- Outbreaks recorded on premises in Indiana, Kentucky, Massachusetts, Michigan, Ohio, Oregon, South Dakota, Tennessee, Minnesota and most recently again in Oregon.
- Virus strains belonged to equine-2 (H3N8) American lineage, clade 1 Florida sublineage.
- Practice of regular vaccination variable; varies with breed.

Strangles:

- Disease endemic in USA.
- No evidence of seasonality in occurrence.

- Number of confirmed outbreaks reported so far in 2015 ranged from 11 to 18 per quarter.
- Disease of wide geographic distribution.

Eastern Equine Encephalomyelitis:

- Disease recurs annually in the USA.
- Climate-related factors major influence on incidence of disease.
- Total of cases so far in 2015, 49 less than in recent years.
- Majority of cases in 2015 reported in Florida.
- Most cases of disease confirmed in unvaccinated horses.

West Nile Encephalitis:

- Significant reduction in number of cases diagnosed during 10-month review period.
- Interim total of 66 cases in 8 states. Highest totals Texas (22), Washington (18), Colorado (11), and Kentucky (8).
- Most cases of the disease recorded in unvaccinated horses.

Equine Infectious Anemia:

- Disease diagnosed at a low prevalence level in USA.
- Outbreaks frequently involved closed horse herds.
- Four cases in Tennessee and four in W. Kentucky.
- Prevalence of disease highest in certain southern states.

Rhodococcal Related Diseases:

- Disease endemic and geographically widespread in USA.
- Numerous outbreaks recorded.
- Most frequently encountered as pneumonic form in young foals.
- Some outbreaks also associated with joint, gastrointestinal involvement.

Corynebacterium pseudotuberculosis Infection:

- Disease endemic and becoming much more widely distributed in the USA.
- Source of increasing economic concern to US horse industry.

REPORT OF THE SUBCOMMITEE ON EQUINE HERPESVIRUS-1

Katie Flynn, Chair
California Department of Food and Agriculture
Presented by Carl Heckendorf

In 2014, the USAHA Committee on Infectious Disease of Horses established an EHV-1 subcommittee to develop a guidance document based on the relevant current scientific information and field experience of the committee members related to the EHV-1 regulatory mitigation.

During Equine Herpesvirus Myeloencephalopathy (EHM) incidents, the State Animal Health Official's (SAHO) goal is to prevent the spread of the disease agent, specifically Equine Herpesvirus-1 (EHV-1) by utilizing science-based disease control protocols adapted to the specific incident, ensure compliance and minimize the impact on equine movement while controlling disease spread.

In 2014, the EHV-1 Subcommittee began development of the EHM Incident Guidance Document for SAHO. The subcommittee concludes that there is no single protocol that can be applied to every EHM incident as there are multiple factors to be taken into consideration when determining the optimal disease containment response. The intent of this guidance document is to provide SAHOs, with the science based control options to be considered during an EHM incident.

The EHV-1 Subcommittee utilized latest field experience and scientific data to develop the most appropriate guidance to reduce disease agent spread while allowing for optimizing business continuity. In 2015, the Subcommittee completed the first version of the guidance document. However, the intent is for this to be a living document. It can be updated when there are relevant advances in science and technology and/or field based experiences.
Summary of topics addressed in this Guidance Document:

1. Diagnostic Testing: Due to advances in diagnostic technologies PCR has become the diagnostic test of choice due to its high analytical sensitivity and specificity as well as rapid availability of test results. To optimally assess the status of infection in a horse, it is recommended that a real-time polymerase chain reaction (PCR) or a nested PCR test be performed on both a nasal swab and an unclotted blood sample. Differentiation of the neuropathogenic (G2254) from non-neuropathogenic (A2254) strains of EHV-1 based on DNA polymerase gene testing may be beneficial for outbreak response planning and the application of the most appropriate biosecurity measures. The optimal time for collection of nasal swab and blood samples is at onset of clinical signs e.g. onset of fever and/or neurologic signs. Since EHV-1 is considered endemic within the horse population, testing of clinically normal horses in the general population for EHV-1 by PCR assay can and likely will detect horses positive for EHV-1 and may represent transient presence of virus; or viral levels that are not considered

sufficient to pose a significant risk of transmission of infection. There is a lack of consensus among regulatory veterinarians on the appropriateness of testing non-clinical exposed horses as part of an outbreak response. However, if testing of non-clinical exposed horses is being considered, then the response to the test results should be decided before initiating the testing. Non-clinical EHV-1 infected horses based on nasal swab and/or buffy coat testing, currently represent a non-quantifiable but potential risk of transmitting virus to horses to which they are exposed. This is arguably more important if the viral DNA detected is of the neuropathogenic (G2254) genotype. Ultimately, the decision to collect samples from exposed horses for EHV-1 testing as part of the outbreak response should be based on evaluation of level of exposure, type and severity of clinical disease present, number of horses with disease consistent with EHV-1 infection and assessment of biosecurity measures in place.

2. Quarantine Placement: Science based criteria for quarantine protocols, adapted to a specific EHM incident, encourage compliance and minimize the impact on equine movement while controlling disease spread. No single protocol can be applied to the need for and scope of quarantine for every EHM incident as there are multiple factors that must be considered for an optimal disease containment response. A prompt on-site risk assessment by the person responsible for the oversight of the incident is critical in identifying the disease transmission risk factors for a given incident. Assessment of risks associated with the index case includes the index EHM case's level of viral shedding and its potential to transient infection to other horses. An exposed horse is one which had direct or indirect contact with an EHM case within the previous 14 days. Highest risk among exposed horses are those with or recent history of direct nose-to-nose contact and moderate risk are those horses stabled within 30 feet of a clinical case of EHV-1 or those that shared transportation with the clinical case of EHV-1 but with no nose-to-nose contact, or that shared equipment or personnel with index EHM case. Disease transmission, as evidenced by newly identified clinical cases would warrant modification of the quarantined operation's biosecurity protocols. Additionally, if spread occurs beyond the index premises, then the quarantine should be extended to additional sites as indicated from the epidemiologic investigation.
3. Quarantine Release: Before placing a quarantine on an equine operation, the criteria for quarantine release should be established using science- based criteria. There is no single quarantine release protocol that is applicable to every EHM incident since there are multiple factors that must be considered when striving for optimal

disease containment. Clinically affected horses should be assumed to be contagious and thus to pose a transmission risk, particularly via the respiratory route, for at least 14 days after resolution of fever or after the onset date of neurologic signs. At a minimum there should be monitoring or quarantine of exposed horses for at least 14 days after removal and isolation of the EHM case. If the EHM case cannot be isolated, then further criteria need to be considered to allow for quarantine release. The scope of the quarantine can be amended to release a subpopulation of horses earlier if the epidemiologic investigation, biosecurity assessment and/or diagnostic testing indicate the risk is minimal from the release of a horse or group of horses. Release of a quarantine should be based on limited potential for spread of the disease agent. Quarantine release is recommended, if adequate biosecurity and monitoring has been maintained and if no new clinical cases (EHM or EHV-1 cases without neurologic signs) are identified in the 21 days from the date of removal of EHM case or the 21 days from the resolution of the last febrile horse or the 21 days from the onset of the last horse with neurologic signs on the premises. Monitoring of the exposed horse population for any clinical signs compatible with EHV-1 infection includes twice daily temperaturing and observation for compatible clinical signs. Note, a 14-day quarantine release for exposed horses may be considered when there is immediate removal of the index EHM case and there is evidence of limited potential for disease agent spread due to adequate biosecurity and an acceptable level of monitoring of exposed horses. Testing of clinical horses for release from quarantine may shorten the quarantine period. A confirmed EHM case or EHV-1 case with two subsequent PCR negative nasal swab and buffy coat samples obtained seven days apart is considered to pose a minimal disease transmission risk, thus quarantine release is recommended.

4. Investigation and Biosecurity measures: An EHM incident investigation involves identification of the five “W’s”; 1) which suspect horse, 2) what agent, 3) where is the index horse, 4) when did clinical signs first appear and 5) why did the horse succumb to the disease. Once the basic information on the index horse is obtained, the investigation objective is to identify the disease transmission risk factors applicable to a particular operation.

   Once the EHM incident investigation identifies the risk factors for exposure, control measures must be implemented to 1.) Limit the extent of spread and severity of clinical disease on the premises and 2.) Limit the spread of disease to adjacent or exposed premises. General biosecurity concepts for managing EHM exposed horses and those that are quarantined include; immediate isolation of clinical

cases, application of quarantine restrictions, required temperature and health monitoring of all horses on the premises, restriction of human, pet and vehicle traffic access to the exposed horse areas, limit direct horse to horse contact, limit stress to exposed horses, eliminate the practice of sharing equipment and movement of personnel between clinical horses and other horses on the operation and implementation of strict cleaning and disinfection protocols with particular attention to areas where the index EHM horse and any other clinical horse may have been in the past 14 days such as tie rails, wash racks, starting gates etc.

5. Incident Communications: Communication during an EHM incident is critical to prompt response and disease control efforts. It is recommended that SAHO establish a communication plan for an EHM incident well in advance of the occurrence of an incident. Drafting content for webpages, alerts and printed outreach materials prior to an incident will facilitate timely dissemination of accurate and useful information during the incident. SAHO should explore all modes of communication and utilize effective resources for communicating information. SAHO, the American Association of Equine Practitioners (AAEP) and the American Horse Council (AHC) have developed a plan for a National Equine Disease Communication Center to assist dissemination of factual timely information at www.equinediseasecc.org .
6. Vaccination: Currently available vaccines against EHV-1 provide some protection against the respiratory form and in the case of two vaccines, against abortion due to the virus; however, none of the licensed vaccines have been shown to protect against EHM in a field setting. It has been suggested that some EHV vaccines may assist in limiting the spread of EHV-1 in outbreak situations by limiting nasal shedding of EHV-1 and thus dissemination of virus. For this reason, some experts hold the opinion that there may be an advantage to vaccinating in the face of an outbreak. If this approach is pursued, only afebrile and asymptomatic horses should be vaccinated and protection against EHM should not be an expectation. The vaccines with the greatest ability to limit nasal shedding and viremia of the EHV-1 include the vaccines licensed as an aid in the control of abortion (Pneumabort-K®; & Prodigy®). It is important to note that there is some controversy associated with the practice of vaccination during an outbreak, as a recent case control study has shown that EHM may be associated with a history of frequent or recent vaccination. For additional vaccination guidance see the American Association of Equine Practitioners EHV-1 Vaccination Guidance for Private Practitioners at http://www.aaep.org/info/vaccination-guidelines-265.

7. Appendix: The appendix section contains risk assessment tools for SAHOs to utilize during an EHM incident to assess horses that might be exposed, premises biosecurity, and quarantine placement and release parameters. Additional resources include epidemiologic investigation report forms for index and exposed horses. The appendix section contains five flow charts including: 1) handling an EHM Suspect Index Case, 2) recommended biosecurity measures for an EHM affected premises, 3) communications during an EHM Incident, 4) exposed horse investigation, and 5) biosecurity recommendations for an EHV-1 exposed premises.

A special thanks to the hardworking EHV-1 Subcommittee members namely, Sara Ahola, formerly of Colorado Department of Agriculture, now with USDA-APHIS-VS-CEAH; Rory Carolan, USDA-APHIS-VS, Surveillance, Preparedness and Response Services (SPRS); Ann Dwyer, American Association of Equine Practitioners; Katie Flynn, California Department of Agriculture; Rusty Ford, Kentucky Department of Agriculture; Kent Fowler, California Department of Agriculture; Carl Heckendorf, Colorado Department of Agriculture; Mike Herrin, Oklahoma Department of Agriculture; RJ Layher and Cliff Williamson, American Horse Council; Eileen Ostlund, USDA-APHIS-VS, National Veterinary Services Laboratories (NVSL); Angela Pelzel-McCluskey, USDA-APHIS-VS, Surveillance, Preparedness and Response Services (SPRS); Keith Roehr, Colorado Department of Agriculture; Mike Short, Florida Department of Agriculture; Andy Schwartz, Texas Animal Health Commission; Peter Timoney, Gluck Equine Research Center; and Josie Traub- Dargatz, USDA-APHIS-VS, Center for Epidemiology and Animal Health (CEAH) and Colorado State University.

Questions or concerns regarding this document can be directed to the chair or vice chair of the Committee on Infectious Diseases of Horses. For committee chair or vice chair contact information visit: http://www.usaha.org/Committees.aspx

REPORT OF THE SUBCOMMITEE ON EQUINE PIROPLASMOSIS

Mike Short, Chair
Florida Department of Agriculture and Consumer Services

- Equine piroplasmosis (EP) continues to be a disease of concern in the United States with continued efforts in surveillance and research. EP testing of horses continues to be driven primarily by industry but some regulatory testing is occurring as well. The majority of regulatory testing is being done through disease investigations and international export with some interstate testing occurring.
    - During the past year, the EP Subcommittee, met via conference calls. The primary discussion points and action items included:
- Ongoing surveillance
    - The Subcommittee is concerned that EP surveillance has been slowly decreasing since 2009. The majority of EP testing is being done through racetrack entry requirements, export requirements, or individual state entry requirements. The decrease in testing is primarily the result of the loss of testing at sanctioned racetracks and interstate movement requirements. Texas and New Mexico are the only states currently requiring testing for quarter horses entering a sanctioned racetrack. The Kentucky State Veterinarian's Office will be requiring testing of racing quarter horses for the 2016 fall meet. There are five states that currently have some type of regulatory interstate entry requirements, California, Georgia, Florida, Pennsylvania and Washington.
    - Dr. Katie Flynn attended the American Quarter Horse Association (AQHA) Annual Convention in March, where she presented at the Racing Committee on the current issues concerning Equine Infectious Anemia (EIA) and EP. A primary point of discussion was the need for increased EP surveillance. The Subcommittee will continue to meet with members of the AQHA to discuss the potential for an EP testing requirement at all AQHA-sponsored racing events.
    - In January 2015, the Texas Animal Health Commission (TAHC) instituted a rule requiring EP testing at **all** racing facilities, not just those licensed by the Texas Racing Commission. The requirement states that equine entering any racetrack facility must have a negative test for *Theileria equ*i, within the past 12 months.

- The TAHC continues South Texas EP surveillance. As reported to the Subcommittee, Brooks County has tested 95% of their equine premises for EP, with 711 blood draws and zero positive results. Kennedy and Kleberg counties have completed testing with 34 positives. The next counties to be tested by the TAHC will be Cameron and Willacy counties.

- Continued EP Introduction Risk
  - USDA and state officials continue to find EP positive horses illegally moved into the United States from Mexico. Discussed during the conference call was a recent shipment of Spanish Andalusians caught moving illegally from Mexico destined to California. The shipment contained ten adults and four young horses, all testing positive for *T. equi*.
- Tick Research and Surveillance
  - There is a need for more tick research, comprehensive tick surveys, and development of a tick submission reporting system and central repository for historical and ongoing tick collection information. Currently, there is no central database for the compilation of tick collection information in the US. There was significant discussion on the need for consolidation of information for a more comprehensive understanding of the current range and species of ticks within the US. The Subcommittee anticipates that the National Animal Health Monitoring System (NAHMS) 2015 study, with tick collection, will be a significant contribution to the current national tick data.
- The USDA added the Complement Fixation Test (CFT) as an official test requirement for the international importation of horses

  An import alert was issued by the USDA on February 9, 2015, which specified that the CF test was being added to the official international import testing protocol. All internationally imported horses will now be tested by both the cELISA and CFT for both *B. caballi* and *T. equi*.

EPIZOOTIC LYMPHANGITIS: POTENTIAL TO SIGNIFICANTLY IMPACT THE HEALTH AND WELL-BEING OF EQUIDS

Peter Timoney
Maxwell H. Gluck Equine Research Center, University of Kentucky

Introduction

Epizootic lymphangitis is a contagious fungal disease principally of horses and other equids, which is responsible for significant morbidity and debilitating illness in affected populations of horses, mules and to a lesser extent, donkeys (26). The disease is most frequently characterized by a cord-like appearance of affected subcutaneous lymphatics and cutaneous pyogranulomas (2). Initial descriptions of the disease trace back to the 19th century when it was reported in horses returning from military campaigns in countries in which it was present (21). The causal agent was first observed in pus from lesions in an affected horse in 1873 (24).

Epizootic lymphangitis tends to occur in tropical and subtropical regions of the world. It is a common disease in various parts of Africa, the Middle East, Russia and the Far East (2). The infection rate varies with geographic region and age of the at-risk animal population. Historically, the disease was far more widely distributed than it is today, having been introduced into many European countries in which it was subsequently eradicated through implementation of a compulsory slaughter policy (26).

The importance of epizootic lymphangitis is very considerable in countries in which it is prevalent, not only with respect to the chronic debilitating effects of the disease on the health and welfare of affected animals but also on its socio-economic impact on their owners who are entirely dependent on these animals for their livelihood and the support of their families. It is ranked as the most important infectious disease of equids in countries/regions where it is endemic (20, 25, 35).

Etiology

The causal agent of epizootic lymphangitis is a dimorphic fungus *Histoplasma capsulatum* var. *farciminosum* (5, 6). It is a variety of *H. capsulatum* var. *capsulatum* and *H. capsulatum* var. *duboisii* with which it shares various morphological and antigenic characteristics (26). *H. capsulatum* var. *farciminosum* and *H. capsulatum* var. *capsulatum* have common H and M antigens. It has been postulated that *H. capsulatum* var *farciminosum* is a variant of *H. capsulatum* var. *capsulatum* (18).

Being a dimorphic fungus, *H. capsulatum* var. *farciminosum* has two phases, a mycelial or saprophytic form that exists in nature, and a yeast or pathogenic phase which exists in animal tissues (2). Given suitable media and conditions of incubation, both forms can be cultivated in the laboratory (6, 36). The organism is highly resistant to the effects of physical and chemical agents (12, 31). Not surprisingly, it can survive in the environment for extended periods of time, at least as long as a month in dust or dirt and up to ten weeks in non-sterile water (12). Warm, moist conditions are believed to favor its

survival (26). The most likely source of environmental contamination is pus discharging from cutaneous lesions primarily on the limbs of affected animals.

Epidemiology

Epizootic lymphangitis is a contagious disease that mainly affects horses, mules and donkeys. The host range of the disease may extend to camels, cattle and dogs (34). Rare cases of human infection have been known to occur (22). Mice, guinea pigs and rabbits can be experimentally infected with the fungus (29). Horses under six years of age are considered more susceptible to infection (22).

The primary mode of transmission of *H. capsulatum* var. *farciminosum* is by entry of the organism through skin wounds or abrasions (23, 28). The source may be the yeast form in infective discharge or the mycelial form from the environment. Indirect spread of infection can also occur through the use of contaminated fomites, e.g. water buckets, harnesses, etc. (17). Experimentally, the disease can be transmitted by biting flies, e.g. *Musca* and *Stomoxys* spp that feed on open, discharging lesions (28). Ticks may also be involved in transmission. In certain endemic areas of the world, horses may be exposed through inhalation of fungal spores during dust storms; this can lead to the development of pneumonia (8). The risk of transmission of the disease is enhanced when large numbers of horses are congregated together (15).

Pathogenesis

The incubation period of epizootic lymphangitis is variable, ranging from a few weeks to as long as six months (29). Following introduction of the yeast or mycelial form through the broken or abraded skin, the organism spreads via the lymphatics to the regional lymph nodes, eventually involving the internal organs (19). Nodules and suppurating lesions develop along affected lymphatic vessels and nodes. In cases of mucosal involvement, lesions are frequently localized to the eyes and upper respiratory tract (3, 30). Nasal infection is characterized by mucopurulent discharge containing large numbers of fungal spores. *H. capsulatum* var. *farciminosum* has infrequently been associated with pneumonia and the development of granulomatous lung lesions (7, 8).

Clinical Signs

Four different forms of epizootic lymphangitis have been described: cutaneous, ocular, respiratory and inapparent carriers (3). They are not necessarily distinct entities and two or more forms of the disease can occur concurrently in the same animal (26). The cutaneous is the most commonly encountered form of epizootic lymphangitis (4, 16, 19). The initial lesion is usually an indolent chancre-like papule that develops along the course of a lymphatic vessel, eventually becoming an irregular pyogranulomatous nodule that ulcerates (26). The lesion undergoes alternate periods of discharging and partial healing before finally healing over with scar formation. This can take about two to three months. The cutaneous form of the disease can best be described as a chronic suppurative, ulcerative pyogranulomatous dermatitis and lymphangitis. The most common sites of lesions are the forelimb, neck and chest (2). In advanced cases, lesions may be distributed over the whole

body. Severely affected animals become anorexic, deteriorate in condition and where there is joint involvement, lame (26). The mortality rate is considered not to exceed 10 to 15%, depending on the bodily condition of affected animals and whether they experience secondary bacterial infection (2).

The ocular form of epizootic lymphangitis is less frequently observed and very rarely becomes generalized (2, 26). Initially, infection is characterized by a watery ocular discharge that may be unilateral or bilateral and variable swelling of the eyelids. This leads to the appearance of papules and button-like growths on the conjunctivae and nictitating membranes. The infection may extend to the periorbital tissues with formation of a granulomatous reaction. The secondary complications of the ocular form of the disease include corneal ulceration, panophthalmitis and myiasis.

In the respiratory form of epizootic lymphangitis, lesions tend to be confined to the upper respiratory tract (8). They commence as papules or nodules on the nasal mucosa. As the disease progresses these ulcerate and form granulating ulcers that tend to bleed (2). Lesions are frequently found close to the external nares. They may extend to the trachea and even into the lungs (5, 7, 8). Affected animals develop a viscous mucopurulent nasal discharge and may exhibit dyspnea. Advanced cases exhibit progressive weakness, coughing and loss of bodily condition.

The fourth form of epizootic lymphangitis described by Al-Ani (1999) is the asymptomatic carrier state. These are animals that have had the disease and have recovered spontaneously or following treatment (3). They can be identified by fibro-calcified skin lesions at previous sites of infection. Such cases are reputed to react positively to the intradermal sensitivity test and in serological tests. The role of these animals in the epidemiology of the disease has not yet been confirmed (26).

Diagnosis

Diagnosis of epizootic lymphangitis is based on microscopic visualization of the yeast form of the causal agent in pus collected preferably from an unruptured lesion, followed by culture to confirm the infection (3, 27, 29). Growth of the organism is relatively slow, frequently taking four to eight weeks for development of colonies (36). There is reference to the usefulness of the fluorescent antibody test for detection of this infection, especially in cases where isolation on culture has been unsuccessful (11).

A number of serological tests have been evaluated for the diagnosis of epizootic lymphangitis (13, 14). These include the ELISA, indirect fluorescent antibody test, agar gel immunodiffusion test and the passive hemagglutination test; while some of these tests have given promising results, none have been shown to be sufficiently sensitive or specific to confirm a diagnosis of the disease (2, 32). Additionally, none of the tests are as yet commercially available (26). There is also a skin test known as the “Histofarcin Test” which provides a sensitivity of 90%, but only a specificity of 69% when evaluated under field conditions in endemic areas (33).

Differential Diagnosis

A number of infectious diseases can be confused on clinical grounds with epizootic lymphangitis, the most important of which is glanders, especially "farcy" or the skin form of the disease (2, 26). Other diseases that clinically resemble the cutaneous form of epizootic lymphangitis include ulcerative lymphangitis caused by *Corynebacterium pseudotuberculosis*, sporothricosis caused by *Sporothrix schenkii*, skin lesions caused by *H. capsulatum* var. *capsulatum*, strangles, sarcoids, fungal granulomata and cutaneous lymphosarcoma.

Treatment

Accepting that epizootic lymphangitis is a chronic disease, treatment can be an extended process and not always with a guarantee of success (26). Some cases are reputed to heal spontaneously a few weeks after development of clinical signs (22). However, recurrence of the disease has been reported in some such cases up to a year after apparent clearance of the infection (26).

Intravenous sodium iodide or oral potassium iodide have been used with considerable success in treating the disease in endemic areas (1, 26). Amphotericin B and nystatin are very effective in the treatment of cases of epizootic lymphangitis (10). Their use in endemic areas of the disease is problematic however, because of the expense involved. Surgical excision and firing of lesions has been tried with limited success (9). It should be emphasized that treatment of epizootic lymphangitis can be labor-intensive, prolonged and without a guarantee of success unless applied in the early stages of the disease (26).

Prevention and Control

The control of epizootic lymphangitis according to the World Organisation for Animal Health (OIE) is usually through elimination of infection. This can only be achieved by culling infected equids and applying strict biosecurity measures to prevent spread of the infectious agent (26). This has proven successful in countries in which the disease has been introduced and has not become widely established. In endemic countries however, culling of infected animals is frequently impractical and control is predicated on basic hygiene, wound management, infection control and treatment when available (2). The methods used to control epizootic lymphangitis in large endemic regions will depend on disease prevalence, methods of husbandry, attitude, and the economic capacity of the horse-owning community to bear the costs involved. Cleaning and disinfection will help in preventing the disease from spreading (1). Owners need to be aware of the importance of preventing indirect transmission of the infection via contaminated fomites. Immunization has become another option for the control of epizootic lymphangitis in endemic countries (2). Killed and a live attenuated vaccine developed from the yeast form of the fungus have been tried with some success (1, 37). However, vaccinated equids that become seropositive will be a complication in any control or eradication program (1).

Summary

Epizootic lymphangitis is a contagious fungal disease principally of equids that is caused by *H. capsulatum* var. *farciminosum*. It is a chronic debilitating

disease that can manifest itself in one of three clinical forms, cutaneous, ocular and respiratory. The disease is commonly characterized by a chronic, ulcerative pyogranulomatous dermatitis and lymphangitis. Epizootic lymphangitis is prevalent in certain areas/regions of the world. The disease has the potential to significantly impact the health and welfare of equids in countries in which it is endemic. It can also have a significant socio-economic effect on the owners of affected animals. Diagnosis is possible by direct visualization of the yeast form of the fungus in pus from infected lymphatic nodules and by culture or histopathologic examination of tissues from clinically affected cases. Serological tests and a skin hypersensitivity test have been described. Various treatment modalities are available some of which are successful in treating early cases of the disease. Effective prevention and control of epizootic lymphangitis is based on culling infected equids and the application of strict biosecurity measures.

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REPORT OF THE COMMITTEE ON INTERNATIONAL STANDARDS

Chair: William Hartmann, MN
Vice Chairs: Mo Salman, CO; Linda Glaser, MN

Stan Bruntz, CO; Jeein Chung, MN; John Clifford, DC; Karen Conyngham, TX; Michael David, MD; Ron DeHaven, IL; Larry Elsken, IA; Conrad Estrada, VA; Anna Claire Fagre, CO; John Fischer, GA; Mallory Gaines, DC; Jane Galyon, IA; Cyril Gay, MD; Paul Gibbs, FL; Gail Golab, IL; Keith Haffer, SD; Percy Hawkes, UT; Rick Hill, IA; Donald Hoenig, ME; Annette Jones, CA; Susan Keller, ND; Bruce King, UT; Elizabeth Lautner, IA; Randall Levings, IA; Linda Logan, TX; Kevin Maher, IA; Bret Marsh, IN; Shirley McKenzie, NC; Sara McReynolds, ND; Emily Meredith, VA; Jamie Ng, NY; Kenneth Olson, IL; Elizabeth Parker, TX; John Ragan, MD; Herbert Richards, HI; James Roth, IA; David Scarfe, IL; Katherine Schuhmacher, NY; Sheryl Shaw, WI; Heather Simmons, TX; Kathryn Simmons, DC; Jonathan Sleeman, WI; Matthew Stone, NZ; Manoel Tamassia, NJ; Susan Tellez, TX; Peter Timoney, KY; Steve Weber, CO; Richard Willer, HI; Mary Anne Williams, TX; Nora Wineland, MO.

The Committee met on October 26, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 1:00-6:00 p.m. There were 14 members and 18 guests present.

Time-Specific Presentation:

"The Impact of Trade Negotiations on Ag Trade; and the Impact of Ag Trade on Trade Negotiation" was presented by Sharon Bomer Lauritsen, US Trade Representative. A summary is included at the end of this report.

Presentations and Reports

Dr. Michael David, International Animal Health Standards, USDA-APHIS-VS presented a report on OIE's 83rd General Session. The complete text of the report in included at the end of this report.

Setting Food Safety Standards for International Trade: Codex Alimentarius and the Impact of Pre-Harvest Animal Health Status

Mary Frances Lowe, US Codex Office

Codex Alimentarius, the joint food standards program of the United Nations (UN) Food and Agriculture Organization (FAO) and the World Health Organization (WHO), has a dual mandate to establish internationally harmonized, science-based standards that (1) protect consumer health and (2) promote fair practices in the food trade. Codex works through specialized committees to develop its standards based on risk analysis principles and relies on independent, international scientific expert review panels assembled by FAO and WHO for the risk assessments that undergird its work. Because Codex standards are based on science and risk assessment, the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures (WTO SPS Agreement) specifically recognizes Codex as the

international standards-setting organization for food safety. The United States participates actively in all Codex committees, hosts/chairs three committees (the Committees on Food Hygiene, Residues of Veterinary Drugs in Foods, and Processed Fruits and Vegetables), and provides substantial expertise and financial support for scientific reviews. The United States benefits from Codex as both a major food importer and as a major agricultural exporter because Codex standards help ensure the safety of imported foods for American consumers and open markets to American producers of safe agricultural exports.

Food safety depends on a "farm to fork," coordinated effort involving producers, processors, retailers and ultimately, the consumer. Codex influences key parts of this continuum through its development of voluntary standards, guidelines and codes of practice for use by governments and industry. Increasingly, Codex is also cooperating closely with the World Organization for Animal Health (OIE), which establishes international guidelines for producing healthy animals: a healthy animal is a prerequisite for the maintenance of high standards of food safety and quality. Examples include recent work in the Committee on Food Hygiene on control of *Trichinella* in meat of *Suidae* and *Taenia saginata* in beef, and ongoing work on control of nontyphoidal *Salmonella* in beef and pork. OIE also has responsibility for animal welfare issues, which are at times raised in the context of the development of Codex standards. Codex and OIE must work closely together at the interface between animal and food to ensure that there are no gaps and that their standards are consistent, while respecting the different mandates and expertise of the two organizations.

Overview of the Global Animal Health and Food Safety Program at the University of Minnesota

Andres Perez, University of Minnesota

The University of Minnesota Center for Animal Health and Food Safety (CAHFS) is an OIE collaborative center for capacity building and training of veterinary services. The Endowed Chair of Global Animal Health and Food Safety (GIFS) works in close collaboration with CAHFS in the promotion of animal health and food safety related activities at national and global scales. Dr. Perez, the new Endowed Chair of GIFS, summarized the features of the recently launched Global Food Access Challenge Program. The program includes four initiatives, namely 1) Professional Development on Animal and Public Health, Food Safety, and Primary Production; 2) identification of strategic external collaborations; 3) Veterinary Services capacity building; and 4) Visibility and outreach.

Opportunities for the USAHA Committee on International Standards are related with 1) activities on research, educational, and outreach on animal health and food safety; and 2) facilitate communication and contact with countries and experts overseas. Dr. Perez may be contacted for information, brainstorming, and exchange of ideas at aperez@umn.edu.

FAO Global Emergency Response Planning

Edgardo Arza, National Import Export Services (NIES), USDA-APHIS-VS

Dr. Arza recently returned from a temporary assignment in Rome at the Food and Agriculture Organization (FAO), of the United Nations. Dr. Arza worked in FAO's Crisis Management Center for Animal Health (CMC-AH) with a mandate to provide rapid response to transboundary animal diseases and emerging animal disease threats. He presented on the role of the CMC-AH, and its connection to agricultural trade. The efforts of the CMC-AH reduce the risk of transboundary diseases impacting the United States.

Since 2006, the CMC-AH has conducted 80 missions in 43 countries. The purpose of those missions has been to help control diseases where they can have a devastating impact on animal productivity and production, trade, human health, and consequently on the economic development, livelihoods and food and nutrition security of populations. The vast majority of those populations affected by emergency situations rely on agriculture for their livelihood. Most of these people are subsistence farmers, herders, foresters or fishers and when a crisis strikes, they often lose not only standing crops, but also their limited productive assets. In short, when affected by a disaster or a conflict, these populations are no longer able to sustain themselves and become highly vulnerable. And while primarily impactful on local populations, these disease events also put the US at risk when we engage in international trade of animals and animal products from these regions.

The Crisis Management Centre for Animal Health (CMC-AH) is a joint arm of FAO's Animal Production and Health and Emergency and Rehabilitation Divisions. Established in partnership with the World Organisation for Animal Health (OIE), the CMC-AH deploys rapid response missions to countries to help assess epidemiologic situations, diagnose outbreaks of animal diseases, and set up immediate measures to prevent or stop disease spread.

Tracking and planning:

The CMC-AH monitors animal health crises and anticipates responses using disease intelligence from the Global Early Warning System or "GLEWS". The Centre continually plans for deployment and works with partners worldwide to rapidly mobilize teams of experts. Multi-sectorial teams are created for the specific mission according to the situation and the specific objectives of the mission. There may be disease control experts, veterinary epidemiologists, laboratory experts, emergency management experts, risk communication experts, value chain experts, wildlife experts, and others.

Deployment:

Once deployed, mission teams provide affected countries with targeted expertise to control epidemiological situations or outbreaks. Where needed, the CMC-AH also assists with mobilizing new resources.

Transition:

The consequences of animal disease emergencies can continue well after outbreaks occur and the CMC-AH works with other FAO units to support governments to transition from emergency assistance to medium- and longer-term action plans for disease control.

With a global network of veterinary and operations experts within FAO and partner organization, the CMC-AH is able to rapidly mobilize and deploy response teams to any region of the world, primarily in the developing world. On site, the CMC-AH works side-by-side with community-based animal health workers to improve livestock health. The Centre works closely with Global Early Warning System (GLEWS) and the Emergency Prevention System (EMPRES) to continuously track and analyze the animal disease situation worldwide, and operates in constant collaboration with the OIE and World Health Organization (WHO) to complement FAO's technical expertise at every step of the response.

In an effort to better prepare its member countries in responding to animal health emergencies, the FAO has published the manual, Good Emergency Management Practice: the essentials, also known as the "GEMP manual". The manual represents the Organization's accumulated knowledge on best practices in preparing for and managing animal health disease outbreaks in an emergency situation. To date, the manual has been translated into Spanish, French, Arabic, Chinese and Russian, in an effort to reach as wide an audience as possible. So far, the CMC-AH has held 16 GEMP workshops with a total of more than 500 participants from 47 different countries. During these workshops, participants, mainly veterinary and animal health officials, gather and discuss emergency preparedness and contingency planning in the event of a disease outbreak.

With regard to avian Influenza (AI), over 1.7 million chickens died or were culled as a result of the disease in five countries affected by H5N1 Highly Pathogenic Avian Influenza (HPAI) in West Africa in the past year. Although there has been no reported human illness due to the H5N1 strain in West Africa to date, it is imperative that preventive measures continue to be taken in order to reduce the risk of the AI virus transmission from poultry-to-humans, with the potential for human fatalities as has occurred in parts of Asia and Egypt. Through the CMC-AH's missions in western Africa, they have learned that HPAI has a high impact on food insecurity, causes a disruption of the poultry value chain, that there are risk misconceptions on how to prevent HPAI, and there is a lack of HPAI preparedness.

All of this leads me to conclude that the US investment in the CMC-AH at FAO, the sword in front of the shield, has and will continue to be a valuable tool to protect American agriculture.

Committee Business:

The primary discussion of the Committee was consideration of merging this Committee with the Committee on Import-Export (see Recommendation below). There were no resolutions proposed before the committee. The Chair reported he is retiring next year and will not continue to serve as chair for this Committee. He recommended Linda Glaser serve as the chair and with Committee approval would propose her name to the USAHA president. The Committee approved.

Recommendation: The chair would request the Executive Committee explore combining the Import/Export Committee with this Committee even considering a trial combined Committee meeting.

THE IMPACT OF TRADE NEGOTIATIONS ON AG TRADE; AND THE IMPACT OF AG TRADE ON TRADE NEGOTIATION*

Sharon Bomer Lauritsen
US Trade Representative

As import duties have declined over the past twenty years due to bilateral and multilateral trade negotiations, countries increasingly have turned to sanitary and phytosanitary (SPS) measures to protect their farmers. In addition, the negotiation of the World Trade Organization's (WTO) trade agreement on SPS measures in the mid-1990s was the advent for the first set of rules that countries should abide by when developing and implementing SPS measures. As a result of these concurrent events, SPS issues and the resolution of SPS barriers "based on science" has come to forefront of the agriculture industry's and US government's work in international trade to help maintain and open export markets for US food and agricultural goods. The just completed Trans-Pacific Partnership negotiations will add to the body of work on SPS rules governing international trade, which will result in even greater demand for alignment and coordination between US government, industry and animal health professionals to support the scientific basis of animal health standards to advance trade in animal products.

USDA/APHIS/Veterinary Services Report of OIE's 83rd General Session

Michael J. David
USDA-APHIS, Veterinary Services (VS)

The 83rd General Session of the World Organization for Animal Health (OIE) was held May 24-May 29, 2015, in Paris, France. The delegations from over 151 of the 180 OIE Member countries and territories, as well as observers from 34 regional and international organizations attended the meeting. There were over 900 registered attendees. The OIE has been recognized by the World Trade Organization (WTO) as the standard-setting body for animal health. The OIE develops and establishes the health standards for the safe trade of animals and animal products and makes recommendations for the overall well-being of animals.

The President of the World Assembly, Dr. Karin Schwabenbauer, welcomed the OIE delegates, invited ministers, representatives from international organizations and other guests to the Session. Dr. Schwabenbauer noted the progress she has seen during her three years as President, and highlighted the continued important role the OIE has in animal welfare, antimicrobial resistance, and assisting with the control of such diseases as rabies, peste des petits ruminants (PPR), foot-and-mouth disease (FMD) and classical swine fever (CSF). The 6th Strategic Plan of the OIE, whose four pillars – solidarity, standards development, transparency, and scientific rigor – will help guide the organization's work during the next 5 years, particularly with the challenges presented by an ever growing population, increased globalization, and climate change.

Three OIE meritorious medals and one gold medal were awarded during the opening ceremonies. The recipients were recognized for their life time contributions to the OIE and to animal health and welfare. One of the meritorious medals was awarded to Dr. Temple Grandin for her significant contributions which have improved the welfare of livestock handled during slaughter and transportation. Finally, the World Veterinary Association granted their Veterinary Day Award jointly to the College of Veterinarians of Costa Rica and the Costa Rican National Animal Health Service.

The Delegation from the United States

The Members of the US delegation attending the 83rd General Session were:

- Dr. John Clifford, OIE Delegate and Deputy Administrator, United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS)
- Dr. Michael David, Director, National Import Export Services (NIES), International Animal Health Standards Services, USDA, APHIS, VS
- Dr. Mark Davidson, Associate Deputy Administrator, NIES, USDA, APHIS, VS
- Dr. Joyce Bowling, Director, Import-Export Animals, NIES, USDA, APHIS, VS

- Dr. Karen Sliter, Regional Manager, APHIS, International Services, Brussels, Belgium

Representatives attending from other US government agencies were:

- Dr. Bettye Walters, International Programs, Center for Veterinary Medicine, US Food and Drug Administration

The following academic, association and industry representatives accompanied the US delegation:

- Dr. Tom Baldwin, President-elect, American Association of Veterinary Laboratory Diagnosticians
- Dr. David Schmidt, President-elect, US Animal Health Association
- Dr. Paul Sundberg, Vice-President of Science and Technology, National Pork Board
- Dr. Elizabeth Parker, Chief Veterinarian, Institute for Infectious Animal Diseases
- Dr. Kathy Simmons, Chief Veterinarian, National Cattlemen's and Beef Association
- Dr. Liz Wagstrom, Chief Veterinarian, National Pork Producer's Council
- Dr. Beth Sabin, Associate Director, International and Diversity Initiatives, American Veterinary Medical Association
- Dr. Jamie Jonker, Vice-President, Scientific and Regulatory Affairs, National Milk Producers Federation
- Dr. Shelly McKee, Director of Technical Services, USA Poultry and Egg Export Council
- Dr. Willie Reed, Dean, School of Veterinary Medicine, Purdue University

Technical Items

The Use of Information Technology in Animal Health Management, Disease Reporting, Surveillance, and Emergency Response

Tammy Beckham

This presentation was based on responses to an OIE questionnaire/survey sent out to all the Member country delegates. The results of the survey indicated that while Member countries have the availability of new technologies, particularly mobile devices, these are being underutilized in animal health. Countries give high priority to technologies for data management and access, with lower priority given to point-of-care testing, and remote sensing or collection. The results also showed that resource and data limitations were affecting the implementation of these technologies as well as the access of the data generated from their use.

World Animal Health Situation (WAHIS)

The OIE Animal Health Information Department presented the most significant animal health events occurring during 2014 and early 2015. The Web-based system for disease notification — or WAHIS — provides the mechanism for reporting animal disease events. All OIE animal health information is available through the OIE database known as the WAHID (World Animal Health Information Database). The Head of the Information Department presented information on the following four terrestrial animal diseases which were identified as priorities by the delegates during last year's session:

- Foot-and-mouth disease (FMD)
- Brucellosis
- Tuberculosis
- Highly pathogenic avian influenza (HPAI)
    a. During 2014 and early 2015, 35 countries reported HPAI involving seven different subtypes.

In addition, Dr. John Clifford gave an update on the HPAI situation in the United States. He presented information on the source of the virus, its changes, and current thinking on its epidemiology, particularly in states of the Midwest. The information he presented was appreciated and well received.

Specialist Commission Reports

A. **Scientific Commission for Animal Diseases (SCAD) –** The SCAD addresses technical issues, and makes science based recommendations to the Terrestrial Animal Health Standards (Code) Commission for improving and updating the various Code Chapters. The President of the SCAD summarized the activities of the Commission during the previous year. These included:
    a. Overseeing and directing the work of 21 different expert ad hoc groups;
    b. Amending and finalizing the chapters on:
        - FMD, particularly with respect to time for recovery of full freedom following a "contained" outbreak.
        - Bovine spongiform encephalopathy (BSE), making a clear distinction between classical and atypical BSE, and clarifying that it is only the classical form for which status is granted, and that findings of atypical BSE do not affect status;
        - Glanders;
        - Tuberculosis, and
        - Antimicrobial resistance (AMR); (two chapters).
    c. Continuing to work on the new Code Chapter on porcine reproductive and respiratory syndrome (PRRS).
    d. Publishing the Animal Health Surveillance Guide.

e. Updating the chapter on the “Criteria for Listing a Disease.”
f. Conducting missions (site visits) to India and South Africa to ascertain the maintenance of granted FMD status and document compliance with the requirements outlined in the *Code*.
g. Identifying the need for a new chapter on vaccination and vaccine strategies, to provide clarity in its application and in the definition of terms (e.g., systemic vaccination, emergency vaccination, ring vaccination, strategic vaccination, routine vaccination, and vaccination to live).
h. Approving five laboratories, including the US Foreign Animal Disease Diagnostic Laboratory at Plum Island, as “holding facilities” of Rinderpest virus containing material (See Resolution No. 25).
i. Updating a fact sheet on Ebola.
j. Developing a Model Certificate for use by High Health High Performance horses.
k. Launching the global initiative to control and eradicate PPR by 2030 during the Global Conference on PPR in Ivory Coast.
l. Instituting a web based tool for re-confirming a Member country’s granted disease status.

Evaluation of country submissions for FMD, contagious bovine pleuropneumonia (CBPP), African horse sickness (AHS), Peste des petits ruminants (PPR), BSE and Classical Swine Fever (CSF) status:

The following additional countries/zones received official status recognition:

1. Free of FMD where vaccination is **not** practiced
    a. Added certain zones in Botswana and Kazakhstan.
    b. The Philippines.
2. Free of FMD **with** vaccination
    a. Continental Ecuador.
3. Free of CBPP: France.
4. BSE
    a. Upgraded status from controlled to negligible risk: Switzerland, Lichtenstein, the Czech Republic, Cyprus, France and Ireland.
    b. Controlled risk: N/A.
5. Free of AHS: Added Morocco to the list of free countries.
6. Free of PPR: Added Mexico, the Czech Republic, Namibia, and Swaziland to the list of free countries.
7. Free of CSF: 23 Countries were granted their freedom status without vaccination, and some zones in Brazil were granted freedom status without vaccination.

B. **Terrestrial Animal Health Standards Commission (*Code* Commission) –** The President of the *Code* Commission presented various *Code* chapters for adoption. *Code* chapters are sent to Member delegates on at least two separate occasions during the course of the year for review and comment. This year, 22 Terrestrial Animal Code chapters were amended and/or rewritten and presented for adoption. Most of the chapters were adopted with little or no discussion. Code chapters which stimulated some discussion before being adopted (either as is or slightly amended) include some additional information in the listing below:

a. **Glossary –** the EU opposed the proposed definition of Stamping Out – particularly the phrase "in whole or in part", because they believed that it might lead to misinterpretation and confusion. Other countries felt the definition needed to be broader. The President of the Code Commission agreed that the words "in whole or in part" could be removed but also invited members to re-submit additional comments for consideration during the next Code Commission meeting in September.
b. **User's Guide;**
c. **Evaluation of Veterinary Services (Chapter 3.2);**
d. **Collection and Processing of in vivo derived embryos from livestock and horses (Chapter 4.7.);**
e. **General Obligations Related to Certification (Chapter 5.1);**
f. **Certification Procedures (Chapter 5.2);**
g. **Prevention, detection and control of *Salmonella* in poultry (Chapter 6.5);**
h. **Animal Welfare and Dairy Cattle Production Systems (Chapter 7.X) -** this is a new chapter. While delegates supported the chapter, the United States intervened to remind the OIE when developing recommendations to any welfare chapters that such recommendations be "outcome based" rather than prescriptive. The United States then gave two examples where the recommendations of the chapter appeared to be too prescriptive – (related to pen space and feeding colostrum) and informed the OIE that additional comments would be submitted prior to the Code Commission's meeting in September.
i. **Animal Welfare and Broiler Productions Systems (Chapter 7.10);**
j. **Slaughter of Animals (Chapter 7.5) –** The United States intervened to support the recognition that, in water-bath stunning of poultry during the slaughter process, a satisfactory stun depends on the management of several parameters besides electrical current and frequency. The United States supported the new text that moves the emphasis from these few parameters to monitoring the welfare outcomes of the whole stunning process, and asked that the word "minimum" be removed from the tables listing the stun amperages to make it consistent with the actual recommended text.

However, the European Union (EU) strongly opposed the change, and, together with the Region of Africa, who indicated that they needed “more time” to evaluate the recommended changes, the proposed changes were not adopted, and the chapter remained as is. The President of the Code Commission invited Members to submit additional comments to address the stunning issues.

k. **Infection with Epizootic Hemorrhagic Disease Virus (Chapter 8.X) –** this is a new chapter which was adopted with very little discussion. It closely parallels the existing chapter on Bluetongue;

l. **Infection with Bluetongue Virus (Chapter 8.3) –** the updates to this chapter were adopted; however, the case definition was slightly amended by removing the words “including naturally transmitted vaccine strains”, until it could be further studies by the pertinent ad hoc Group.

m. **Infection with *Taenia solium* (Chapter 15.X) –** this is a new chapter that was adopted. The United States intervened by requesting reconsideration of setting the arbitrary limit (cut off points) of “20” or more cystecerci detections in a carcass before disposing of the carcass. The United States also asked the OIE for the technical information that prompted the OIE to change the processing requirements (thermal cooking) of meat to inactivate cystecerci from 60 C to 80 C. The existing studies, although now old, did show that 60 C was the appropriate and sufficient temperature to inactivate the cystecerci. The United States indicated to the OIE that additional comments on the above items would be submitted to the Code Commission prior to their meeting in September.

n. **Infection with Foot-and-Mouth disease virus (Chapter 8.7) –** this chapter received significant revisions, which for the most part were supported by the delegates. The delegate of Canada, however, intervened on behalf of the Quadrilateral countries, encouraged the pertinent Commissions to continue revising the FMD chapter. Specifically, the Quads requested that the Ad hoc Group further consider ways of incorporating the Quads proposal of allowing for the establishment of a containment zone during an outbreak while still providing acceptable levels of protection to importing countries. Allowing for the option of establishing a Containment Zone during an outbreak in circumstances where an outbreak can be limited to a specific and confined geographic area will help minimize depopulation while continuing to facilitate trade. The Quads countries also strongly encouraged the Commissions to find acceptable ways for a country that follows a *vaccinate-to-live* policy to regain their FMD free status in three months.

o. **Infection with Rift Valley Fever virus (Chapter 8.13)**

p. **Infection with *Brucella abortus, melitensis and suis* (Chapter 8.X** this chapter was adopted last year and received only minor

corrections for this General Session. However, just as the United States did last year, Australia intervened because of continued concern related to the format of the chapter – combining all *Brucella species* into one chapter. As separate Chapters, they speak to species-specific *Brucella* organism for the traditional host species. As a combined Chapter, this is lost each time the term « *Brucella* » is used throughout the Code Chapter. If the chapter will not be split back into three separate chapters for each *Brucella spp*, Australia offered to provide some additional language to the Code Commission before its next meeting to help reduce any confusion that might be caused by consolidating the chapter;

q. **Infection with Avian Influenza Viruses (Chapter 10.4)**

r. **High Health Status Horse Subpopulation (Chapter 4.16)** – this is chapter that was adopted as a new chapter in 2014. It presented the concept of "higher health status" horses, which, by being closely monitored and tested for certain diseases they should be able to move in and out of countries where they may compete with greater ease that they would otherwise.

s. **Bovine Spongiform Encephalopathy (Chapter 11.4) –** this chapter was updated to recognize the distinction between "classical BSE" and "atypical BSE." New Zealand, on behalf of the Quads countries (New Zealand, Australia, United States, and Canada), made an intervention. Specifically, the Quads are concerned that once again changes to a current *Terrestrial Animal Health Code* chapter are being proposed for adoption without Member Countries being given the appropriate opportunity to consider the changes carefully and offer comment to the Terrestrial Animal Health Standards Commission. While acknowledging that there may be occasions when changes to *Code* chapters must be made with urgency, this was not such an occasion. The Quads recognized the need to make a distinction between the occurrence of a case of "classical" BSE and a case of "atypical" BSE, and welcomed the recognition that a case of "atypical" BSE, an uncommon, spontaneously occurring condition, should not negatively affect a country's BSE risk status. However, the changes proposed have broader implications. With the normal cycle of Member Country comments on proposed changes, countries would have time to recognise the implications for surveillance and information gathering systems and be prepared when the changes are adopted after the normal process of consultation and comment. The Quads also pointed to another problem with rushing this revised text through. A very important distinction is made between "classical" and "atypical" BSE. However, nowhere in the *Code* or *Manual* is there a case definition for either condition. Before the *Code* recommends different responses to these two conditions, the OIE Member Countries should be provided with definitive case

definitions so as to avoid ambiguity and dispute over BSE status. Since the occurrence of "atypical" BSE has been recognised for several years now, the Quads suggested that there was no need for urgency to make changes to the *Code* and the normal cycle of Member Countries' scrutiny, comment and consultation should be followed. The EU, however, did have an urgency to get these changes through (likely because they have been detecting "atypical" cases of BSE and did not want these to influence their status, since the Code does not currently make such a distinction). A compromise was reached by not adopting the proposed changes, but adding a short sentence at the end of the introductory paragraph of the chapter which reads: "For the purpose of official BSE status recognition, BSE excludes 'atypical BSE' as it is a condition believed to occur spontaneously in all cattle populations at a very low rate." Countries can now review the proposed changes and submit any comments before the next meeting of the Code Commission in September 2015.

t. **Harmonization of National Antimicrobial Resistance Surveillance and Monitoring Programs (Chapter 6.7)**
u. **Risk Analysis for Antimicrobial Resistance Arising from the Use of Antimicrobial Agents in Animals (Chapter 6.10).**

The new and updated chapters became effective at the closing of this 83rd General Session (May 29, 2015).

C. **Aquatic Animal Health Standards Commission (AAHSC) –** The President of the Commission presented the updated aquatic code chapters for adoption and summarized the activities of the Commission for 2014. Chapters were updated based on identified errors, new science, and needs. All chapters that were distributed for adoption were approved and adopted. The User's Guide, Chapter 5.1 (General Obligations Related to Certification), Chapter 6.5 (Risk Analysis for AMR Arising from the Use of Antimicrobial Agents in Aquatic Animals) received some minor revisions based on some of the interventions made on the floor of the session. In addition, four chapters in the *Manual* for the Diagnosis of Aquatic Diseases were revised and adopted.

Finally, Australia made an intervention requesting the OIE consider providing the Aquatic Animal Health Standards Commission with additional resources to help with the ever increasing workload of the Commission. Australia suggested that the OIE consider establishing a separate commission to address the *Manual* issues (like they have on the Terrestrial side), or at the very least, convening an ad hoc Group to assist with these issues.

D. **Biological Standards (Laboratory) Commission –** The Vice-President of the Laboratory Commission reported on the Commission's activities for 2014. The Commission has concentrated on monitoring the activities of current OIE Reference Laboratories worldwide, reviewing applications for additional disease-specific reference laboratories and collaborating centers, coordinating and approving specific twining projects, reviewing and updating various chapters in the *Manual of Diagnostic Tests and Vaccines* (18 *Manual* chapters and a Glossary were updated this year), and providing technical expertise and guidance to the Terrestrial Animal Health Standards Commission.

a. The Commission is also involved with:
   - Reviewing the applications to register diagnostic test kits;
   - Overseeing the work of the ad hoc Group on High Throughput Genetic Sequencing, Bioinformatics and Computational Genomics;
   - In conjunction with other Specialist Commissions, working to harmonize overlapping issues where possible.

b. New Reference Laboratories were approved for:
   - FMD (France)
   - Tularemia (Hungary)
   - Equine rhinopneumonitis (Ireland)
   - BSE and Scrapie (Spain)

The Laboratory Commission is now placing greater rigor and scrutiny before approving applications for OIE Reference Laboratories. Criteria that is now required include being International Organization for Standardization (ISO) 17025 certified or its equivalent and being well published in the area/disease of request.

A resolution was passed to have the OIE develop standards for high throughput genomic sequences (HTGS)- Bacille Calmette-Guerin (BCG), and to establish a platform for the collection and management of partial and complete genomic sequences to integrate the reporting of genomic sequence data into the World Animal Health Information System (WAHIS). Another resolution was passed that officially registers BOVIGAM® as a validated diagnostic kit fit for purpose.

Elections

This is an election year at the OIE. Elections were held for all positions on the Specialist Commissions and the Council (all these positions have a three-year term). In addition, an election to choose the Director General was held (5-year term).

Director General: Dr. Monique Eloit. She is the first woman to be elected as Director General (DG) at the OIE. She currently serves as Deputy Director General, and will take over as DG on January 1, 2016.

Specialist Commissions (each commission has a president, two vice-presidents and three members).

Commission	Pres.	VP-1	VP-2	Member	Member	Member
Terrestrial Animals	Bonbon (France)	McDiarmid (NZ)	Funes (Argentina)	Okita (Japan)	Hammami (Tunisia)	Hyman (Ivory Coast)
Aquatic Animals	Ernst (Australia)	Gallardo (Chile)	Peeler (UK)	Constantine (Canada)	Barson (Zimbabwe)	Mohamed Din (Malaysia)
Biological Standards	Schmitt (USA)	Berthe (France)	Chen (China)	El Harrak (Morocco)	Fooks (UK)	Daniels (Australia)
Scientific	Bruckner (South Africa)	DeClercq (Belgium)	Hammond (Australia)	Dungu (Congo)	Montano (Mexico)	Bellini (Italy)

Election of the Presidency and Council Members of the Assembly

President: Bothe Michael Modisane (South Africa)
Vice-President: Mark Schipp (Australia)
Members:

- African Region Nicholas Kauta (Uganda)
- Americas Region Joaquin Delgadillo (Mexico)
  Hugo Federico Idoyaga (Paraguay)
- Asia, Far East, Oceana Toshiro Kawashima (Japan)
- Europe Region Evgeny Nepolonov (Russia)
- Middle East Region Hadi Mohsin Al lawati (Oman)

Regional Commission Meeting for the Americas

The Delegates of the Regional Commission for the Americas met on May 25, 2015. The activities during the past year were summarized. Twenty-one of the 30 Member countries of the Region for the Americas were represented. Dr. Guilherme Marquez, Chief Veterinary Officer (CVO) from Brazil and President of the Regional Commission of the Americas, chaired the session. In addition to summarizing the activities of the Regional Commission, technical topics for both the 85th General Session and the 23rd Regional Conference were identified and recommended for consideration by the Assembly.

The next bi-annual Regional Commission Conference for the Americas will be hosted by Bolivia in the town of Santa Cruz in November, 2016.

Evaluation of the Specialist Commissions – to strengthen the desired technical expertise of the OIE's activities, the Assembly of Delegates adopted a Resolution which establishes a performance committee to evaluate the four Specialist Commissions. Thus, the performance of these commissions will be regularly evaluated based on criteria yet to be developed. Specialist

Commission Members who either do not contribute, or are not technically competent, may be asked to leave.

Next General Session of the OIE World Assembly: May 22 – 27, 2016.

REPORT OF THE COMMITTEE ON JOHNE'S DISEASE

Chair: David Smith, NY
Vice Chair: Vacant

Bruce Addison, MO; Paul Anderson, MN; Richard Breitmeyer, CA; Charles Brown II, WI; Todd Byrem, MI; Michael Collins, WI; Stephen Crawford, NH; Ria de Grassi, CA; Anita Edmondson, CA; William Fales, MO; Kathy Finnerty, MA; Keith Forbes, NV; Mallory Gaines, DC; Robert Gerlach, AK; Stephane Guillossou, NJ; William Hartmann, MN; Linda Hickam, MO; Donald Hoenig, ME; David Hunter, MT; Carla Huston, MS; Marv Jahde, KS; Annette Jones, CA; Jamie Jonker, VA; Susan Keller, ND; Gerald Kitto, ND; John Lawrence, ME; Donald Lein, NY; Tsang Long Lin, IN; Mary Lis, CT; Laurent O'Gene Lollis, FL; Travis Lowe, MN; Chuck Massengill, MO; Jay Mattison, WI; Sara McReynolds, ND; Antone Mickelson, WA; Eric Mohlman, NE; Jeffrey Nelson, IA; Dustin Oedekoven, SD; Kenneth Olson, IL; Lanny Pace, MS; Elizabeth Parker, TX; Boyd Parr, SC; Elisabeth Patton, WI; Janet Payeur, IA; Kris Petrini, MN; Jewell Plumley, WV; Suelee Robbe-Austerman, IA; Paul Rodgers, WV; Allen Roussel, Jr., TX; Patricia Scharko, SC; Andy Schwartz, TX; Kathryn Simmons, DC; Marilyn Simunich, ID; Shri Singh, KY; Julie Smith, VT; Rebecca Smith, IL; Scott Stuart, CO; Tahnee Szymanski, MT; Robert Temple, OH; Brad Thurston, IN; James Watson, MS; Robert Whitlock, PA; Ching Ching Wu, IN.

The Committee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 12:30 to 4:00 p.m. There were 14 members and 12 guests present. The 2014 USAHA resolution #8, Assess Johne's Disease Fecal Check Test Performance was briefly discussed and the committee recognized that USDA's resources had to be diverted to the highly pathogenic avian influenza (HPAI) outbreak and therefore APHIS, Veterinary Services (VS) was forced to delay its intention to assess test performance until the following fiscal year.

Johne's Diagnostics at the Pennsylvania Veterinary Laboratory

Deepak Tewari, Pennsylvania Veterinary Laboratory

The Pennsylvania Veterinary Laboratory offers Johne's diagnostics for cattle, small ruminants, and cervids. Dr. Tewari presented the laboratory's experience with fecal culture, polymerase chain reaction (PCR), and Johne's ELISA. The presentation is included on the Committee web page.

USDA-APHIS-Veterinary Services Update

Michael Carter, USDA-APHIS-VS, Cattle Health Programs

Dr. Carter reviewed the status of funding for cattle health programs and described the structure of Veterinary Services' program areas.

Johne's Disease Fecal Check Test

Kevin Stokes, USDA-APHIS, Veterinary Services, National Veterinary Services Laboratory (NVSL)

A total of 61 laboratories participated in the 2015 Johne's Disease Fecal Proficiency Panel (7 Canadian, 4 European Union, 1 New Zealand, 1 Australian and 48 USA laboratories). Compared to 2014, the number of individual proficiency panel requesting laboratories increased for direct PCR, decreased for liquid, and remained the same for solid culture methods. Requests for pooled proficiency panels increased for direct PCR, and remained constant for liquid and solid culture methods. A total of 160 panels were requested; results were not returned for five. None of the kits were reported to be faulty this year. If preliminary results indicated that the laboratory had failed, it was given the opportunity to retake the proficiency panel provided the results were completed by September 30, 2015. The full report is included at the end of this report.

MDA AAMD Update

Vivek Kapur, Penn State University

Dr. Kapur gave a thorough update on Mycobacterial Diseases of Animals initiative. The mycobacterial diseases of animals coordinated agricultural project (MDA-CAP) grant application was not successful, but efforts continue. Acquisition and Asset Management Division (AAMD) is in its second year and a new website is active www.mycobacterialdiseases.org. Advances in Johne's Disease control and prevention will depend on revising our strategy and seeking new allies and sources of funding. The full presentation is available on the Committee web page.

Committee Business:

A discussion was held regarding the future of the committee's efforts. The members present agreed that communication throughout the year in the form of conference calls every two months may be helpful to keep the committee moving forward. Committee Chair David Smith will coordinate the calls.

A draft resolution, which would request that USDA-APHIS-VS encourage coordination in research on mycobacterial diseases, including Johne's Disease, was presented to the members in attendance. After comment, the authors decided not to advance a motion for adoption.

2015 Johne's Disease Fecal Proficiency Panel General Summary

Kevin Stokes
USDA-APHIS, Veterinary Services, National Veterinary Services Laboratory (NVSL)

Overview

A total of 61 laboratories participated in the 2015 Johne's Disease Fecal Proficiency Panel (7 Canadian, 4 European Union, 1 New Zealand, 1 Australian and 48 USA laboratories). Compared to 2014, the number of individual proficiency panel requesting laboratories increased for direct PCR, decreased for liquid, and remained the same for solid culture methods. Requests for pooled proficiency panels increased for direct PCR, and remained constant for liquid and solid culture methods. Table 1 details the number of individual and pooled panels shipped and the overall pass/fail status for each method. Laboratories could order multiple panels for each method and were notified of their preliminary pass/fail status upon submission of their results. A total of 160 panels were requested; results were not returned for 5. None of the kits were reported to be faulty this year. If preliminary results indicated that the laboratory had failed, it was given the opportunity to retake the proficiency panel provided the results were completed by September 30, 2015. The results provided in Table 1 include these retests. Laboratories that only used reagents from a single manufacturer, either Tetracore or Life Technologies, are listed separately. Laboratories that use either in-house reagents, other commercial kits not marketed in the US, or mix commercial reagents are listed under the "In House" category. One laboratory used in-house liquid culture reagent, which is grouped with the laboratories using the MGIT system. All laboratories using solid media were grouped together even though two laboratories used in-house solid media.

Table 1. Summary results of the 2015 Johne's Disease Fecal Proficiency Panel. In order to pass results must meet the criteria listed in the 2010 Uniform Program Standards for the Voluntary Bovine Johne's Disease Control Program.

	# passed 1st attempt (%)	# failed 1st attempt (%)	# passed 2nd attempt (%)	# failed 2nd attempt (%)	# Kits not retested	Total Shipped	Total shipped in 2014 (%change)
Individual Panel							
Direct PCR (all)	52 (91%)	5 (9%)	2 (100%)		3	60	63 (-5%)
Tetracore	21 (91%)	2 (9%)	2 (100%)			25	24 (+4%)
Life Technologies	20 (95%)	1 (5%)				21	19 (+11%)
In-House	11 (85%)	2 (15%)				13	17 (-24%)
Liquid Systems (all)	21 (95%)	1 (5%)			1	24	29 (-17%)
MGIT 960	4 (80%)	1 (20%)				5	7 (-29%)
TREK	17 (100%)					17	22 (-23%)
HEY Solid Media (all)	11 (92%)	1 (8%)			1	12	13 (-8%)
Individual Panel Total	**84 (92%)**	**7 (8%)**	**2 (100%)**		5	**96**	**105 (-9%)**
Pooling Panel							
Direct PCR (all)	40 (95%)	2 (5%)	1 (100%)		1	44	41 (+7%)
Liquid	16 (100%)					17	18 (-6%)
HEY	3 (100%)					3	4 (-25%)
Pooled Panel Total	**59 (97%)**	**2 (3%)**	**1 (100%)**		1	64	**63 (+2%)**

Individual Panel Description

Each individual panel consisted of 25 unknown samples and one positive control. Positive samples were collected from naturally infected cows, and negative samples were from individual animals residing in non-infected herds. Approximately 4 liters of fecal material were collected rectally per animal, shipped to NVSL, aliquoted as soon as possible in individual vials, and stored at -70°C until kits were distributed. Panels were assembled in groups, each with a different key (See Table 9 at the end of this report for the key). Table 2 shows the categorical (positive/negative) performance for each identification method by animal ID. This year all animals met the required 70% pass rate to be considered valid. Numbers in red indicate percentages that were less than the required 70%.

Table 2. Composition of the 2015 Johne's Disease Fecal Proficiency Panel, and the overall categorical summary results per cow for each method performed by laboratories

				Percent of Samples Correctly Classified					
					Liquid Media		Direct PCR		
Cow ID	# Vials /Panel	Shedding Status[1]	All Kits 93[2]	HEY 12	TREK 17	MGIT 5	Life Tech 21	Tetracore 25	In-House 13
14-02868 (IA)	2	Critical- Neg	100%	100%	100%	100%	100%	100%	100%
13-01420 (IA)	3	Critical- Neg	99%	100%	100%	100%	98%	100%	97%
13-00354 (IA)	1	Critical- Neg	99%	92%	100%	75%	100%	100%	100%
13-00349 (IA)	1	Critical- Neg	98%	100%	100%	100%	100%	92%	100%
14-02866 (IA)	1	Critical- Neg	99%	100%	100%	100%	98%	98%	100%
12-03917 (ND)	2	Low	98%	100%	97%	63%	98%	98%	100%
12-03913 (ND)	2	Low	96%	83%	91%	75%	98%	100%	88%
12-03914 (ND)	2	Moderate	99%	100%	100%	100%	100%	100%	92%
13-06801 (IA)	2	Moderate	99%	100%	100%	100%	100%	100%	100%
14-03358 (IA)	2	Critical- High	99%	100%	100%	88%	98%	98%	100%
13-08115 (ID)[3]	2	Critical- High	99%	100%	100%	100%	100%	98%	100%
11-09754 (MT)	2	Critical- High	100%	100%	100%	100%	100%	100%	100%
12-03428 (ND)	2	Critical- High	100%	100%	100%	100%	100%	100%	100%
12-03916 (ND)	2	Critical- High	100%	100%	100%	100%	100%	100%	100%

[1]In order to pass, laboratories must correctly classify critical samples. A critical sample is any negative sample or a sample that is identified as a heavy shedder by more than 50% of the laboratories using solid media.

[2]Number of proficiency panels submitted per method.

[3]The positive control was one of the two from this animal.

Samples from 6 animals had been used in prior years, 2 in 2013 and 4 in 2014, and their performance compared. Table 3 shows the respective year panels' categorical (positive/negative) performance for each identification method by animal ID.

Table 3. Comparison between four animals used in both the 2012 and 2013 Johne's Disease Fecal Proficiency Panels with the overall categorical summary results per cow for each method performed by laboratories

					Percent of Samples Correctly Classified					
						Liquid Media		Direct PCR		
				All Kits	HEY	TREK	MGIT	Life Tech	Tetracore	In-House
			2013	109[1]	19	19	11	16	25	19
	Panel	# Vials	2014	106	13	22	7	19	24	17
Cow ID	Year	/Panel	2015	93	12	17	5	21	25	13
13-00349 (IA)	2014	2	Critical-Neg	99%	100%	100%	100%	97%	100%	97%
13-00349 (IA)	2015	1	Critical-Neg	98%	100%	100%	100%	100%	92%	100%
12-03917 (ND)	2014	2	Low	98%	92%	100%	75%	97%	99%	97%
12-03917 (ND)	2015	2	Low	98%	100%	97%	63%	98%	98%	100%
12-03913 (ND)	2014	2	Low	89%	85%	100%	63%	92%	90%	89%
12-03913 (ND)	2015	2	Low	96%	83%	91%	75%	98%	100%	88%
12-03914 (ND)	2013	2	Low	96%	97%	97%	88%	100%	100%	89%
12-03914 (ND)	2015	2	Moderate	99%	100%	100%	100%	100%	100%	92%
11-09754 (MT)	2014	2	Critical-High	99%	100%	100%	100%	100%	98%	100%
11-09754 (MT)	2015	2	Critical-High	100%	100%	100%	100%	100%	100%	100%
12-03428 (ND)	2013	2	Critical-High	99%	100%	100%	95%	100%	100%	97%
12-03428 (ND)	2015	2	Critical-High	100%	100%	100%	100%	100%	100%	100%

[1]Number of proficiency panels submitted per method.

The performance of each method was further evaluated by determining the number of samples that were misclassified (Figure 1). In this analysis all three direct PCR methods and TREK performed comparably and very well. Eighty-six percent of laboratories using Life Technologies direct PCR method correctly classified all the samples. Eighty-two percent of laboratories using the TREK system correctly classified all samples, and 58% of the laboratories using solid media correctly classified all samples.

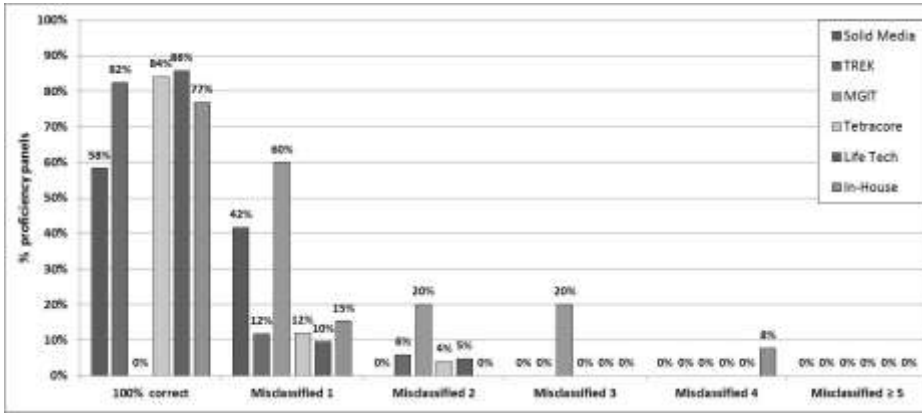

Figure1. Percentage of 2015 Johne's disease fecal proficiency panels by number of samples misclassified for the three culture (TREK liquid media, solid media and MGIT 960 liquid media) and three direct PCR (Tetracore, Life Technologies, and In-House) methods. A panel consisted of 25 fecal samples.

According to the 2010 Johne's Disease Uniform Methods and Rules, laboratories must correctly classify all critical-high shedding samples as positive, all negative samples as negative and misidentify less than 30% of the remaining, valid, non-critical samples. Table 4 lists the specific reasons laboratories failed to pass the proficiency panel for each method.

Table 4. Reasons laboratories failed the 2015 Johne's Disease Fecal Proficiency Panel. Laboratories were required to correctly identify all the negative samples as negative and all the critical high shedding samples as positive (critical samples). They also were required to correctly classify at least 70% of the remaining samples.

	Direct PCR (Tetracore)	Direct PCR (Life Tech)	Direct PCR (In-House)	TREK liquid media	MGIT liquid media	HEY solid media
Misclassified a negative sample as positive	0	2	1	0	1	1
Missed 4 or more low / moderate shedders (lack of sensitivity)	1	0	0	0	0	0
Misclassified a high shedding sample as negative	0	0	0	0	0	0
Multiple reasons cited above	1	0	0	0	0	0
Total failed kits	**2 (8%)**	**2 (10%)**	**2 (8%)**	**0 (0%)**	**1 (20%)**	**1 (8%)**
Total kits tested	**25**	**21**	**13**	**17**	**5**	**12**

As more laboratories use direct PCR as their primary organism detection assay, the performance of that assay across laboratories becomes more important. Variation in reported cycle threshold (Ct) of the direct PCR methods was investigated in Figure 2 by comparing the average reported Ct for the positive samples. Only valid Ct values from each panel were used in this comparison and include samples categorized as negative but that had valid Ct scores reported (e.g. negative but a Ct of 39.9). The overall means of all three groups were statistically similar with the average Ct score between the methods for each animal differing by less than 3. Despite life technologies having the most laboratories correctly classify all of the samples, this method resulted in higher mean Ct values.

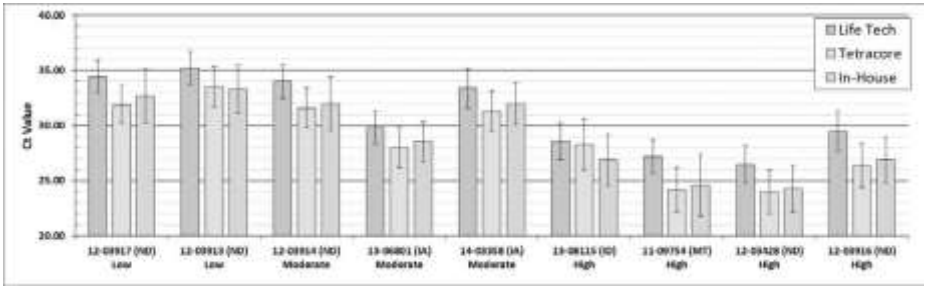

Figure 2. Average reported Ct of 2015 Johne's disease fecal proficiency panel animals for the three direct PCR methods (ABI, Tetracore, and In House). Shedding status is listed below the animal ID.

False positive results with either direct fecal PCR or confirmatory culture PCR continue to be the most common cause of failure. While animal 13-00349 (IA) is the only non-infected cow used in previous check tests, fecal material from animals in this herd has been used in previous years' proficiency panels. This year the highest shedding animals we included were one animal that contained 8,500 CFU per tube (2 samples) and another that contained 5,700 CFU per tube (2 samples). Table 5 examines the number of negative samples reported with Ct values by PCR method; this includes laboratories that had Ct values but correctly reported them as negative. Errors were relatively evenly distributed amongst three of the negative animals that were used in this year's

panel. There were a total of 5 laboratories that reported Ct values one negative sample each. Of those 5 laboratories, 4 failed the PT (see Table 4) by calling the negative sample positive, which is half the number of failing laboratories as the last three years.

Table 5. The number of samples from non-infected cows reported with Ct values (regardless of their categorical positive/negative results) by direct PCR method

	Tetracore	ABI	In-House
13-01420 (IA)	1	0	1
13-00354 (IA)	0	0	1
13-00349 (IA)	0	2	0

Pooling Panel Description

Twenty-five individual samples were provided with instructions regarding which 5 samples to pool together, for a total of 5 pooled samples. Table 6 lists the contents of each pool, and Table 8 lists the pool numbers associated with each lot of kits. Laboratories were required to correctly classify the negative pool and the two pools that contained a high-shedding animal (12-03427 & 13-08115) in order to pass. Laboratories were allowed to misclassify one of the other two pools (12-00953 & 14-03358) and still pass the panel.

Table 6. Composition of the 2015 Johne's Disease Fecal Pooling Proficiency Panel

	Positive sample(s) description	
	Cow ID	Avg. CFU/ tube*
1 High, 4 Negative samples	12-03427	3,350
1 High, 4 Negative samples	13-08115	500
1 Moderate, 4 Negative samples	12-00953	44
1 Moderate, 4 Negative samples	14-03358	38
5 Negative samples		

*Refers to the positive samples, not the pooled sample

Table 7 further describes the performance of each method used in the pooled proficiency test. It is commendable that all but two laboratories passed the pooled panel. The two laboratories that failed were using a direct PCR method; one laboratory misclassified the negative pool and other misclassified a pool with a high shedding animal.

Table 7. Performance of each method used in the Johne's Disease 2015 Fecal Pooling Proficiency Panel. A total of 5 pooled samples were in each panel.

		No. panels		
		Direct PCR	Liquid media	Solid media
Panels that failed	Identified the negative pool as positive	1	0	0
	Identified a high -shedding pool as negative	1	0	0
	Two non-critical pools were identified as negative	0	0	0
	Failed due to multiple criteria	0	0	0
Panels that passed	One non-critical pool was misidentified as negative	2	0	0
	All 5 pools were identified correctly	39	16	3
	Total Failed Pooled Kits	**2 (5%)**	**0 (0%)**	**0 (0%)**
	Total	**43**	**16**	**3**

A current listing of all the approved laboratories is available in the NVLS web site: Approved laboratories.

Remaining sample vials from the 2015 Proficiency Panel are available to laboratories for validation or research purposes. Available samples can be viewed in the reagents catalog under Johne's positive/negative fecal samples on the NVSL web site: Reagent Catalog.

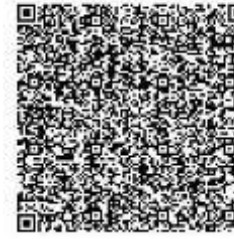

Table 8. 2015 Johne's Disease Pooled Fecal Proficiency Panel key by kit number

	Pool Sample Number			
Pool Description	Kit# 1-20	Kit# 21-40	Kit# 41-60	Kit# 61-80
5 Negative samples	4	1	3	5
1 moderate (14-03358), 4 Negative samples	5	4	1	2
1 moderate (12-00953), 4 Negative samples	2	5	4	3
1 high (13-08115), 4 Negative samples	3	2	5	1
1 high (12-03427), 4 Negative samples	1	3	2	4

Table 9. 2015 Johne's Disease Individual Fecal Proficiency Panel key by kit number. Samples are coded by color according to shedding status as follows: Negative, Noncritical positive samples, Critical – high shedding samples. Sample 26 was the positive control.

Vial #	1-25	26-50	51-75	76-100
1	12-03428 (ND)	14-03358 (IA)	13-01420 (IA)	12-03916 (ND)
2	13-00349 (IA)	12-03428 (ND)	12-03913 (ND)	12-03914 (ND)
3	13-01420 (IA)	14-02868 (IA)	12-03917 (ND)	13-00354 (IA)
4	12-03917 (ND)	12-03916 (ND)	12-03916 (ND)	13-06801 (IA)
5	13-08115 (ID)	13-01420 (IA)	12-03914 (ND)	12-03917 (ND)
6	13-06801 (IA)	12-03913 (ND)	14-03358 (IA)	14-02868 (IA)
7	12-03917 (ND)	12-03914 (ND)	13-08115 (ID)	13-06801 (IA)
8	14-02868 (IA)	12-03917 (ND)	11-09754 (MT)	13-01420 (IA)
9	12-03913 (ND)	13-00349 (IA)	13-00354 (IA)	12-03913 (ND)
10	11-09754 (MT)	11-09754 (MT)	12-03913 (ND)	12-03428 (ND)
11	13-06801 (IA)	13-08115 (ID)	12-03917 (ND)	11-09754 (MT)
12	12-03914 (ND)	14-03358 (IA)	13-06801 (IA)	12-03913 (ND)
13	14-02868 (IA)	13-06801 (IA)	13-00349 (IA)	13-01420 (IA)
14	14-02866 (IA)	13-01420 (IA)	12-03914 (ND)	11-09754 (MT)
15	14-03358 (IA)	12-03913 (ND)	14-02868 (IA)	12-03917 (ND)
16	13-01420 (IA)	13-00354 (IA)	12-03428 (ND)	14-02868 (IA)
17	11-09754 (MT)	12-03917 (ND)	11-09754 (MT)	14-02866 (IA)
18	12-03916 (ND)	14-02868 (IA)	14-03358 (IA)	14-03358 (IA)
19	12-03913 (ND)	14-02866 (IA)	14-02868 (IA)	13-08115 (ID)
20	14-03358 (IA)	12-03914 (ND)	14-02866 (IA)	12-03916 (ND)
21	13-00354 (IA)	11-09754 (MT)	13-06801 (IA)	13-01420 (IA)
22	12-03916 (ND)	13-01420 (IA)	13-01420 (IA)	12-03428 (ND)
23	13-01420 (IA)	12-03428 (ND)	12-03916 (ND)	12-03914 (ND)
24	12-03428 (ND)	13-06801 (IA)	13-01420 (IA)	13-00349 (IA)
25	12-03914 (ND)	12-03916 (ND)	12-03428 (ND)	14-03358 (IA)
26	13-08115 (ID)	13-08115 (ID)	13-08115 (ID)	13-08115 (ID)

Any questions or comments can be directed to the Diagnostic Bacteriology Laboratory at 515.337.7388.

Report was prepared by:
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REPORT OF THE COMMITTEE ON LIVESTOCK IDENTIFICATION

Chair: William Brown, KS
Vice Chair: Kevin Maher, IA

Sara Ahola, CO; Marianne Ash, IN; James Averill, MI; Rich Baca, CO; Bill Barton, ID; Karen Beck, NC; Richard Breitmeyer, CA; Paul Brennan, IN; Becky Brewer-Walker, AR; Charlie Broaddus, VA; Nancy Brown, KS; Jess Burner, TX; Alan Clark, WI; Robert Cobb, GA; Matt Cochran, TX; Michael Coe, UT; Jim Collins, GA; Karen Conyngham, TX; Susan Culp, TX; Kristi Doll, ND; Brandon Doss, AR; Anita Edmondson, CA; Adam Eichelberger, SC; James England, ID; Kathy Finnerty, MA; Glenn Fischer, TX; Tony Forshey, OH; Robert Fourdraine, WI; W. Kent Fowler, CA; Tony Frazier, AL; Mallory Gaines, DC; Chelsea Good, MO; Tony Good, OH; Alicia Gorczyca-Southerland, OK; Michael Greenlee, NV; Rod Hall, OK; Steven Halstead, MI; Neil Hammerschmidt, MD; William Hartmann, MN; Nephi Harvey, UT; Greg Hawkins, TX; Bill Hawks, DC; Burke Healey, CO; David Hecimovich, WA; Carl Heckendorf, CO; Julie Helm, SC; Kristi Henderson, IL; Warren Hess, UT; Linda Hickam, MO; Bob Hillman, ID; Donald Hoenig, ME; Joseph Huff, CO; Dennis Hughes, NE; John Huntley, WA; Russell Iselt, TX; Marv Jahde, KS; Regina Jensen, DE; Jamie Jonker, VA; Susan Keller, ND; Bradley Keough, KY; Bruce King, UT; Diane Kitchen, FL; Gerald Kitto, ND; Eileen Kuhlmann, MN; T.R. Lansford, TX; James Leafstedt, SD; Brad LeaMaster, OR; Mary Lis, CT; Jim Logan, WY; Laurent O'Gene Lollis, FL; Bret Marsh, IN; Stu Marsh, AZ; David Marshall, NC; Michael Martin, SC; Rose Massengill, MO; Jay Mattison, WI; Paul McGraw, WI; Thomas McKenna, MA; Sara McReynolds, ND; Shelley Mehlenbacher, VT; Emily Meredith, VA; Mendel Miller, SD; Ronald Miller, PA; Ernie Morales, TX; Louis Neuder, MI; Kenneth Olson, IL; Greg Onstott, MO; Elizabeth Parker, TX; Boyd Parr, SC; John Picanso, MD; William Pittenger, MO; Jewell Plumley, WV; Barbara Porter-Spalding, NC; John Ragan, MD; Valerie Ragan, VA; Jeanne Rankin, MT; Justin Roach, OK; Keith Roehr, CO; Susan Rollo, TX; David Scarfe, IL; Shawn Schafer, OH; David Schmitt, IA; Stacey Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Mark Shaw, TX; Craig Shultz, PA; Richard Sibbel, IA; Kathryn Simmons, DC; David Smith, NY; Diane Stacy, LA; Robert Stout, KY; Nick Striegel, CO; Scott Stuart, CO; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Beth Thompson, MN; Tracy Tomascik, TX; Jeff Turner, TX; Victor Velez, CA; Rick Wahlert, CO; Mark Walter, PA; James Watson, MS; Patrick Webb, IA; Richard Wilkes, VA; Kyle Wilson, TN; Ross Wilson, TX; Thach Winslow, WY; David Winters, TX; Cindy Wolf, MN; Marty Zaluski, MT; Glen Zebarth, MN; Ernest Zirkle, NJ.

The Committee on Livestock Identification met on October 27, 2015, at the Rhode Island Convention Center in Providence, Rhode Island, from 8:05 to 11:35 a.m. There were 61 members and 29 guests present. An overview of the agenda, mission statement and sign in process was reviewed at the beginning of the meeting.

The following agenda was followed, and a summary of each presentation is listed below:

Animal Disease Traceability Update

Neil Hammerschmidt, USDA-APHIS, Veterinary Services (VS)

Traceability Performance Measures - First Comparison to National Baseline Values

Animal Disease Traceability (ADT) is a performance-based program focusing on improved traceability. This approach will ensure we document tracing capability progress. Traceability performance measures were developed by the State/Federal Regulatory Working Group (WG) in 2010 that provided input to the content of the traceability regulation. These measures align with activities or actions that are typically associated with the administration of trace back investigations. The WG designated these specific activities for measuring performance as they can be uniformly measured regardless of the complexity of the trace. The activities measure the lapsed time it takes to answer four specific questions:

1. In what State was an imported animal officially identified?
2. Where in the State was the animal officially identified?
3. From what State was an animal shipped?
4. From what location was an exported animal shipped?

The duration, or lapsed time, is measured when completing an exercise. The start time is when the State is notified of the official identification number, and the end time is when the State finds the information to answer the question posed by the Activity. Additional explanation for the administration of the trace performance measures used for the 1st year comparison is contained in the document, Guidelines for Administering Test Exercises, December 17, 2014.

National Baseline Values

The first objective was to establish baseline values for the United States that reflect the average lapsed time to complete each Activity prior to the implementation of ADT. Trace test exercises were conducted through cooperative agreement periods of FY2012 and FY2013. The number of records received was more limited than projected and there were apparent variations in the interpretations of the Activity measures. As a result, supplemental exercises were conducted for Activities 2, 3, and 4 as part of the FY2013 cooperative agreement period to ensure adequate numbers of records were received and analyzed in establishing national baseline values. The resulting national baseline values are summarized in Table 1.

Table 1. Traceability Performance Measures – National Baselines

#	Performance Activity Description	National Baselines	
		% Successful	Time
1	In what State was an imported animal officially identified?	NA [1]	NA [1]
2	Where in the State was the animal officially identified?	69%	88 hr.
3	From what State was an animal shipped?	58%	138 hr.
4	From what location was an exported animal shipped?	76%	264 hr.

[1] Activity 1 is only applicable for 840 identification numbers as the State abbreviation is the prefix for the NUES tags which answers the question posed by Activity 1. Evaluation of Activity 1 will be made as the use of 840 tags becomes more significant.

1st Comparison to the National Baseline Values

The administration of the same traceability performance measures conducted to achieve the national baseline values were continued through the ADT Cooperative Agreements in FY2014. The "Guidelines for Administering Test Exercises", December 17, 2014 document provided information and guidance to the State and APHIS-VS personnel regarding the administration of the exercises. The guidelines for FY2014 cooperative agreement period included an objective for the number of traces that each State was to complete for cattle for Activities 2, 3, and 4. The assigned number or "quota" was based on the States' cattle population ranking. For example, Texas had a quota of 10 traces for each Activity while Connecticut's quota was 4. Based on the assigned quota, approximately 350 records were anticipated for analysis and summarization for Activities 2, 3 and 4.

Tables 2 and 3 reflect various methods used to summarize and review the data. The average of all trace records received using no "weighted" adjustments were 35, 34, and 50 hours respectively for Activities 2, 3 and 4. Additionally, each State with four or more records was averaged. The average of all States combined was 31, 37, and 40 hours for Activities 2, 3 and 4 respectively. Finally, the quota assigned to each State was used to account for the distribution of the cattle population to arrive at weighted values. For example, Texas is weighted 10 compared to Connecticut at 4. This weighted method resulted in values of 35, 42, and 46 for noted activities.

Table 2. Summarization of Traceability Performance Measures

#	Activity	Average All Records (Hrs.)	State Average (Hrs.)	Weighted Average (Hrs.)
1	In what State was an imported animal officially identified?	39 [1]	--- [1]	--- [1]
2	Where in the State was the animal officially identified?	35	31	35 hr.
3	From what State was an animal shipped?	34	37	42 hr.
4	From what location was an exported animal shipped?	50	40	46 hr.

[1] Administration of Activity 1 is based primarily on the completeness of records maintained in the Animal Identification Management System (AIMS) operated by APHIS VS versus State systems. Therefore, the average of all records submitted by the States is used for the analysis of this performance measure.

Table 3 provides the comparison of the 1st year results to the national baselines established in 2014. The weighted method explained above is used for the first comparison to the national baselines for Activities 2, 3, and 4. This approach helps minimize potential bias that could result if the average of all States was used entirely to arrive at the traceability performance measure values for Activity 2, 3 and 4. Since Activity 1 is not specifically based on the States' record keeping systems, the average of all State records received are used to reflect the current traceability measure for that Activity.

Also in Table 3, the total number of records received and number of traces completed are used to reflect the percent of time information was successfully retrieved to answer the question posed by each Activity. For example, the national baseline values indicate that information was successfully retrieved 69% of the time for Activity 2. In the 1st year comparison, this value increased to 88%.

Table 3. 1st Comparison to National Baseline Values

#	Performance Activity Description	National Baselines		1st Year Comparison		Baseline and 1st Year Average
		% Successful	Time	% Successful	Time	
1	In what State was an imported animal officially identified?	NA	NA	88%	39 hr.	- - -
2	Where in the State was the animal officially identified?	69%	88 hr.	88%	35 hr.	62 hr.
3	From what State was an animal shipped?	58%	138 hr.	85%	42 hr.	90 hr.
4	From what location was an exported animal shipped?	76%	264 hr.	88%	46 hr.	155 hr.

The emphasis placed on record keeping systems to retrieve data associated with the performance measures has resulted in a favorable trend for improved and more timely traceability. It is important to acknowledge again that the data used for the national baseline values reflects time to retrieve information prior to the implementation of the ADT. The events associated with establishing the national baseline values reflect events from 2009, 2010, and 201l (date of tags applied/distributed, date of interstate shipment). For the first year comparison, event records from 2012, 2013, and 2014 were primarily selected. Therefore, the year one comparison is based on records that are much more current, which alone would likely make those records more readily available. As States and APHIS-VS continue to improve record keeping processes, both internally and with accredited veterinarians, tagging sites, tag manufactures, etc., the traceability performance measures are anticipated to be maintained or improved. Additionally, increased use of electronic record keeping systems is expected to decrease the time required for searching records to trace livestock. The ongoing administration of the traceability performance measures through the current cooperative agreement period will help document continued progress as well as identify possible limitations to the current ADT infrastructure.

UHF Tag State Projects

Tahnee Szymanski**,** Montana Department of Livestock

A summary of the progress to date of Montana's participation in the USDA ultra-high frequency (UHF) project. Montana's objectives in the project were:

- To evaluate the potential for reading UHF tags at the speed of commerce
- To evaluate the use of UHF tags for animals sold at a Montana livestock market

- To increase the efficiency and accuracy of collecting animal identification and subsequent generation of vaccination, laboratory submission, and interstate movement documents.

Montana Department of Livestock (MDOL) is evaluating the tags at two Montana livestock markets and a heifer development feedlot. To date, Montana has been able to document the practical use of both electronic systems in general as well as the UHF radio frequency identification (RFID) tags. The benefits demonstrated include:

- Decreased processing time
- Decreased personnel requirements
- Improved accuracy
- Generation of electronic health documents and electronic transmittal to state animal health officials

UHF Tag State Projects

Alex Turner, Colorado Department of Agriculture

An update on five of the locations where ultra-high frequency (UHF) tags are being used for the project in Colorado. Blue Valley Ranch, Brush Livestock Market, herds with Dr. Chard in Nebraska and Northeast Colorado, The Robertson Family Ranch in Northwest Colorado and the Western Slope Livestock Market in western Colorado. Producers seem to prefer the smaller UHF ear tags, and they seem to have a slightly higher retention rate. The read rates and retention rates overall have been 100% and about 96%, respectively. Interestingly, almost all of the users in the project have gone on to buy their own tags and equipment to continue to use the UHF tags in their own herd management and market situations.

Swine Traceability from a Production Company Perspective

Maryn Ptaschinski, Cargill Pork

In modern pork production business decisions that affect health, movements, and marketing are based on the analysis of large amounts of production data that are gathered through normal business practices. The data that is captured by production systems contains more information than is needed by State and Federal Animal Health Officials in disease investigations and while many State and Federal officials have utilized this data, it is beneficial to highlight how data is captured and managed for day to day health management.

The volume of swine movements in production systems has evolved as a result of a transition from single to multiple site production and moving growing pigs to areas where there are significantly lower costs for feeding market swine. The identification of swine moving between States complies with 9 CRF 71.19 (identification of swine in interstate commerce), and health papers and commuter agreements serve to document health status and report movements to regulatory officials. It is important to understand that the type of identification that a production system chooses to use also integrates into production records for business and health purposes.

Swine production systems contain the most complete source of pre-harvest traceability data that accounts for the introduction of new breeding stock into the herd, movement of weaned pigs and marketing of market hogs and breeding stock. In some cases, where sow farms reside in the same State as the wean-to-finish sites, the production system records may be the only source that can be used by animal health officials to trace out and trace forward animals involved in disease investigations.

Once captured, the traceability data does not stay idle and is used to by the herd veterinarian to carry out activities that are related to health and production. This information is valuable when managing breeding herds or investigating outbreaks of endemic diseases like Mycoplasma and Circovirus in wean to finish herds. The key is that swine production systems capture and utilize pre-harvest traceability as a course of normal business and can be a valuable partner in aiding animal health officials in official investigations when disease investigations are warranted.

Application of the Swine ID Plan Program Standards to Business Continuity

Patrick Webb, National Pork Board

The identification of swine in interstate commerce has been codified since the late 1980s, which has driven the use of official identification tags, devices or methods in the pork industry. The official premises identification number (PIN) is the cornerstone of the swine ID program standards. This officially recognized site identifier provides benefits as a common denominator used for group/lot identification, official identification of animals in harvest channels, disease surveillance, emergency preparedness and response, business continuity and product attribution.

Production data is important throughout the pork chain. There are prodigious amounts of data captured by producers, veterinarians, and packers that support day to day operations and decision making that help bring safe, wholesome and affordable pork to consumers in the US and around the world. Data is also important for state and federal animal health authorities, veterinary diagnostic laboratories, and private companies who generate and capture data that supports animal health and commerce of live pigs, pork and pork products.

Much of the data being used for business and regulatory purposes sits in disparate databases and is usable to the audience(s) that have access. This is an approach that works fine for carrying out normal operations but is not ideal when data needs to be shared to respond to an incident like Foot and Mouth Disease. The challenge is not where data is located. The chances of one database containing everything needed to make decisions in an outbreak is low. The challenge is how data is captured, linked and shared when it is needed to help support decision making.

The nationally standardized PIN provides an opportunity for the pork industry to integrate PIN’s into business practices that will support the ability to share data for analysis and decision making during FAD incidents. The challenge is influencing adoption of practices that facilitate integration.

Integration works most efficiently when the use of PIN's are part of a program or needed for doing business. For example, the outbreak of porcine epidemic diarrhea virus (PEDv) in the pork industry underscored the importance of site identifiers on veterinary diagnostic laboratory submission forms. Educational efforts helped drive adoption during the outbreak however USDA's policy on paying for PEDv diagnostics only for samples that have PIN's facilitated compliance.

The Secure Pork Supply (SPS) Plan is another example where the integration of PIN's into movement records, diagnostic data, and active observational surveillance and site biosecurity verification provides a mechanism to link data in multiple data sources so it can be shared though technologies like Ag Connect to develop a common operating picture to support business continuity in a foreign animal disease (FAD) incident.

Recently the Center for Food Security and Public Health (CFSPH) piloted the producer components of the SPS plan with an Iowa based production system and packer processor, State and Federal animal health officials, Food Safety and Inspection Service (FSIS) and the Institute for Infectious Animal Diseases (IIAD) and the National Pork Board (NPB). The pilot was successful and demonstrated how PIN's can be used to link data in different databases so it could be visualized by animal health officials for decision making purposes. The pilot is being expanded to assess the plan when multiple States are included and movements would occur across State lines for business purposes and expected to be complete by the end of FY2015.

A Time Specific Presentation entitled, "National Survey Results - CVI and ADT Compliance– Via State ADT Coordinators and State Veterinarians," was presented by Kendra Frasier, Kansas State University. The paper is included at the end of this report.

Agricultural Animal Population Database and Case Study for the DTRA BSVE

Meg Rush, Gryphon Scientific

One of the missions of the Defense Threat Reduction Agency's (DTRA) Chemical and Biological (CB) Technologies Directorate is to safeguard the United States from chemical and biological threats. In support of this mission, DTRA, CB initiated the Biosurveillance Ecosystem (BSVE) project to develop a system that accelerates 'detect – identify – respond' capabilities for disease outbreaks and other biological threats. The development model for the BSVE allows for many different contractors to create applications that will bring new data feeds or analytical tools into the BSVE. Recognizing the importance of animal species in the transmission of many important human diseases, Gryphon Scientific and SES, Inc. have initiated a project to bring agricultural animal population and production practice data into the BSVE and to then perform a case study to explore the utility of these data to inform BSVE surveillance. In addition to informing zoonotic disease prediction, the collected animal population data have the potential to be a useful decision support tool

for State Animal Health Officials (SAHOs) in planning for and responding to animal disease outbreaks.

We propose to focus the presentation to the USAHA Committee on Livestock Identification on the work performed in the first year of the project. We have developed a methodology to estimate seasonal, county-level commercial animal populations using data from the United States Department of Agriculture (USDA) Census of Agriculture (CoA) and USDA surveys. Additionally, we have re-classified data from the Census to estimate the frequency of specific production types (such as feedlots, or cow-calf operations). Our estimated population data set could be significantly improved with the addition of data held by the States, such as Concentrated Animal Feed Operation (CAFO) Permits. During initial State data collection efforts, we received feedback from multiple States expressing concerns over producer privacy. In response we developed a proposal to help alleviate privacy concerns. To ensure producer privacy, we will summarize data contributed by the States to the BSVE at the Agricultural District level (which incorporates multiple counties into a single region). Additionally, we plan to develop a system that allows States that have contributed Agricultural District data for use in the BSVE to store more detailed data in a restricted area that is only accessible to the States and trusted partners they designate, to improve their ability to plan and respond to agricultural disease outbreaks.

The next steps in the first year of this project will be to develop metadata describing production practices for BSVE users with little background in agricultural production. For example, we will provide estimates for the relative frequency of human-animal contact. Additionally, we are working to collect auxiliary datasets that may serve as risk factors for zoonotic disease transmission, including state and local fair dates and state-level regulations. Together with the animal population data, these data will inform a case study in Year 2 to explore the utility of animal population data for predicting or characterizing zoonotic disease outbreaks in human populations.

Update of Resolution #26 - Development of a Web-Based Solution for Interstate Movement Requirements of Livestock

Kathy Finnerty**,** Trace First

In 2013 the USAHA Committee on Livestock Identification put forth Resolution 26 to support the creation of and maintenance of a publically accessible resource that compiles identification, documentation, disease-specific, and other requirements for moving livestock interstate. USAHA partnered with the National Institute of Animal Agriculture (NIAA) and garnered funds from USDA Veterinary Services (VS) - Animal Disease Traceability (ADT) program. A competitive bid process was initiated in January 2015 and the contract was awarded to Trace First in March 2015.

There are two main tasks to the project, development of the web site and associated tables to house the data; and communication with states to gather and prepare the information that feeds the web site. Information on entry regulations was requested from the states in a question and answer format.

The information was parsed out by type of facility, type of cattle, sex, age, etc. to the point of a specific regulation for the particular set of cattle. Some states have multiple sets of regulations to meet entry of animals from tuberculosis, brucellosis and/or vesicular stomatitis affected states or areas. As the web site starts with choosing an origin state and a destination state it can accommodate specific regulations for states that have further testing regulations. As well, a set of emergency regulations for an outbreak, such as vesicular stomatitis, can be entered and set as inactive, ready to be activated in the case that there are additional entry regulations for states with the disease.

To date entry has been completed for 40 states. The total data includes 108 sets of regulations, 1,147 questions, 2,571 questions and 640 entry regulations.

Committee Business:

Called to order by Committee Chair Bill Brown. There was no old business. New business resulted in a motion and unanimous approval of the resolution from the Committee on Infectious Diseases of Horses entitled “Record and Electronically Capture Name and Description of Mexican Imported Equine”.

No further action occurred during the business meeting. The meeting adjourned at 11:35 a.m.

NATIONAL SURVEY RESULTS - CVI AND ADT COMPLIANCE– VIA STATE ADT COORDINATORS AND STATE VETERINARIANS

Kendra Frasier
Kansas State University

After conversations at the 2015 Western States Livestock Health Association (WSLHA) meeting, a survey was created to determine where states stand on several traceability-related issues, including the use of premises identification numbers (PINs) vs location identification number (LIDs), National Uniform Eartagging System (NUES) tags vs 840 tags, movement documents and electronic capabilities. The survey was emailed to the National Assembly of State Animal Health Officials (NASAHO) in August 2015, and requested the State Veterinarian, an assistant state veterinarian or an Animal Disease Traceability coordinator fill out the online questionnaire. Forty-eight states responded (46 responses were complete), and responses were captured identifiable at the state level. Generalized responses for some questions are below.

- Does your state use primarily PINs or LIDs? – 46 states responded
    - 31/46 states primarily use PINs, 11/46 states primarily use LIDs, and the rest did not indicate a clear preference
    - Average national usage rate : 70% PINs and 30% LIDs
- Do you have intrastate traceability regulations in place? – 46 states responded
    - 19 states do have intrastate regulations (41%), and 27 states do NOT have intrastate traceability regulations (59%)
    - When asked “when do the regulations apply” returned a large range of answers
- Of 46 respondents, 40 primarily use NUES tags, while 6 primarily use 840-RFID tags
    - Secondary tags are predominantly 840-RFID, with NUES and 840-visual or other tags
    - Only 14/47 respondents (34%) have used state postal abbreviations on NUES tags
- How are tag distribution records maintained when provided to veterinarians, tagging sites or tag distributors? – 47 respondents
    - Responses varied from maintaining NUES tag records paper/electronically at their office, paper/electronically in the state office, and data searchability varied across the country
    - 840 tag maintenance is split between the Animal Identification Management System (AIMS) (USDA) or state-level electronic databases
- Most states primarily use interstate certificates of veterinary inspection (ICVIs) as movement documents, while a few (3%) use brand inspections or other forms
- GlobalVetLINK (GVL) is the most popular electronic CVI system (47%), followed by Veterinary Services Process Streamlining (VSPS) (22%)

and the fillable portable document format (PDF) electronic certificates of veterinary inspection (eCVI) (12%)

- How can we increase the use of electronic CVI systems? Answers ranged from requirements, to incentives (both financial and hardware), to targeted outreach with veterinarians.
- A variety of electronic data systems are used across the country, and the amount of captured searchable CVI data ranged from 0% (11 respondents) to 100% (16 respondents), with a relatively even distribution between.
- Is animal disease traceability (ADT) enforced beyond collection points (i.e. livestock markets)? – 45 respondents
    - 35 states (78%) do enforce ADT at a variety of points; 10 states (22%) only practice enforcement at collection points

The drive toward electronic information, including official tags, ICVIs and database systems will continue, and this survey was helpful in identifying states that have been successful in implementing systems or practices.

REPORT OF THE USAHA/AAVLD COMMITTEE ON NATIONAL ANIMAL HEALTH LABORATORY NETWORK

Chair: Barbara Powers, CO
Vice Chair: Harry Snelson, NC

Helen Acland, PA; John Adaska, CA; Bruce Akey, TX; Gary Anderson, KS; A. Catherine Barr, TX; Bill Barton, ID; Tim Baszler, WA; Tammy Beckham, KS; Steven Bolin, MI; Richard Breitmeyer, CA; James Britt, AR; Sandra Bushmich, CT; Beverly Byrum, OH; Craig Carter, KY; Estela Cornaglia, QC; Marie Culhane, MN; Barbara Determan, IA; Edward Dubovi, NY; François Elvinger, VA; Mallory Gaines, DC; Joseph Garvin, VA; Patrick Halbur, IA; Steven Halstead, MI; Timothy Hanosh, NM; Bob Hillman, ID; Stephen Hooser, IN; Pamela Hullinger, CA; Marv Jahde, KS; Bill Johnson, OK; Jim Kistler, FL; Elizabeth Lautner, IA; Randall Levings, IA; Christina Loiacono, IA; Rodger Main, IA; David Marshall, NC; Barbara Martin, IA; Terry McElwain, WA; Michael McIntosh, NY; Thomas McKenna, MA; Rey Molina, TX; Igor Morozov, KS; Thomas Mullaney, MI; Dustin Oedekoven, SD; Claudia Osorio, MD; Kristy Pabilonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; Roger Parker, TX; Amar Patil, NJ; Jewell Plumley, WV; Robert Poppenga, CA; M. Gatz Riddell, Jr., AL; Keith Roehr, CO; Jeremiah Saliki, GA; Kathryn Simmons, DC; Marilyn Simunich, ID; Wendy Stensland, IA; Deepanker Tewari, PA; Sarah Tomlinson, CO; David Zeman, SD.

The Committee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 12:05 until 3:00 p.m. There were 31 members and 36 guests present.

National List of Reportable Animal Diseases (NLRAD) Update

Stan Bruntz, USDA-APHIS, Veterinary Services (VS)

Dr. Bruntz reviewed a concept paper put up on APHIS web site for review last year. Thirty to forty individual comments received concerning:

- Adding/removing diseases to the list
- Notification of emerging diseases
- Reporting structure
- Use of official premises ID

How does NLRAD affect National Animal Health Laboratory Network (NAHLN) laboratories?

- Formed a working group of NAHLN coordinating council and NLRAD steering committee to discuss – charged with developing a draft implementation plan
  - Intellectual property questions
  - When/how to report emerging diseases
  - Developing a case definition
  - confidentiality concerns
- Developing SOPs
- Goal to start regulatory implementation process by the end of the year

- To improve and standardize reporting, meet international reporting requirements, ensure US animal health reporting
- Will help improve emerging and endemic disease reporting
- Disease classifications
  - Notifiable – FAD, emerging, high impact diseases
  - Monitored diseases
- Discussion:
  - It was suggested the need for programming dollars to support further Laboratory Messaging Service (LMS) Information Technology (IT) to allow data sharing back to the states.
  - A need to ensure the state animal health official makes the final call on reportability.

NAHLN Restructuring Project

Christina Loiacono, USDA-APHIS, Veterinary Services (VS)

- Coordinating council report – Outlined three levels of laboratory participation plus affiliate recognized laboratories (approved by the NAHLN). Specialty laboratories – private laboratories brought on to fill a niche that the NAHLN laboratories cannot meet.
  - Interested laboratories were asked to self-assess in 2014.
  - External review and updating self-assessments completed.
  - Conducted national needs assessment – geographic locations, species in the state, numbers of animals by species, etc.
  - Coordinating council provided a recommendation for moving forward based on a scoring system ranking each laboratory.
- Determined that all three levels will receive some funding based on percent capacity provided to the network. Example: Level 1 laboratories = 46% of the capacity and will receive 46% of the funding.
- Re-evaluated on an annual basis/full network reassessment every 3 years.
- Implementation: Funding will be implemented in the next funding cycle depending on whether or not funding comes through NIFA or APHIS.
- Discussion: The committee expressed gratitude for the efforts of the coordinating council.

AAVLD Lobbying Efforts

Brad Mollet, Capitol Partners

- NAHLN received an authorization in the Farm Bill but has not received an appropriation.
- Has conducted ~ 80 meetings in Washington, DC in the last year.

- Received additional $5 million in House budget this year, not included in the Senate. So, need to push to maintain the House funding.
- Continue to push for a separate line item and eventual $30 M total funding.
- Goal: mandatory funding in the next Farm Bill.
- Discussion:
  - produce one pager by state of the value of the laboratory in the individual state that shows the value of the industry protected by the lab and the programs that need additional funding.
  - Friends of the Lab fundraising effort to support continued lobbying.

Avian Influenza (AI) Response and Preparedness

Christina Loiacono, USDA-APHIS-VS

- NAHLN responded well to the outbreak – 16 laboratories responded (12 can electronically message) 80,000 total polymerase chain reaction (PCRs) were conducted. NAHLN laboratories sent technicians to assist states in need. Estimating a new outbreak could result in four times that amount of testing.
- 30,000 PCR tests per day is the total NAHLN laboratory capacity needed for foot-and-mouth disease (FMD) – could we even collect 30,000 samples/day to submit to the laboratory?
- Working with vendors to ensure adequate reagent availability given the projections going forward.
- There has been discussion/resolution from USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species to allow National Poultry Improvement Plan (NPIP) laboratories to be allowed to do AI testing. AAVLD directors expressed concern regarding quality assurance and the ability to message/IT capabilities with utilizing private NPIP laboratories.

IT update

- USDA-APHIS Staff
  - 20 new laboratories can electronic message (bringing the total to approximately 30 labs which can message). 10 others are working to begin messaging.
  - 9 different diseases can be messaged – African swine fever (ASF), foot-and-mouth disease (FMD) and vesicular stomatitis (VS) were added this year.
    - Working to get the message data into Emergency Management Response System (EMRS).
  - Working to continue to expand the number of laboratories and diseases that can message.
- IIAD processing and usage of HL7 messages in enhanced passive surveillance – Austin Riddell.

- Field personnel collect and submit diagnostic data via mobile devices. Can be combined with other data streams via AgConnect. Laboratory results reported back to practitioner and to central repository.
- IIAD is offering incentives for laboratory and practitioner participation and wants to expand program

Antimicrobial Resistance

USDA Staff

- USDA AMR update
  - USDA developed a strategy to collect data on-farm in food producing animals.
  - System to monitor resistance data within NAHLN laboratories. Stood up a joint committee (AAVLD, FDA, Clinical laboratories standards, Center for Epidemiology and Animal Health (CEAH), NAHLN, NVSL)
  - Need to gather info on current practices – developed and conducted a survey submitted to VDLs.
    - Diseases or bacteria (e.g. E coli, Staph spp, etc.)
    - Species tested (companion animals were in the top 5)

NAHLN Portal

Christina Loiacono

- Contact information for the veterinary diagnostic laboratories (VDLs)
- Hoping to streamline proficiency testing – 13 are available through the portal
- 8 APHIS proficiency tests (PTs) are available through the portal
- Will offer training for non-NAHLN APHIS PTs.

Other topics

Beth Harris, USDA-APHIS

- Vesicular Stomatitis –
  - fairly large outbreak
  - de-listed by OIE leads to variety in state response
  - 5 laboratories currently activated and outbreak is on-going
- Quality management training – 2 classes this year
- Influenza A virus of swine (IAV-S), pseudorabies virus/brucellosis (PRV/BR), classical swine fever (CSF) surveillance testing
- Exercises and Drills working group put on educational exercises this year and held its first annual meeting
- Aquaculture – first round of PT completed for 2 diseases
- Priorities for 2016
  - Implement NAHLN structure

- Codification of NAHLN
- Increasing laboratory messaging
- Finalize process for validating test methods
- NLRAD implementing laboratory activities
- antimicrobial resistance (AMR) – finalizing data collection
- Swine surveillance disease funding

Committee Business:

The Committee put forth one resolution, urging USDA to require that all regulatory testing conducted under USDA programs must maintain quality assurance comparable to NAHLN-approval, AAVLD accreditation or ISO 17025 standards. Motion approved by voice vote (with one abstention). There was no further Committee business.

REPORT OF THE COMMITTEE ON NOMINATIONS AND RESOLUTIONS

Chair: Stephen Crawford, NH

J Lee Alley, AL; Philip Bradshaw, IL; Richard Breitmeyer, CA; Jones Bryan, SC; Joe Finley, TX; Robert Gerlach, AK; Thomas Hagerty, MN; Steven Halstead, MI; Bob Hillman, ID; Donald Hoenig, ME; Maxwell Lea, Jr., LA; James Leafstedt, SD; Donald Lein, NY; Bret Marsh, IN; David Marshall, NC Michael Marshall, UT; Richard McCapes, CA; David Meeker, VA Lee Myers, GA; John Ragan, MD; Glenn Rea, OR; Michael Short, FL; Nick Striegel, CO; Scott Stuart, CO; Manoel Tamassia, NJ; H. Wesley Towers, DE; Max Van Buskirk, PA; Richard Willer, HI; Larry Williams, NE; Ernest Zirkle, NJ.

Nominations

OFFICERS

PRESIDENT..... David D. Schmitt, Des Moines, IA
PRESIDENT-ELECT..... Boyd H. Parr, Columbia, SC
FIRST VICE-PRESIDENT..... Barbara C. Determan, Early, IA
SECOND VICE-PRESIDENT..... Kristin M. Haas, Montpelier, VT
THIRD VICE-PRESIDENT..... Martin A. Zaluski, Helena, MT
TREASURER..... Annette M. Jones, Sacramento, CA

DISTRICT DELEGATES

NORTHEAST.....Spangler "Buzz" Klopp, DE; Bruce Akey, NY
NORTH CENTRAL.....Paul. Brennan, IN; Louis Neuder, MI
SOUTH.....L. "Gene" Lollis, FL; A. Gregario Rosales, AL
WEST.....Bill Sauble, NM; H. M. Richards, III, HI

Resolutions

***RESOLUTION NUMBER*: 1 APPROVED**
***SOURCE*: USAHA/AAVLD COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT**
***SUBJECT MATTER*: NATIONAL FOOT-AND-MOUTH DISEASE PREPAREDNESS**

BACKGROUND INFORMATION:

Foot-and-Mouth disease (FMD) is the most contagious and economically destructive disease of livestock. A FMD event in the United States would have severe, profound, and long lasting negative impact on the United States agriculture and general economy. The United States Department of Agriculture (USDA) estimates that economic losses due to an FMD event in

the United States would range from $15 billion to $100 billion per year (Source: USDA FMD Vaccination Policy in the United States, September 2014). Recent experiences in the United States with foreign animal disease outbreaks, such as porcine epidemic diarrhea virus (PEDv) and H5 type highly pathogenic avian influenza (HPAI), underscore the need for preparedness in dealing with high consequence animal diseases impacting agriculture. In collaboration with animal agriculture stakeholders, allied industries, academia, state and other federal agencies, the USDA continues to make progress on FMD preparedness and response planning.

Outdated notions of FMD disease mitigation through culling-to-control methods are not practical for the scale and sophistication of animal agriculture in the United States. Emergency FMD surveillance, vaccination, control, and elimination strategies together provide the most timely and viable option for minimizing the economic impact of the disease. In the event of an FMD outbreak in North America that becomes endemic, control of the disease with vaccination will be essential to assure some level of continuity of business operations to sustain short and long-term viability for United States livestock producers, as well as maintaining sufficient numbers of vaccinated commercial and purebred breeding stock to re-build the national herds.

The September 2014 USDA FMD Vaccination Policy states the following:

The goal (of this Policy) is to advance preparedness by facilitating discussion, if not consensus, among our many partners to identify what level of preparedness is adequate and cost effective when considering:

- *Procuring and maintaining a sufficient amount of vaccine for a large-scale emergency vaccination effort is extremely costly.*
- *Vaccine quantity currently available to USDA is sufficient to respond to a small, focal outbreak in an area that is not livestock-dense.*
- *FMD virus strains are sufficiently different so vaccinating against one strain may not protect against different strains, even if they are related.*
- *FMD vaccine cannot be currently produced in the United States (21 U.S.C. 113A). The current vaccine antigen concentrate (VAC) held by the North American FMD Vaccine Bank must be shipped abroad to be finished into vaccine.*
- *VAC currently held by the North American FMD Vaccine Bank is intended to be shared by the United States, Canada, and Mexico. For VAC currently held by the North American FMD Vaccine Bank, the vaccine manufacturers can produce 2.5 million doses in 21 days upon receiving the VAC. For additional vaccine (created from a master seed and not currently stored as VAC), vaccine production can take as long as 14 weeks.*

In working with our stakeholders, USDA-APHIS believes that an efficient, overall approach to protect the Nation's livestock industry in an FMD outbreak can be developed. Although the vaccination aspect of

preparedness presents unique challenges, these can be overcome with adequate advance planning and consideration of the capabilities and opportunities that public-private partnerships and cost-sharing can afford.

RESOLUTION:

The United States Animal Health Association urges the United States Secretary of Agriculture to include adequate funding for Fiscal Year 2017 for an optimized Foot-and-Mouth Disease (FMD) vaccine bank to support continuity of business operations by the United States livestock industry in the face of a major FMD outbreak. The budget should include:

1. Funds for a managed FMD antigen bank located offshore (in compliance with 21 U.S.C. 113 A), with sufficient antigen diversity to provide timely access to FMD vaccines protecting against all strains currently circulating in the world; and
2. Contracts for surge production capacity to rapidly produce the millions of doses of vaccine that would be required to mitigate an extensive FMD outbreak in the United States.

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***RESOLUTION NUMBER*: 2 APPROVED**
***SOURCE*: USAHA/AAVLD COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT**
***SUBJECT MATTER*: FEDERAL CLASSIFICATION STANDARD FOR THE VETERINARY MEDICAL OFFICER (VMO) -0701 SERIES**

BACKGROUND INFORMATION:

There is a current concern for a lack of science, technology, engineering and mathematics (STEM) professionals to fill science and technology positions within federal service to support the progress and innovation of the United States government. Veterinarians, with their broad-based skills sets, can be utilized to address many of these current and future needs.

Veterinarians possess a wide variety of skills and training beyond strictly clinical veterinary medicine. These include utilizing a One Health approach to addressing animal, public and environment health, and experience and skills in advanced science, research, public health, broad-based agricultural/environmental knowledge, problem solving, business management, and communication. These skills can be utilized to address hiring needs within federal service in a broad array of science-associated fields including both technical and management arenas. However, the diverse skill set, critical thinking ability, and strong scientific background of veterinarians is often over-shadowed by the perception that veterinarians are only trained to treat animals, thus leading hiring authorities to under-value the skills and knowledge that veterinarians have to contribute and succeed in a

variety of employment areas, and in some cases, preventing veterinarians from even being able to apply for relevant positions.

The current federal classification standard for a Veterinary Medical Officer (701 series) limits veterinarians to positions primarily related to animal health and veterinary medical science and does not recognize the additional professional skills that veterinarians obtain during their veterinary training. As a result, professionals with Doctor of Veterinary Medicine or Veterinary Medical Doctor (DVM/VMD) degrees are sometimes not considered to be qualified for other types of positions that require a background in the basic sciences, health, agriculture and/or environmental issues, although required veterinary training encompasses all of these subjects. The breadth of knowledge and insight that veterinarians have can contribute to a wide variety of technical fields and would be very valuable to the federal government.

The recognition of the skills offered by veterinarians has often not been considered when developing federal position descriptions, thus minimizing the likelihood of veterinarians applying for or being considered for a variety of positions for which they would be highly qualified. A veterinary medical officer is considered by some to not have many skills equivalent to those with Medical Doctor (MD) or Doctor of Philosophy (PhD) degrees. In many cases, this is because the narrow scope of the 0701 series leads to the belief that veterinarians are only capable of performing a limited number of professional animal health related activities.

The federal classification standard for the Veterinary Medical Officer 0701 series should be expanded to include the additional skill sets that veterinarians possess as veterinarians are well trained to serve and excel in a variety of federal science, technology, and management positions.

RESOLUTION:

The United States Animal Health Association requests that the United States Office of Personnel Management update the federal classification standard of the Veterinary Medical Officer 0701 series to incorporate the expanded skills and abilities of veterinarians beyond clinical veterinary medicine. For example, those skills and abilities should include problem solving, critical thinking, administrative and management skills. The classification should also reflect a veterinarian's understanding and ability to implement:

1. The One Health concept protecting human, animal, and environmental health;
2. Population medicine; and
3. Expertise in the arenas of zoonotic disease prevention and control, epidemiology, diagnostic medicine, and food safety and security.

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***RESOLUTION NUMBER*: 3 AND 7 COMBINED APPROVED**
***SOURCE*: COMMITTEE ON IMPORT-EXPORT; COMMITTEE ON BLUETONGUE AND RELATED ORBIVIRUSES**
***SUBJECT MATTER*: BLUETONGUE, NATIONAL STRATEGY FOR ANIMAL EXPORTS**

BACKGROUND INFORMATION:

The importance of bluetongue and related orbivirus infections to the United States livestock industry was the focus of a recent United States Department of Agriculture Gap Analysis workshop available at: http://www.ars.usda.gov/SP2UserFiles/Program/103/OrbivirusGapAnalysisWorkshopFinalFeb2014.pdf.\
The global range of bluetongue virus has expanded recently, notably:

- The discovery since 1998 of at least ten new serotypes of bluetongue virus in the Southeast indicates that previously exotic viruses now are entering the United States, likely from the Caribbean Basin. Some of these viruses have now spread beyond the southeastern United States.
- The emergence of numerous serotypes of bluetongue virus into Europe since 1998 has been associated with extensive clinical disease in both sheep and cattle. Climate change is postulated to have played a role in the spread of bluetongue viruses into Europe through its impact on the insect vector, particularly in the Mediterranean Basin.

Endemic bluetongue virus infection has resulted in the imposition of non-tariff trade barriers to the international export of ruminant livestock from the United States. At present, there is no coordinated surveillance for bluetongue virus in the United States to detect potential introductions of new virus serotypes or document their spread. Without comprehensive surveillance it will be difficult or impossible for the United States to develop an internationally accepted regionalization strategy to facilitate livestock exports.

RESOLUTION:

Given the historic and ongoing negative impact of endemic Bluetongue Virus and Epizootic Hemorrhagic Disease Virus infections on the export of ruminant livestock from the United States, the United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services facilitate the development of a national strategy for animal exports with consideration of regionalization supported by a national surveillance program as prescribed by the World Organization for Animal Health's (OIE) Terrestrial Animal Health Code chapter 8.3. The surveillance should include the identification of specific circulating serotypes**.**

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***RESOLUTION NUMBER*: 4 APPROVED**
***SOURCE*: USAHA/AAVLD COMMITTEE ON AQUACULTURE**
***SUBJECT MATTER*: COMMERCIAL AQUACULTURE HEALTH PROGRAM STANDARDS**

BACKGROUND INFORMATION:

The Commercial Aquaculture Health Program Standards (CAHPS) were initiated by the National Aquaculture Association and developed with the United States Department of Agriculture. The standards set forth a model framework for the health of commercially farmed aquatic animals. CAHPS recognizes and builds on current activities and existing guidelines for health of aquatic animals and aims to establish uniform standards for United States (US) farmed aquatic animal health and movement. The goal of CAHPS is to provide uniform standards for US commercially farmed aquatic animal health and movement and a template for known national aquatic animal health status. Implementation of CAHPS will provide leverage for the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) in trade negotiations.

The United States Animal Health Association (USAHA) applauds the efforts of USDA-APHIS for working with the National Aquaculture Association to develop the CAHPS. We believe that the program will be a tremendous benefit to commercial aquaculture especially with regards to trade both nationally and internationally. The effectiveness and success of the program requires the cooperation of not only industry but also state and federal entities. USAHA encourages these entities including the US Fish and Wildlife Service and the National Oceanic Atmospheric Administration to adopt and participate in these efforts.

RESOLUTION:

The United States Animal Health Association encourages the United States Department of Agriculture, Animal and Plant Health Inspection Service to ensure sufficient funds are available in the Fiscal Year 2018 Aquaculture Health Line to implement the Commercial Aquaculture Health Program Standards program.

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***RESOLUTION NUMBER*: 5 TABLED**
***SOURCE*: USAHA/AAVLD COMMITTEE ON THE NATIONAL ANIMAL HEALTH LABORATORY NETWORK**
***SUBJECT MATTER*: QUALITY ASSURANCE SYSTEMS REQUIRED FOR PROGRAM TESTING**

BACKGROUND INFORMATION:

Quality assurance for animal disease laboratory testing in the United States (US) is of critical importance to minimize false positive results that could cause adverse regulatory or economic impacts (quarantine, depopulation, market loss, etc.) or false negative results that may allow spread of disease, also resulting in adverse economic impacts. Currently there are three quality assurance systems in the US that are nationally or internationally recognized for providing third party accreditation of veterinary diagnostic laboratory testing: American Association of Veterinary Laboratory Diagnosticians (AAVLD) accreditation, the United States Department of Agriculture's National Animal Health Laboratory Network Quality Management System (NAHLN), and ISO 17025 accreditation.

RESOLUTION:

The American Association of Veterinary Laboratory Diagnosticians and the United States Animal Health Association (USAHA) strongly recommend that the United States Department of Agriculture (USDA) require that all testing for the determination of animal disease status, regulatory or otherwise, under all USDA programs, must be conducted in laboratories that maintain a quality assurance program that meets the standards of one of the three recognized national or international laboratory accreditation programs (American Association of Veterinary Laboratory Diagnosticians (AAVLD) accreditation, the United States Department of Agriculture's National Animal Health Laboratory Network Quality Management System (NAHLN), and ISO 17025 accreditation).

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***RESOLUTION NUMBER*: 6 AND 14 COMBINED APPROVED**
***SOURCE*: COMMITTEE ON INFECTIOUS DISEASE OF HORSES; COMMITTEE ON LIVESTOCK ID**
***SUBJECT MATTER*: RECORD AND ELECTRONICALLY CAPTURE NAME AND DESCRIPTION OF MEXICAN IMPORTED EQUINE**

BACKGROUND INFORMATION:

With increased equine movement from Mexico, the disease risk is increased to the United States (US) equine population. Diseases of concern include, but are not limited to, equine piroplasmosis, contagious equine metritis, equine infectious anemia (EIA), and Venezuelan equine encephalomyelitis. Recent equine disease events involving horses imported

to the US demonstrate the risk of importation. Traceability of equine imported from Mexico is a critical element in the protection of the US equine population.

In September 2015, a three-year-old racing Mexican-born Quarter Horse filly, imported from Mexico in June of 2015, was confirmed positive for EIA in California. At the owner's request, the California Department of Food and Agriculture (CDFA) conducted an investigation to determine potential time of exposure. As part of the investigation, a request for the EIA laboratory test result and Mexican border crossing documentation for the import of the horse was sent to the United States Department of Agriculture (USDA). USDA was unable to verify or provide the laboratory test report for this imported horse due to the failure to record the horse's name and physical description at the border crossing. The investigation revealed that at the Mexican border crossing, the current USDA practice is to record only a temporary neck tag number, age, color and, sometimes, markings of the horse being tested for importation. No record is made of the horse's name, any permanent identification present, radio frequency identification (RFID) microchip number, breed or complete physical description of the animal. The lack of adequate data capture of equine identification on import test documents at Mexican border crossings has proven to be an impediment for disease investigation traceback. There is an immediate need for enhancement of equine identification import test documents for traceability of all equids imported from Mexico into the US

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Veterinary Services to require USDA border personnel to electronically capture and record adequate official animal identification on all equids imported into, or returning to, the United States from Mexico. Adequate official animal identification, at a minimum, is the equid's name and any permanent identification present, to include radio frequency identification microchip number, and breed, sex, age, color, and all markings. Record of this information should be on all border crossing laboratory testing paperwork and be captured electronically in a searchable database accessible to state and federal animal health officials for use during a disease investigation.

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***RESOLUTION NUMBER*: 7 COMBINED WITH 3**
***SOURCE*: COMMITTEE ON IMPORT-EXPORT; COMMITTEE ON BLUETONGUE AND RELATED ORBIVIRUSES**
***SUBJECT MATTER*: BLUETONGUE, NATIONAL STRATEGY FOR ANIMAL EXPORTS**

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***RESOLUTION NUMBER*: 8 AND 27 COMBINED APPROVED**
***SOURCE*: COMMITTEE ON PHARMACEUTICALS; COMMITTEE ON ANIMAL WELFARE**
***SUBJECT MATTER*: PROTECTING VETERINARIANS' ACCESS TO KETAMINE**

BACKGROUND INFORMATION:

Ketamine is widely used for animal immobilization, sedation and pain management in veterinary medicine around the world. Access to ketamine is essential, because it is the only injectable anesthetic agent that is safe and well-tested in the full range of species that veterinarians must treat, including both large and small domestic animals and wildlife.

Concerns have been expressed about the diversion and illicit use of ketamine; however, in the United States, ketamine is currently a Schedule III drug under the Controlled Substances Act, and strict regulations are in place to help prevent its illegal use. Ketamine is not currently controlled internationally under either the Psychotropic Convention or the Single Convention on Narcotic Drugs.

The World Health Organization (WHO) Expert Committee on Drug Dependence reviewed ketamine at its 34th, 35th, and 36th meetings, and plans to review ketamine again, along with a number of other drugs, during its upcoming 37th meeting in Geneva on November 16-20, 2015. The November review relates to a revised proposal pending before the United Nations (UN) Commission on Narcotic Drugs to control ketamine under Schedule IV of the 1971 Psychotropic Convention. On March 13, 2015, the UN Commission on Narcotic Drugs decided by consensus to postpone consideration of this proposal and to request additional information from the WHO. The original proposal bought to the March meeting by China was to place ketamine in Schedule I. On October 5, 2015, via the *Federal Register*, the Food and Drug Administration (FDA) issued a request for comments regarding the abuse potential, actual abuse, medical usefulness, trafficking and impact of schedule changes on the availability of 10 drug substances—including ketamine. Due on October 15, those comments will be considered as FDA prepares a response to the WHO's Expert Committee on Drug Dependence regarding the abuse liability and diversion of these drugs.

The international scheduling of ketamine has the potential to adversely affect its availability to veterinarians. Accordingly, veterinarians from across the United States have responded to the FDA's call for comments with examples of ketamine's use in clinical settings, emergency response, and research. In addition, and in response to the discussions being conducted by the WHO's Expert Committee on Drug Dependence, the World Veterinary Association and World Small Animal Veterinary Association have issued policy expressing veterinarians' needs for continued access to ketamine and opposition to increased international control.

The United States Animal Health Association recognizes that veterinarians' access to anesthetics and analgesics that are pure, safe,

potent and efficacious for animals is imperative for quality patient care. This includes ketamine, which is used for animal immobilization, sedation and pain management. In some areas, ketamine is the only analgesic/anesthetic agent available to the veterinary profession and additional restrictions on its use would have a significant negative impact on animal health and welfare on a global scale.

RESOLUTION:

The United States Animal Health Association (USAHA) opposes international and domestic regulatory action, specifically changes in scheduling, that would result in ketamine becoming more difficult, if not impossible, to obtain within the United States by licensed veterinarians for the authorized treatment of animals. The USAHA also requests that the Food and Drug Administration consider this resolution as they develop their comments to the World Health Organization Expert Committee.

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***RESOLUTION NUMBER*: 9 APPROVED**
***SOURCE*: COMMITTEE ON CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK**
***SUBJECT MATTER*: CHRONIC WASTING DISEASE PROGRAM STANDARDS - GUIDANCE ON RESPONDING TO CHRONIC WASTING DISEASE POSITIVE HERDS**

BACKGROUND INFORMATION:

There is a need to review, revise and update the protocols for how the cervidae industry and state and federal agencies respond to chronic wasting disease (CWD) positive herds, trace back herds and trace forward herds. There is also a need to update and revise the protocols for how to release movement restrictions and reinstate herds to the appropriate herd certification program status. In order to (1) complete CWD investigations more quickly, (2) avoid unnecessary depopulation of farmed cervidae herds, and (3) avoid unnecessarily long quarantine periods, these protocols must include the use of live animal tests for CWD such as the rectal biopsy (rectoanal mucosa-associated lymphoid tissue (RAMALT)).

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to amend the Chronic Wasting Disease (CWD) Program Standards by deleting all language in Part B, “Guidance on Responding to CWD Affected Herds” and rewrite Part B under the guidance of a working group of state and federal regulatory officials and representatives from the farmed cervidae industry.

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***RESOLUTION NUMBER*: 10 APPROVED**
***SOURCE*: COMMITTEE ON CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK**
***SUBJECT MATTER*: CHRONIC WASTING DISEASE TESTING PROTOCOL FOR WILD CERVIDAE**

BACKGROUND INFORMATION:

Over the last 15 years the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) and state regulatory officials have worked to prevent and control the spread of Chronic Wasting Disease (CWD).

Producers farming CWD susceptible species can only move their animals interstate if they are in compliance with the CWD program set forth in 9 Code of Federal Regulations (CFR) Parts 55 and 81 that states animals must originate from herds with five years of CWD monitored status.

State Wildlife agencies that plan and execute elk restoration projects from one state to another are moving CWD susceptible species interstate without following minimum interstate movement requirements set for farmed cervidae. Instead, CFR 81.3 states the source population be considered “low risk” by the receiving state and USDA-APHIS.

To date, over two dozen herds of wild elk have been captured and transported to other states across the nation without following the Chronic Wasting Disease protocol set forth in the CWD program for farmed cervidae.

The movement of CWD susceptible cervid species with unknown CWD status by state wildlife agencies can undermine the success of CWD control programs that have been in place in many states for more than a decade. CWD has been found in 23 states. Eight of the 23 states have detected CWD in the free-ranging deer populations but not in the farmed cervid herds.

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to work with stakeholders to develop a guidance document on determining chronic wasting disease risk levels of source herds for interstate cervid restoration projects.

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***RESOLUTION NUMBER*: 11 APPROVED**
***SOURCE*: COMMITTEE ON CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK**
SUBJECT MATTER: Live Animal Testing For Chronic Wasting Disease

BACKGROUND INFORMATION:

Detection of Chronic Wasting Disease (CWD) in live animals remains an important component of CWD Prevention and Control Programs. The United

States Animal Health Association (USAHA) and the United States Department of Agriculture (USDA) recognize this and have stated such for several years (see USAHA resolutions 14 (2011), 16 (2011), 20 (2012), 13 and 23 combined (2012), 24 (2012), and 28 (2015), with associated USDA replies).

Notwithstanding the development and evaluation of the rectoanal mucosa-associated lymphoid tissue (RAMALT) test, CWD program regulatory analysis and actions continue to rely on post-mortem tissue collections, with Immunohistochemistry (IHC) testing in the laboratory, in accordance with current USDA CWD Program Standards.

This continues to impose significant adverse impacts on the industry, the economies of local communities, and the regulatory agencies involved. Post-mortem testing also limits the data and information that can be gathered and used to improve management and control of CWD.

The need for a successful live test option, with the accuracy and sensitivity equal to current post-mortem testing, is critical. A rational deployment of such a solution will require regulatory updates and guidelines to account for live testing of white-tailed deer, in both a trace-forward / trace-back scenario, as well as in CWD Herd Certification and/or Management Programs.

A group of veterinarians with specific white-tailed deer experience, led by VERGE PLLC, has successfully developed an ante-mortem procedure to collect the tissues required for IHC testing, as well as enzyme linked immunosorbent assay and other approved test protocols. This solution, the VERGE procedure, provides the same medial retropharyngeal lymph node (MRPLNs) tissues with negligible morbidity or mortality, for the same regulatory lab tests as are currently in use, thus virtually eliminating the concerns for sensitivity and accuracy associated with live tests using other tissues or lab protocols.

Preliminary regulatory reviews indicate that the VERGE procedure may be employed under 9 Code of Federal Regulations 55.8, as implemented by USDA CWD Program Standards (May 2014). The VERGE group has done preliminary work on implementation guidelines for an effective live test to allow integration of the live test option into existing programs and standards for both trace-forward/trace-back and herd certification and management programs, as well as refinement and development work for rapid training and wide-spread deployment to Industry.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) as well as state animal health officials to continue and to expedite discussions and evaluation of ante-mortem collection procedures for medial retropharyngeal lymph node (MRPLN) tissues for the live testing for chronic wasting disease (CWD) in white-tailed deer. USAHA also urges USDA-APHIS-VS to issue a VS

Guidance Document stating that ante-mortem collection procedures for MRPLN tissues are acceptable and authorized in accordance with current federal regulations (9 Code of Federal Regulations (CFR) 55 and 9 CFR 81) and existing federal CWD Program Standards (MAY 2014).

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***RESOLUTION NUMBER*: 12 AND 26 COMBINED NOT APPROVED**
***SOURCE*: COMMITTEE ON CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK; COMMITTEE ON TUBERCULOSIS**
***SUBJECT MATTER*: TUBERCULOSIS TESTING PROTOCOL FOR FARMED CERVIDAE**

BACKGROUND INFORMATION:

The dual pathway platform (DPP®) test has been used for three years to test farmed cervidae in the United States for tuberculosis. Approximately 31,000 animals have been tested. There have been 84 animals that were classified as reactors because they had non-negative test results on two consecutive DPP® tests conducted at 30 day intervals. These animals were euthanized, necropsied and cultured for tuberculosis. None of these animals were determined to be infected with *Mycobacterium bovis*. In many of these cases, the owners of the animals that were classified as reactors and euthanized received indemnity payments from the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services.

There is a need to change the testing and classification protocol used for farmed cervidae following non-negative test results on the DPP® test. This change is needed to avoid the unnecessary euthanasia of animals that are not infected with *Mycobacterium bovis.* The testing and classification protocol for tuberculosis in farmed cervidae needs to be changed to allow for the use of an alternative test prior to final classification following non-negative DPP® test results.

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to amend the testing and classification protocol for tuberculosis in farmed cervidae to allow for the use of an alternative test prior to final classification following non-negative dual pathway platform (DPP®) test results.

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***RESOLUTION NUMBER*: 13 APPROVED**
***SOURCE*: COMMITTEE ON SCRAPIE**
***SUBJECT MATTER*: SCRAPIE RULE**

BACKGROUND INFORMATION:

While the Scrapie Eradication Program has been very successful in decreasing the prevalence of scrapie in the United States, eradication has not yet been achieved in sheep or goats. Improved traceability and surveillance are needed to detect the last remaining cases of scrapie, proving to our trading partners that the United States is scrapie-free thus adding approximately $50 million in export value. Mandatory identification of sheep has allowed slaughter surveillance to be the key in reducing the prevalence of scrapie in sheep by 85%. Slaughter surveillance of goats has been problematic because currently only 50% of mature goats are officially identified at slaughter, making it impossible to conduct effective surveillance.

A proposed rule to amend 9 Code of Federal Regulations Parts 54 and 79 has been published. This proposed rule addresses new standards for official identification and traceability for goats as well as other gaps in the regulation. To succeed in the eradication of scrapie, it is imperative that this rule be promptly finalized after appropriate review and consideration of comments.

RESOLUTION:

The United States Animal Health Association urges the United States Secretary of Agriculture to publish a final scrapie rule in early 2016. The proposed rule, which provides for improved traceability for goats and addresses other gaps in the current regulation, is a critically important element needed to achieve scrapie eradication in the United States.

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***RESOLUTION NUMBER*: 14 COMBINED WITH 6 APPROVED**
***SOURCE*: COMMITTEE ON INFECTIOUS DISEASE OF HORSESCOMMITTEE ON LIVESTOCK ID**
***SUBJECT MATTER*: RECORD AND ELECTRONICALLY CAPTURE NAME AND DESCRIPTION OF MEXICAN IMPORTED EQUINE**

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***RESOLUTION NUMBER*: 15 APPROVED**
***SOURCE*: COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY**
***SUBJECT MATTER*: CATEGORICAL EXCLUSIONS FROM ENVIRONMENTAL ASSESSMENTS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT**

BACKGROUND INFORMATION:

Some of the veterinary biological products regulated by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) are required to undergo an environmental assessment under the USDA-APHIS National Environmental Policy Act implementing regulations. Such assessments typically take up to 18 months to complete. To date, all of the environmental assessments conducted on veterinary biologics have resulted in a Finding of No Significant Impact (FONSI). Because of the substantial experience with veterinary biologics, USDA-APHIS has been working since 2005 to amend their regulations to allow categorical exclusions, when appropriate, for veterinary biologic products. Such categorical exclusions are currently available for animal drugs regulated by the Food and Drug Administration. USDA-APHIS has created a draft proposed rule that was reviewed by the President's Council on Environmental Quality (CEQ). The CEQ responded to USDA-APHIS with process questions that were not specific to veterinary biologics. USDA-APHIS has currently been working on a response to CEQ for approximately three years.

Having the ability to grant categorical exclusions, where appropriate, would also allow USDA-APHIS to move more quickly to respond to outbreaks or emerging disease. For example, when the managers of the National Veterinary Stockpile desired to obtain vaccines for potential use to combat the recent outbreak of H5 avian influenza, rather than granting a categorical exclusion, USDA-APHIS had to conduct an environmental assessment that published in the Federal Register on October 7, 2015, despite USDA-APHIS having extensive experience with the technology. If such a rule were in place USDA-APHIS could have granted a categorical exclusion and moved more quickly.

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS) to expeditiously respond to the Council on Environmental Quality request for information regarding USDA-APHIS' implementation of the National Environmental Policy Act, and to propose and finalize a rule to amend 7 Code of Federal Regulations 21 § 372.5(c) to allow USDA-APHIS the ability to grant categorical exclusions for veterinary biologic products in appropriate cases.

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***RESOLUTION NUMBER*: 16 APPROVED AS AMENDED**
***SOURCE*: COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY**
***SUBJECT MATTER*: SELECT AGENT INSPECTIONS**

BACKGROUND INFORMATION:

The Federal Select Agent Program is overseen by both the Centers for Disease Control and Prevention (CDC) and the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS). This overlapping jurisdiction has led to duplicative inspections and sometimes conflicting findings. The Government Accountability Office (GAO) issued a report in 2013 that found, "There is no apparent value added when specific inspection activities are duplicative and occur, in some cases, before entities have had time to respond to findings from a previous inspection." Among its recommendations for Executive action, the GAO recommended that where possible CDC and USDA-APHIS accept each other's inspection results rather than conducting independent inspections.

For the veterinary biologics industry and others currently regulated and inspected by USDA-APHIS, the lead agency for these inspections should be USDA-APHIS.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS) and the Centers for Disease Control and Prevention (CDC) to implement the findings of the Government Accountability Office report of 2013 titled, "Overlap and Duplication: Federal Inspections of Entities Registered with the Select Agent Program" with specific focus on the recommendation that USDA-APHIS and CDC accept each other's inspection results rather than conducting independent inspections. Further, USAHA urges that where Select Agent Registrants are already regulated and inspected by USDA-APHIS that the lead agency be USDA-APHIS.

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***RESOLUTION NUMBER*: 17 APPROVED**
***SOURCE*: COMMITTEE ON PUBLIC HEALTH AND RABIES**
***SUBJECT MATTER*: ELIMINATION OF RACCOON RABIES IN THE NORTHEAST REGION OF NORTH AMERICA (UNITED STATES AND CANADA)**

BACKGROUND INFORMATION:

The Canadian Provinces of Ontario, Quebec, and New Brunswick have effectively eliminated raccoon and fox variants of rabies virus with the implementation of effective rabies control strategies, including oral rabies vaccination. Success has also been realized in New York State with the

extirpation of terrestrial rabies in New York City Parks and two heavily-populated Long Island counties. The Northeastern United States (US) including New England, New York, Pennsylvania, and portions of New Jersey, provides the best opportunity to expand the geographic area leading to terrestrial rabies elimination.

State, provincial, federal (Canadian) and local county funding has leveraged US federal funding to support rabies control efforts in the northeastern states since the mid-1990's. Natural geographical barriers (i.e., Great Lakes, Adirondack, Green and White Mountain ranges, spruce-fir eco-zone, and Atlantic Ocean) will contribute to a rapid and economical rabies elimination program. Additional factors expected to facilitate successful pathogen elimination are close proximity to the coast and viral infection pressure only from the south.

Phase 1, viral containment, of the North American Rabies Management Plan has been achieved. Phase 2, terrestrial rabies elimination, is the next logical step.

RESOLUTION:

The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services initiate Phase 2, terrestrial rabies elimination, with a raccoon rabies elimination program in the Northeastern United States.

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***RESOLUTION NUMBER*: 18 APPROVED**
***SOURCE*: COMMITTEE ON PUBLIC HEALTH AND RABIES**
***SUBJECT MATTER*: INCREASED FISCAL YEAR 2017 FUNDING FOR THE UNITED STATES DEPARTMENT OF AGRICULTURE, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, WILDLIFE SERVICES ORAL RABIES VACCINATION PROGRAM**

BACKGROUND INFORMATION:

Rabies control programs in the United States that have integrated oral rabies vaccination (ORV) with traditional public and animal health measures have successfully eliminated the canine variant of rabies in the south Texas coyote population, halted the westward expansion of raccoon rabies at the Appalachian Mountains, and eliminated raccoon rabies on Long Island, New York. ORV resources have also been shifted to adjacent, infected areas as portions of vaccination zones in affected states have been discontinued following the inability to detect terrestrial rabid animals. The elimination of raccoon rabies in Canada (i.e., Ontario and Quebec) resulted in enhanced, binational control measures along the international border under the auspices of the North American Rabies Management Plan (2008). Successful programs in Texas strive towards rabies elimination in gray foxes, as well as increasing knowledge relative to rabies control methodology in

skunks. The requested funding will allow the United States Department of Agriculture (USDA) to:

- Continue logistical program support and critical wildlife rabies surveillance;
- Execute contingency actions in response to rabid animals in sensitive areas;
- Maintain existing operational programs to control rabies in target wildlife populations;
- Continue the investigation of novel and US-licensed vaccines;
- Continue studies relating to rabies control in skunks; and
- Initiate the Phase 2 elimination of raccoon strain terrestrial rabies in the Northeastern United States.

The USDA, Animal and Plant Health Inspection Service, Wildlife Services, ORV program has been demonstrated to be cost-effective, while continuing to reduce rabies exposure and transmission among wildlife, livestock, pets and people. The United States Animal Health Association agrees with the World Organization for Animal Health (OIE) - the best strategy to implement rabies control is at the animal (i.e., vector) source. ORV programs are designed to immunize target wildlife species by increasing the percentage of rabies-immune animals within vaccination zones. Creating a population of immune animals results in the reduction of rabies cases, prevention of viral spread, and eventual rabies elimination. The United Nations Food and Agriculture Organization declared that terrestrial rabies and foot and mouth disease should be the next targets for global disease eradication.

RESOLUTION:

The United States Animal Health Association requests the 115th Congress appropriate a minimum of $30 million for the Oral Rabies Vaccination Program management and contingency actions at the state level in the Fiscal Year 2017 budget line item for the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services.

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***RESOLUTION NUMBER*: 19 AND 25 COMBINED APPROVED**
***SOURCE*: COMMITTEE ON PUBLIC HEALTH AND RABIES; COMMITTEE ON TUBERCULOSIS**
***SUBJECT MATTER*: GLOBAL HEALTH SECURITY AGENDA – A NEW INITIATIVE TO LIMIT THE SPREAD OF INFECTIOUS DISEASES GLOBALLY**

BACKGROUND INFORMATION:

The Global Health Security Agenda vision is a world safe and secure from global health threats posed by infectious diseases – where they can prevent or mitigate the impact of naturally occurring outbreaks and intentional

or accidental releases of dangerous pathogens, rapidly detect and transparently report outbreaks when they occur, and employ an interconnected global network that can respond effectively to limit the spread of infectious disease outbreaks in humans and animals, mitigate human suffering and the loss of human life, and reduce economic impact. Over the next five years the United States commits to working with at least thirty partner countries. The United States Department of Agriculture, Animal and Plant Health Inspection Service, One Health Group is a member.

RESOLUTION:

The United States Animal Health Association (USAHA) requests the United States Secretary of Agriculture to commit United States Department of Agriculture (USDA) resources to building strong linkages with the Global Health Security Agenda. We encourage USDA, Animal and Plant Health Inspection Service to use the USAHA as a forum to seek broad community input on areas of direct relevance to the prediction, prevention, and response of global health concerns that impact animal agriculture.

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***RESOLUTION NUMBER*: 20 APPROVED**
***SOURCE*: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES**
***SUBJECT MATTER*: USE OF HIGHLY PATHOGENIC AVIAN INFLUENZA (HPAI) SECURE EGG SUPPLY PLANS, SECURE BROILER SUPPLY PLANS AND SECURE TURKEY SUPPLY PLANS DURING AN HPAI EVENT**

BACKGROUND INFORMATION:

In the event of a Highly Pathogenic Avian Influenza (HPAI) outbreak, ensuring market continuity for the poultry industry is a significant challenge. Through continuity of business planning prior to an HPAI outbreak, the standards outlined in the various Secure Poultry Supply Plans promote food security and animal health. Developed collaboratively by multi-disciplinary groups of industry, public and academic partners familiar with HPAI and the different industry segments, the Secure Poultry Supply Plans provide clear recommendations for emergency response leaders to facilitate the movement of poultry products in a safe and timely manner during an HPAI event.

Poultry and poultry products may be live animals or products with limited shelf life. Appropriate timely but safe movement is essential to poultry welfare and product safety as well as business continuity. Brief interruptions in poultry or product movement can have very serious welfare and product quality consequences. The Secure Poultry Supply Plans provide a transparent process for the movement of products during an HPAI outbreak, benefiting consumer, producers, regulators and the animals themselves. The

science-and risk-based recommendations provided in these Plans provide a high degree of confidence that the health of uninfected flocks will not be endangered by the movement of poultry or poultry products and that HPAI virus will not enter commerce in a hazardous manner.

The Secure Poultry Supply Plans provide guidelines that have been developed and agreed upon by poultry producers, processors, poultry disease experts and public health experts as well as federal and state officials. However, a defined mechanism to update and alter the Plans is necessary as additional risk assessments, research and experience become available. The Secure Poultry Supply Plans are available for reference as needed.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that regulatory and industry entities involved in Highly Pathogenic Avian Influenza (HPAI) control strategies, utilize the Secure Poultry Supply Plans in the development of their HPAI response efforts.

USAHA requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service consider including proposed revisions of the Secure Poultry Supply Plans as a responsibility of the National Poultry Improvement Plan to review and update at biennial conference meetings of Plan participants.

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***RESOLUTION NUMBER*: 21 APPROVED**
***SOURCE*: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES**
***SUBJECT MATTER*: USE OF VENTILATION SHUT DOWN FOR MASS DEPOPULATION OF POULTRY TO CONTROL HIGHLY PATHOGENIC AVIAN INFLUENZA**

BACKGROUND INFORMATION:

In the event of a Highly Pathogenic Avian Influenza (HPAI) outbreak, control of further spread to uninfected poultry through rapid depopulation is essential to limit the number of birds that may die as a result of continued spread between poultry facilities. The current United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) goal is to depopulate infected flocks within 24 hours of diagnosis to limit this spread, relieve the suffering of the diseased flock and limit exposure of personnel to the virus.

Depending upon the nature of the poultry facility involved and equipment/supply availability, it may be necessary to employ ventilation shut down (VSD) to achieve depopulation within the time frame desired. Due consideration must be given to the factors described in USDA-APHIS “Ventilation Shutdown Evidence & Policy September 18, 2015” to determine

if VSD will result in timely depopulation. It must be realized that timely depopulation is preferable to a slow death from HPAI and the release of catastrophic amounts of HPAI virus. There are situations where VSD, like other depopulation methods, may be difficult or impossible to employ. Judgement and additional research are needed. USDA-APHIS VSD Reference Link: https://www.aphis.usda.gov/animal_health/emergency_management/downloads/hpai/ventilationshutdownpolicy.pdf

RESOLUTION:

The United States Animal Health Association (USAHA) requests regulatory authorities employ ventilation shut down (VSD) if appropriate and as needed for control of Highly Pathogenic Avian Influenza (HPAI) in order to achieve depopulation within 24 hours of diagnosis if other methods of mass depopulation cannot achieve this goal.

USAHA requests that the Center for Epidemiology and Animal Health (CEAH) conduct a risk assessment to determine the outcome if VSD had been employed where appropriate in the 2015 United States HPAI outbreak.

USAHA requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service develop a Request for Proposal (RFP) and conduct research to determine the conditions under which VSD may be appropriately employed and what additional measures may make the use of VSD more clearly defined.

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***RESOLUTION NUMBER*: 22 APPROVED**
***SOURCE*: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES**
***SUBJECT MATTER*: INCORPORATION OF POULTRY INDUSTRY BIOSECURITY OVERSIGHT INTO THE NATIONAL POULTRY IMPROVEMENT PLAN**

BACKGROUND INFORMATION:

The 2015 Highly Pathogenic Avian Influenza (HPAI) outbreak in the United States (US) was the largest foreign animal disease outbreak in US history, costing producers and governments over $1 billion. To enable producers to better protect themselves, and to offer government entities some insight into producers' self-protection efforts, the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Veterinary Services has created a biosecurity self-assessment tool and national poultry producer organizations are developing guidelines. Producers and agencies are working to standardize and strengthen the impact of biosecurity oversight through regular engagement and consistent auditing.

A number of approaches for overseeing biosecurity have been discussed, but the National Poultry Improvement Plan (NPIP) stands out as the best home for standardizing and administering biosecurity. The NPIP is a longstanding, internationally accepted USDA poultry disease control program driven by industry, academic, state, and federal input, and is formally structured to regularly adapt in response to changing needs.

RESOLUTION:

The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services evaluate the use of the National Poultry Improvement Plan for oversight of poultry industry biosecurity programs.

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***RESOLUTION NUMBER*: 23 NOT APPROVED**
***SOURCE*: COMMITTEE ON SHEEP AND GOATS**
***SUBJECT MATTER*: ENSURING SOUND SCIENCE-BASED ANIMAL HEALTH POLICIES**

BACKGROUND:

As part of its mission, the United States Animal Health Association (USAHA) works to ensure that government policy, rulings, or decisions regarding animal health issues are based on sound, rigorous, and valid scientific evidence. Over the past several years, federal agencies, such as the United States Department of Agriculture, have underscored the importance of their animal disease policies, decisions, approved diagnostic tests, rulings, etc., as being science-based. Some, if not many, policies and decisions emerge from studies that do not undergo a rigorous outside and independent scientific review. Other studies used to provide foundation for policy and published in scientific journals have editorial boards that include individuals from the agency or department to which the policy applies, thus presenting a potential conflict of interest.

RESOLUTION:

The United States Animal Health Association urges the United States Departments of Agriculture (USDA), Homeland Security, and Interior to establish Department-wide criteria for evaluating research that is used to support animal health policy decisions to ensure that the best, state-of-the-art science is used. The USAHA recommends the following steps be taken in order to establish the evaluation criteria:

- initiate an outside, independent, and unbiased review of the science and/or methodologies used to influence policy approval or decision,
- require that Department policy will not be based on published studies in journals for which the agency or department implementing the policy is

or has been represented on the editorial board or based on studies on which department staff was an author or reviewer,

- establish a validation process for prediction models, risk assessments, spread models, or other diagnostic or analytical methods that are to be used in any way to justify policy or support, and
- require any studies proposed to be undertaken by an agency or department, and intended to be used to justify or direct animal health policy or decision making, be subject to an independent scientific review, which would be consistent with already established rigorous outside, independent review process in place for evaluation of competitive grant proposals and intramural research plans at USDA.

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***RESOLUTION NUMBER*: 24 APPROVED**
***SOURCE*: COMMITTEE ON BRUCELLOSIS**
***SUBJECT MATTER*: THE RE-EVALUATION OF THE BRUCELLOSIS RING TEST**

BACKGROUND INFORMATION:

The Brucellosis Ring Test **(**BRT) has been used in the United States Brucellosis Eradication Program for decades. It is also used worldwide to detect brucellosis on both the herd and individual animal basis.

The National Veterinary Services Laboratory recently reported that the current BRT antigen is consistently demonstrating false positives. This BRT performance is not consistent with the past performance in the United States or the world. Therefore, it appears that there may be a problem with the current antigen or testing protocol.

RESOLUTION:

The United States Animal Health Association recommends that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services review the process for, and evaluate the production of Brucellosis Ring Test **(**BRT) antigen. USAHA further recommends that the BRT procedures, interpretation, and program use be re-evaluated immediately to determine where discrepancies may exist and solutions be implemented to correct them.

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***RESOLUTION NUMBER*: 25 COMBINED WITH 19**
***SOURCE*: COMMITTEE ON PUBLIC HEALTH AND RABIES; COMMITTEE ON TUBERCULOSIS**
***SUBJECT MATTER*: GLOBAL HEALTH SECURITY AGENDA – A NEW INITIATIVE TO LIMIT THE SPREAD OF INFECTIOUS DISEASES GLOBALLY**

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***RESOLUTION NUMBER*: 26 COMBINED WITH 12**
***SOURCE*: COMMITTEE ON CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK; COMMITTEE ON TUBERCULOSIS**
***SUBJECT MATTER*: TUBERCULOSIS TESTING PROTOCOL FOR FARMED CERVIDAE**

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***RESOLUTION NUMBER*: 27 COMBINED WITH 8**
***SOURCE*: COMMITTEE ON PHARMACEUTICALS; COMMITTEE ON ANIMAL WELFARE**
***SUBJECT MATTER*: PROTECTING VETERINARIANS' ACCESS TO KETAMINE**

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REPORT OF THE COMMITTEE ON PARASITIC DISEASES

Chair: Dee Ellis, TX
Vice Chair: David Winters, TX

Gary Anderson, KS; Bethany Bradford, VI; Matt Cochran, TX; Karen Conyngham, TX; Joseph Corn, GA; Lynn Creekmore, CO; Susan Culp, TX; Mark Davidson, MD; Barbara Determan, IA; Anita Edmondson, CA; Katherine Flynn, CA; Chester Gipson, MD; Nita Grause, IA; Thomas Hairgrove, TX; Greg Hawkins, TX; Carl Heckendorf, CO; Terry Hensley, TX; Linda Hickam, MO; Bob Hillman, ID; Thomas Holt, FL; Russell Iselt, TX; Charlotte Krugler, SC; T.R. Lansford, TX; Charles Lewis, IA; Linda Logan, TX; Travis Lowe, MN; David Marshall, NC; Chuck Massengill, MO; Terry McElwain, WA; Daniel Mead, GA; Eric Mohlman, NE; Ernie Morales, TX; Elizabeth Parker, TX; Boyd Parr, SC; David Pyburn, IA; Keith Roehr, CO; Shawn Schafer, OH; Jack Schlater, IA; Andy Schwartz, TX; Charly Seale, TX; Michael Short, FL; David Smith, NY; Robert Stout, KY; Manoel Tamassia, NJ; Tracy Tomascik, TX; Paul Ugstad, NC; James Watson, MS.

The Committee met on October 28, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 8:00 a.m. to 12:00 p.m. There were 25 members and 30 guests present. Seventeen guests requested to join the committee.

Presentations

SCWDS Arthropod Surveillance

Joseph Corn and Stacey Vigil, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia

James Mertins, USDA-APHIS-National Veterinary Services Laboratories (NVSL)SCWDS, in collaboration with the USDA-APHIS, Veterinary Services (VS), conducts surveys for exotic arthropods in the Southeastern United States and Caribbean region. Current programs include surveys for the tropical bont tick on wildlife in Vieques, Puerto Rico; surveys for cattle fever ticks on wildlife in the Cattle Fever Tick Quarantine Area in Texas; surveys for vesicular stomatitis virus in overwintering insects in Colorado; and surveys for *Culicoides* vectors of bluetongue virus and epizootic hemorrhagic disease virus in the Southeast United States. Surveys for the tropical bont tick on mongooses, cattle egrets and feral horses in Vieques began in late 2014 and are ongoing. SCWDS is collaborating with Vieques NWR on surveys in previously restricted areas in Vieques. A survey for cattle fever ticks on feral swine was conducted in August in collaboration with USDA-APHIS-Wildlife Services (WS), USDA-APHIS-VS, Laguna Atascosa National Wildlife Refuge (NWR), and the Texas Animal Health Commission (TAHC). Ticks were collected from 81 feral hogs and results are pending at USDA-APHIS-VS-NVSL. Surveys for *Culicoides* have detected new state records for 11 *Culicoides* species in 15 states as some *Culicoides* species appear to

be expending their range northwards. Surveys this year were conducted in Alabama, Georgia, Mississippi, North Carolina, South Carolina and Tennessee.

Trichinella - International Trade Overview
Dave Pyburn, National Pork Board

Trichinella spiralis is a parasitic roundworm found in many animals including pigs. Transmission between animals can only occur by ingestion of muscle tissue. *Trichinella* is found in feral hogs and in domesticated herds where uncooked meat waste is fed to animals, or where the animals have the opportunity to eat rodents and other infected wildlife. Pork remains a frequent source of *Trichinella* in countries where these practices are permitted.

To help control any spread of *Trichinella*, the US government bans the feeding of uncooked meat waste to livestock. Also, US pork producers have adopted biosecurity measures to control rodents and any domestic pig contact with feral swine. As a result, *Trichinella* has been virtually eliminated from the US commercial swine herd. This should make the verification of a "negligible risk" status for the domestic pork industry easily achievable, which would help facilitate trade.

The demand and value for US fresh pork continues to grow worldwide, but many countries today still require *Trichinella* testing or freezing of meat as a precondition to the trade of fresh chilled pork. In a recent study by Dermot Hayes, an Iowa State University economist, it's conservatively estimated that if the US pork industry could remove trade restrictions and requirements due to *Trichinella,* the benefit to the industry would be hundreds of millions of dollars.

Recently, both the World Organization for Animal Health (OIE) and Codex have developed global guidelines to assure the safety of pork with respect to *Trichinella*. Through work of these international organizations, the process to achieve and maintain a negligible risk status for *Trichinella* in pork has been established (see: OIE Terrestrial Animal Health Code Chapter 8.15 and Codex Guidelines for Control of Specific Zoonotic parasites in Meat: *Trichinella* spp. in Meat of Suidae). The negligible risk guidelines use a combination of auditing to demonstrate the use of on-farm good management practices to preclude swine infection with the parasite and then either continued auditing or on-going surveillance to show that this compartment of negligible risk is maintained.

2015 Vesicular Stomatitis Outbreak: A Modified Approach to Response
Angela Pelzel-McCluskey, USDA-APHIS-VS

A summary of the ongoing 2015 vesicular stomatitis (VS) outbreak was presented with emphasis on the new national approach to control VS in light of OIE de-listing of the disease, which took effect January 1, 2015. The 2015 VS outbreak in the United States began April 29, 2015 and surpassed the 2014 VS outbreak in both number of affected premises and geographic scope. As of September 30, 2015, a total of five hundred twenty-seven (527)

VSV-affected premises (New Jersey serotype) have been confirmed or suspected in eight (8) US states; Arizona (36 premises in 3 counties), Colorado (270 premises in 27 counties), Nebraska (21 premises in 3 counties), New Mexico (48 premises in 12 counties), South Dakota (44 premises in 5 counties), Texas (3 premises in 3 counties), Utah (24 premises in 5 counties), and Wyoming (81 premises in 9 counties). At the time of this writing, there were 104 premises remaining under quarantine in 6 states (Colorado, Nebraska, New Mexico, South Dakota, Utah, and Wyoming). Weekly situation reports and maps from the incident are publically available on the USDA-APHIS website.

The World Organization for Animal Health (OIE) removed vesicular stomatitis from the international list of reportable diseases as of January 1, 2015. VS held a national-level VSV after-action review in January 2015 to review the response to the 2014 outbreak and to examine future VSV response actions in light of OIE's delisting of the disease. Overall conclusions from the meeting included: 1) a VSV control strategy is still needed to prevent movement of infectious animals and to secure both interstate and international trade during an outbreak; 2) VSV must remain reportable to State and Federal officials to implement this control strategy; and 3) while existing regulatory response protocols in cloven-hooved species must be maintained to rule out other diseases such as foot-and-mouth disease, response to equine cases can be appropriately modified to reduce the impact on State and Federal resources.

Based on these conclusions and other recommendations, USDA-APHIS-Veterinary Services (VS) and State Animal Health Officials (SAHO) employed a modified response in the 2015 outbreak. New measures included a reduction in the quarantine period based on viral shed from affected animals, activation of VSV-approved *National Animal Health Laboratory Network (*NAHLN) laboratories to assist in testing of affected equine species, and flexibility to use accredited veterinarians for sample collection in equine species and management of affected premises. Feedback from affected States on the modified approach was positive, especially with regard to the reduced quarantine period and the use of accredited veterinarians, both of which significantly reduced the impact on State and Federal resources while maintaining the necessary infection control strategy.

2015 Vesicular Stomatitis State Updates
Wyoming Vesicular Stomatitis Report Summary

Jim Logan, Wyoming State Veterinarian

During the 2015 season, Vesicular Stomatitis Virus (VSV) has been found in ten Wyoming counties. The first case of VSV found in Wyoming was in Laramie County. Subsequent cases were then found in Goshen, Platte, Sublette, Albany, Fremont, Converse, Weston, Natrona and Crook counties. As of October 22, we have had 154 investigations that resulted in 133 quarantines. The outbreak has affected equine primarily; however, seven of

these cases did involve cattle. The first case in any new county has been handled as a foreign animal disease (FAD) and all cases involving cattle were handled as FADs. Of the 133 quarantines issued, 90 cases have been closed and quarantines released. The rest currently remain under quarantine, the majority of which are located in Fremont County. New cases continue to be reported daily.

As a result of VSV also being found in other states, Wyoming has imposed stricter import requirements on affected counties within these states (while active infection and quarantines are in place) for all livestock entering Wyoming. A health certificate is required within 14 days of entry instead of the usual 30-day requirement.

Update on Equine Piroplasmosis

Angela M. Pelzel-McCluskey, USDA-APHIS-Veterinary Services (VS)

Since November 2009, more than 292,000 domestic US horses have been tested for equine piroplasmosis (EP) through active surveillance and movement testing. To date, 262 EP-positive horses (252 *Theileria equi*-positive, 10 *Babesia caballi*-positive) have been identified through this surveillance. These positive horses are unrelated to the 2009-2010 *T.equi* outbreak on a Texas ranch where 413 positive horses were identified in connection with the outbreak and natural tick-borne transmission on the ranch was documented to have occurred over at least 20 years. Of the 262 positive horses identified through active surveillance, 213 were Quarter Horse racehorses, 13 were Thoroughbred racehorses, one was a Quarter Horse roping horse, three were identified during an illegal importation investigation, and 32 were horses previously imported to the United States before August 2005 under the complement fixation test. The epidemiology investigations conducted in all of these cases have indicated no evidence of tick-borne transmission and the cases in racehorses specifically have involved iatrogenic transmission as the method of spread.

So far in 2015, 18,235 domestic US horses were tested for EP with the identification of 15 horses positive for *T. equi*. All 15 horses were Quarter Horse racehorses participating in both sanctioned and unsanctioned racing and one of these horses was found to be dually infected with both *T. equi* and equine infectious anemia. Fourteen (14) of the horses were epidemiologically linked into two distinct clusters, one cluster of three horses and the other a cluster of 11 horses, related to a common owner/trainer combination. Epidemiology investigations conducted have implicated iatrogenic transmission (needle/syringe/IV equipment reuse, blood transfusions, contamination of multi-use drug vials, etc.) as the primary method of transmission in all 15 cases identified in 2015.

All EP-positive horses are placed under State quarantine and the horse owners are offered four options for long-term management under state/federal regulatory oversight: 1) life-time quarantine, 2) euthanasia, 3) export from the country, or 4) long-term quarantine with enrollment in the

APHIS-VS and ARS treatment research program. In February 2013, APHIS-VS established a policy to release horses previously infected with *T. equi* which had completed the official treatment program, been proven cleared of the organism by a series of methods over time, and were test negative on all available diagnostics. Of the 262 positive horses identified, 162 have either died or been euthanized, 18 have been exported, and 55 have been enrolled in the treatment research program. Twenty-six (26) of the horses enrolled in the treatment program have met all of the test-negative requirements and have been released from quarantine. From the Texas ranch outbreak, 163 horses were enrolled in the treatment research program and have completed treatment with more than 140 horses having met all test-negative requirements and are eligible for release. Successful results from the treatment research program were previously reported by Ueti et al. in "Re-emergence of the Apicomplexan *Theileria equi* in the US: Elimination of Persistent Infection and Transmission Risk" published in *PLoS One*, September 2012.

Texas Equine Piroplasmosis Report

TR Lansford, Texas Animal Health Commission

Equine piroplasmosis (EP) was first diagnosed in Kleberg County, Texas in October 2009, as part of the diagnostic work-up on a clinically ill horse. Since that time, based on the high level presence of competent tick vectors and common equine movement practices of equine in counties around Kleberg County, the Texas Animal Health Commission has been conducting county-wide testing of equine in an effort to disclose positive equine. Most recently, Brooks County was designated as a high risk county for equine piroplasmosis in October 2014 and a county-wide test of all equine was conducted in late 2014/early 2015. A total of 689 equine on 218 premises were tested for both *Theileria equi* and *Babesia caballi*. The county-wide testing disclosed no positive equine.

The Texas Animal Health Commission (TAHC), through collaboration with the Texas Racing Commission, implemented required piroplasmosis testing of all equine entering sanctioned racing facilities in 2010. Testing between 2010 and 2014 disclosed 118 positive horses. To date in 2015, testing requirements have disclosed eight (8) positive racing Quarter Horses, many with links to racing in other States. Epidemiological investigations of positive horses showed infected horses are almost exclusively racing Quarter Horses. In January 2015, the TAHC amended the rule requiring EP testing to include all racing facilities, regardless of status with the Texas Racing Commission. Concurrently, the TAHC held the requirement for testing Thoroughbred horses in abeyance. Since enforcement of the rule began, TAHC has cited owners of 86 horses that did not meet testing requirements.

Research on Screwworms: Male-only Strains, Cryo-preservation and Reducing Ammonia in Mass Rearing

Steven R. Skoda, Muhammad Chaudhury, Pamela Phillips and Agustin Sagel, USDA-ARS

Screwworm myiasis is devastating to warm blooded animals. The eradication of screwworms from mainland North America using the sterile insect technique (SIT) is an unprecedented achievement; re-invasion is prevented by maintenance of a barrier at the Panama – Colombia border. Several potential advantages of male only strains of the screwworm for the eradication and prevention programs have been identified. These include: 1) more efficient population suppression, 2) increased potential plant capacity, 3) reduced diet costs and 4) improved bio-security of the Program. Transgenic lines have been obtained carrying a single-component tetracycline-repressible female-lethal system. In single-component strains female mortality is late in larval development. Therefore, two component systems have been developed and are being tested for female mortality that is early in development.

Cryopreservation of screwworm embryos has been implemented at the screwworm mass rearing facility in Panama. Cryopreservation allows agencies involved in eradication efforts against screwworms to eliminate the practice of rearing a backup strain and will allow for the storage of screwworms embryos from different genetic backgrounds for use in future eradication efforts as well as research projects. Embryos from the current mass rearing strain and the backup strain have been cryopreserved; research strains, including the male only lines, are currently being cryopreserved. Potassium permanganate in the screwworm larval diet reduces ammonia production and is a viable replacement for formaldehyde as an antimicrobial. Soy powder, used as a substitute for milk replacer in the larval diet, reduces the chance of calcium binding with tetracycline used with male only strains.

These research accomplishments are being transferred to, or will be implemented by, the Panama – US Commission for Eradication of Screwworms.

USDA-ARS Knipling-Bushland US Livestock Insects Research Laboratory (KBUSLIRL) Tick/Biting Fly Research

Beto Perez de Leon, Agriculture Research Service (ARS), USDA

Dr. Perez De Leon provided an overview of all research activities at the USDA-ARS, KBSUSLIRL Research Center headquartered in Kerrville, Texas.

Virgin Islands Tick Issues

Bethany Bradford, Virgin Islands State Veterinarian

Ticks are the main ectoparasite of concern for cattle and horses. Farmers face a constant challenge of heavy tick burdens dependent on weather, are of island tick control efforts. The most common ticks present are

Rhipicephalus and *Ixodes* spp. Babesiosis is endemic for horses and cattle although clinical disease is not often reported.

A Tropical bont tick was collected on one farm and that farm is currently under quarantine. Perimeter surveillance of nine farms continues monthly. Mongoose surveys in 2014 did not collect any bont ticks. Tick surveillance by the Virgin Island Department of Agriculture includes island wide daily farm visits, abattoir, and impounded animal inspections. No bont tick has been found since October of 2014.

Texas Cattle Fever Tick Update USDA Perspective

Hallie Hasel, USDA-APHIS-VS

The Cattle Fever Tick Eradication Program encompasses an area of land along the Texas/Mexico border from Del Rio to Brownsville, approximately 500 miles. This strip of land was established in 1938 as the Permanent Quarantine Zone (PQZ), a border to keep the cattle fever tick from moving north following its eradication from most of the southeast US.

In FY15, we have experienced a 211% increase in infested premises over FY14. Approximately 30% of the new infestations are due to infested Nilgai or WTD. The highest concentration of premises found infested due to wildlife has been outside of the PQZ in Cameron and Willacy Counties. We have 57 new infestations in FY15, with 37% in Zapata County and 28% in Cameron and Willacy Counties.

We are exploring treatment options other than Co-Ral and Dectomax at this time. Further options for treatment including utilizing an injectable tick vaccine in cattle, a vaccine bait for wildlife, and biological and habitat control of the cattle fever tick.

Texas Cattle Fever Tick update Texas Perspective

Brodie Miller, Texas A&M University

Dr. Miller gave an update on the Control Purpose Tick Quarantine zones that are located approximately 100 miles away from the permanent quarantine zone which are being managed by Texas Animal Health Commission (TAHC) personnel primarily.

Kleberg County Control Purpose Quarantine Area (CPQA)

- Began December 2014
- Trace from Cameron County
- 166 premises with livestock quarantined
- 2180 head of cattle
- 135 head of horses
- 2 infestations
- Small population of nilgai present but no whitetail deer
- Building a vat
- Could be released in August 2016

Jim Wells County CPQA

- Began July 2015
- Detected through inspection at a vat
- Epi linked to Cameron County
- 61 premises quarantined
- Mostly hunting camps
- 461 head of cattle
- 43 head of horses
- No nilgai but significant population of whitetail deer
- Will likely be in place for at least 12-15 months

Committee Business:

Solicitation for a new chair and vice-chair was held. No candidates were identified at this time. There was no further business.

REPORT OF THE COMMITTEE ON PHARMACEUTICALS

Chair: Liz Wagstrom, DC
Vice Chair: Timothy Goldsmith, MN

James Averill, MI; Tom Burkgren, IA; Stephen Crawford, NH; Barbara Determan, IA; William Fales, MO; Kristi Henderson, IL; Rick Hill, IA; Christine Hoang, IL; Donald Hoenig, ME; Jennifer Koeman, IA; David Marshall, NC; Shelley Mehlenbacher, VT; M. Gatz Riddell, Jr., AL; Craig Shultz, PA; Brad Williams, TX; Ellen Mary Wilson, NM.

The Committee met on October 27, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 8:00 a.m. to 12:00 p.m. There were nine members and 16 guests present. The Committee charge was read to start the meeting.

Presentations and Reports

European Antimicrobial Data Collection Schemes

Peter Davies, University of Minnesota

Dr. Davies discussed antimicrobial use collection systems and the metrics by which they report use in the European Union. He discussed the variation in both numerators and denominators utilized to report antimicrobial use. He contrasted data sources in Europe from that available in the United States. His presentation is available on the USAHA website under Committees.

USDA Antimicrobial Use Data Collection Activities

Dave Dargatz, USDA-NAHMS

Dr. Dargatz provided an update on the surveillance activities around the collection of antimicrobial use. This is a portfolio approach including annual surveys, longitudinal surveys and more extensive multiyear surveys. Engagement with stakeholders to determine feasibility of the approaches. Budgetary constraints are preventing implementation of these activities. However, work is being done to position the Agency to collect data including: retrospective studies of existing data from previous National Animal Health Monitoring System (NAHMS) studies, further characterizing isolates from the previous studies, releasing new information from recent NAHMS studies and will add further antibiotic questions to future surveys, study of animal health information related to use and resistance via aggregation of date from veterinary diagnostic laboratories, and engaging with industry groups on data that they may be collecting. A working group to examine the variation and capacity of the laboratories to determine the feasibility of analyzing VDL data has been developed.

USDA is engaging on a global basis through World Organization for Animal Health (WHO) global initiative, the OIE, and the Global Health Security Agenda.

USDA engaging in outreach and education through the release of new information, development of veterinary accreditation modules, help with industry stewardship programs, and interaction with the Farm Foundation outreach meetings.

National Residue Program Update
Charles Pixley, USDA-FSIS

Dr. Pixley gave an overview of the National Residue Program and provided preliminary data on residue violations. He outlined the increasing number of compounds analyzed for each sample collected, and the increased number of commodities sampled as part of the National Residue Program. The total violative residue prevalence was below 1%. The presentation, in its entirety, is available on the USAHA website under Committees.

Update on Livestock Associated MRSA
Peter Davies, University of Minnesota

Dr. Davies presented results of global surveillance on research on strains of methicillin resistant Staph aureus (MRSA). He made the point that referring to livestock associated and cc398 as equivalent disregards the evidence that some MRSA strains other than cc398 are found in livestock, and that there are human adapted cc398 spa types that are not livestock associated. Globally the clinical impacts of livestock associated MRSA is extremely low, and there is no evidence of occupational illness associated with animal production or veterinary practice. The US appears to have a lower prevalence of MRSA in swine herds and veterinarians. The presentation, in its entirety, is included on the USAHA website under Committees.

Update on Changes to the VFD Rule, the Practitioner's Perspective
Harry Snelson, American Association of Swine Practitioners

Dr. Snelson gave an overview of practitioner responsibilities following implementation of Food and Drug Administration (FDA) Guidance #213 and the revisions to the Veterinary Feed Directive (VFD) Rule. He outlined the responsibilities of the practitioner under the revised VFD rule, including record retention, veterinarian-client-patient relationship (VCPR) and other pertinent topics. The presentation, in its entirety, is included on the USAHA website under Committees.

Food and Drug Administration – FDA Update
Michael Murphy, Center for Veterinary Medicine

Dr. Murphy gave an overview of the FDA's actions to address animal feed safety as part of the Food Safety Modernization Act (FSMA). He also gave further updates on the progress of implementing Guidance 213 and the VFD rule revisions. He discussed the public meeting held on antibiotic use data collection. His presentation, in its entirety, is included on the USAHA website under Committees.

Committee Business:

The Committee discussed ways to build awareness of the committee's mission area. It was suggested that the mission be included on the agenda. A motion was made and seconded asking the Executive Committee to change the name of the committee from the Committee on Pharmaceuticals to the Committee on Pharmaceutical Issues. Motion passed.

The Committee also passed a resolution on veterinary availability of ketamine.

REPORT OF THE COMMITTEE ON PROGRAM

Chair: David Schmitt, IA

Gary Anderson, KS; Tammy Beckham, KS; William Brown, KS; Stephen Crawford, NH; Tarrie Crnic, KS; Marie Culhane, MN; Barbara Determan, IA; Dee Ellis, TX; Mark Engle, MO; Donna Gatewood, IA; Paul Gibbs, FL; Colin Gillin, OR; William Hartmann, MN; Kristin Haas, VT; Amy Hendrickson, WY; Annette Jones, CA; Lester Khoo, MS; Bruce King, UT; Dale Lauer, MN; Chuck Massengill, MO; Patrick McDonough, NY; Dustin Oedekoven, SD; Boyd Parr, SC; Kris Petrini, MN; Barbara Powers, CO; David Schmitt, IA; Andy Schwartz, TX; Heather Simmons, TX; David Smith, NY; Harry Snelson, NC; Belinda Thompson, NY; Larry Thompson, MO; Liz Wagstrom, DC; Doug Waltman, GA; Peregrine Wolff, NV; Marty Zaluski, MT.

Dr. Schmitt called the meeting to order at 6:00 p.m. at the Omni Hotel in Providence, Rhode Island. Everyone introduced themselves and dinner was served.

Schmitt reviewed the following procedural items for the committee in preparation for their respective committee meetings:

- Manual of Operating Procedures for Committee Chairs and Committees
- Robert's Rules of Order are the prevailing method for operating.
- Quorum for Committee Meetings
    - 10 members or 30%, whichever is less
- Voting and use of proxies
- Mission Statements – Committee should be reviewing their mission statement, and make any recommendations to the President.

Ben Richey, USAHA Executive Director, was called upon to review the process for submitting committee reports. Templates were provided electronically, and are due within 24 hours of the meeting. Richey also discussed meeting security procedures if any issues were to arise.

Richey noted that OIE Terrestrial Code Chapters would soon be sent out for comment, and USAHA would seek input on any relevant issues from chairs through the Committee on International Standards.

Richey next made comments regarding Committee on Nominations and Resolutions, led discussion about resolutions and recommendations. He reminded chairs that resolutions should be succinct, direct and actionable. He also noted that recommendations could be used for less formal requests, and requests directed internally to the executive committee or committee on government relations.

The 2016 Committee on Government Relations will likely be held in March. Chairs are encouraged to continue thinking of issues during their committee

meetings, and leading up to the spring meeting. While all chairs are invited, there is limited space, so issues will be prioritized for these meetings.

King provided and update on the Strategic Plan, highlighting two key goals, the Committee evaluation process and also Resolution effectiveness.

The following chairs were recognized for their work, completing a 5-year tenure. They were awarded a wooden plaque as a token of appreciation.

- Dee Ellis, Parasitic Diseases
- Harry Snelson, Transmissible Diseases of Swine
- Larry Thompson, Environment and Toxicology
- Doug Waltman, *Salmonella*

The floor was opened for questions from Chairs. With no further business the meeting was adjourned.

REPORT OF THE COMMITTEE ON PUBLIC HEALTH AND RABIES

Chair: Tarrie Crnic, KS
Vice Chair: Ernest Oertli, TX

Helen Acland, PA; Gary Anderson, KS; Karen Becker, DC; Scott Bender, AZ; Joseph Corn, GA; Stephen Crawford, NH; Susan Culp, TX; Donald Davis, TX; Ignacio dela Cruz, MP; Thomas DeLiberto, CO; Brigid Elchos, MS; François Elvinger, VA; Anna Claire Fagre, CO; Katherine Flynn, CA; Nancy Frank, MI; Donna Gatewood, IA; Robert Gerlach, AK; Keith Haffer, SD; Steven Halstead, MI; Bill Hawks, DC; Rick Hill, IA; Christine Hoang, IL; Donald Hoenig, ME; Regina Jensen, DE; Patrice Klein, MD; Jennifer Koeman, IA; Daniel Kovich, DC; Donald Lein, NY; Charles Lewis, IA; Mary Lis, CT; Margie Lyness, GA; Joanne Maki, GA; Rose Massengill, MO; Patrick McDonough, NY; Shirley McKenzie, NC; David Meeker, VA; Lee Myers, GA; Cheryl Nelson, KY; Sandra Norman, IN; Roger Parker, TX; William Parker, GA; Kris Petrini, MN; Jewell Plumley, WV; Susan Rollo, TX; Joni Scheftel, MN; Marc Schwabenlander, MN; Stacey Schwabenlander, MN; Michael Short, FL; Tom Sidwa, TX; Marilyn Simunich, ID; Jonathan Sleeman, WI; Nick Striegel, CO; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Belinda Thompson, NY; Brad Thurston, IN; Jeff Turner, TX; Liz Wagstrom, DC; Michele Walsh, ME; Steve Weber, CO; Margaret Wild, CO; Michelle Willette, MN; Nora Wineland, MO.

The Committee met on October 27, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 1:00 to 5:30 p.m. There were 25 members and 13 guests present. Dr. Crnic welcomed members and guests and provided introductory comments.

Presentations and Reports

Wildlife Services, National Rabies Management Program Update

Kathy Nelson, USDA, Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS), National Rabies Management Program (NRMP)

In FY15, WS distributed >10.1 million oral rabies vaccination (ORV) baits over 192,000 km^2 (an area larger than the State of Washington) in Alabama, Georgia, Maine, Maryland, Massachusetts, New Hampshire, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Vermont, Virginia, and West Virginia. Bait distribution included RABORAL V-RG® and ONRAB® vaccines targeting raccoons, coyotes, gray fox and skunks. More than 7.4 million baits were distributed to prevent raccoon rabies from spreading beyond the eastern US; >1 million to prevent canine (dog-coyote) rabies from reemerging in Texas along the Mexico Border; approximately 235,000 to prevent gray fox rabies from reemerging in central Texas; and >1.4 million baits targeting skunks in the Houston area as part of an effort led by the Texas Department of State Health Services (TDSHS). In cooperation with the Centers for Disease Control and Prevention (CDC), The Wistar Institute and state agriculture, health, and fish and wildlife agencies, the NRMP continued to expand use of the direct rapid immunohistochemical test (dRIT), a rapid diagnostic test that can confirm

rabies in 50 minutes and allows for real-time rabies management decision-making based on the best available surveillance data. To date, WS has sent 73 personnel from 20 states for dRIT training and certification at the CDC and Wistar Institute. From 2005 through August 31, 2015, WS collected 85,443 animals (from 27 states) to enhance rabies surveillance. Of those, WS tested 70,980 (83%) samples (from 23 states) using the dRIT, while the remaining animals were submitted to local public health laboratories or the CDC; 1,324 of the dRIT tested animals were confirmed rabid. Field trials using ONRAB (a recombinant oral rabies vaccine that uses a human adenovirus5 as the virus vector to express the rabies glycoprotein) have been conducted by WS since 2011. A trial in New York, Vermont and New Hampshire conducted from 2012-2014 showed a 3-year average rabies virus neutralizing antibody (rVNA) response in raccoons of 70%. Some of the trapping cells within this field trial were in rural forested areas of eastern Vermont with known low raccoon density (WS has conducted 66 raccoon density studies in Vermont with densities in this area of 2-3 raccoons/km^2). During the 2012-2014 trial, these cells had rVNA levels of 90-100% which prompted WS to look at a field trial in 2015 to test ONRAB at low density (37.5 baits/km^2, half that of the previous trial) and see if high levels of rVNA can still be achieved with fewer baits. A separate field trial in the Burlington, Vermont area was designed in 2015 to look at increased ONRAB density (150 baits/km^2) in an urban area, while also testing our ground ORV distribution methods. Trials targeting raccoons in New Hampshire, New York and Ohio continued in FY15; and the second year of a trial targeting skunks in West Virginia also continued in FY15. During July pre-ONRAB trapping, >1,200 raccoons were captured and sampled for baseline rVNA analysis. In August, nearly 2 million ONRAB baits were distributed in the 5 states. Post-ONRAB trapping will take place in October. All 2015 results are pending from laboratories.

Raccoon Rabies Management in Québec, Canada

Marianne Gagnier, Ministry of Forests, Wildlife and Parks, Canada

In June 2006, the first case of raccoon rabies was detected in the province of Québec, Canada. Between June 2006 and April 2009, 104 cases were confirmed. They were all found in the Montérégie region, which is located south of Montréal and neighboring Vermont and New York states. This raccoon rabies incursion, coming from Vermont state, was immediately considered a serious threat to public health. For this reason, as soon as the first case was found, a rabies control program was implemented to control the outbreak, to avoid its entry in Montréal and highly populated surrounding cities and eventually to eliminate this zoonotic disease of Québec. This control program was developed and improved under the collaborative work of Health, Wildlife, Agriculture and Public safety ministries as well as Canadian Food Inspection Agency (CFIA) and University of Montréal representatives. Many improvements have been made to the plan over 8 years, allowing a significant reduction of direct expenses. The cost of Quebec Rabies Control program went from 2,8 M$/year in 2008 to 1,8 M$/year in 2015. The control and

elimination plan was very successful; from May 2009 to May 2015, no cases were reported. The key of this success is mainly based on the use of ONRAB baits vaccine, on an enhanced surveillance program (about 1,000 samples tested/year) and on targeted apply research. Whereas we were able to avoid a new entry of rabies in Québec, we were also able to reduce the cost of our program by using less baits while being more efficient. Through several field studies and monitoring, the results helped us improving our baits distribution techniques according to habitat quality and raccoon density. In March 2015, a rabid raccoon was found in Franklin county (New York State (NYS), about 5 km from the Quebec border. Unfortunately, the vaccine bait used in this county (V-RG) is not as effective as the one used in Québec and in the neighboring counties of New York state. Thereby, a total of 13 rabid raccoons were confirmed in Franklin county from March to August 2015. This outbreak has spread out towards Quebec and a case was found in Akwesasne reserve on May 29 2015. This section of the province had never been vaccinated with ONRAB baits before. This new threat of raccoon rabies entry in Quebec is taken very seriously and Quebec control plan has been adjusted in June to reinforce the immunity barrier close to Franklin (NY) outbreak. Since reaching the goal of raccoon rabies elimination in North America requires collaboration from all concerned jurisdictions, Quebec is available and open to collaborate such as under the North American Rabies Management Plan.

25 Years of RABORAL V-RG as Part of US Wildlife Rabies Control: A Manufacturer's Perspective

Emily Lankau, and Joanne Maki, Merial

This year (2015) marks the 25th anniversary of the first use of RABORAL V-RG® in the United States. RABORAL V-RG was initially considered for use in the US to vaccinate raccoon populations in response to a multi-state epizootic that brought wildlife rabies to the forefront of veterinary public health initiatives. Early experimental US field trials targeting raccoons during 1990-1991 led to the first US commercial oral rabies vaccination (ORV) program in Cape May, New Jersey during 1992. Soon other wildlife rabies control programs followed at the federal, state, and local levels. Milestones of ORV use in the US include: establishment of the USDA-Wildlife Services (WS) program preventing the western spread of raccoon rabies beyond the Appalachian Mountains; success in controlling or eliminating raccoon rabies virus circulation on the smaller scale by intensive efforts such as the Long Island, New York ORV program; and achievement of regional rabies control in both coyotes and grey foxes in Texas. Acquiring approval for environmental release of this recombinant vaccine was the first of many challenges for applying this product to control rabies in the US Such challenges were met through real-time collaborations and risk analyses. The combined efforts of governmental and commercial entities paved the way for organized regional distribution of this unique vaccine in sufficient volumes to address rabies outbreaks in multiple species. The production process and delivery pipeline for RABORAL V-RG have grown and evolved over time in partnership with US

ORV program demands to ensure efficient cold-chain delivery of vaccine to often remote locations for airplane distribution. Merial remains committed to supporting the evolving US wildlife ORV program as field parameters and product needs shift from creating barriers to elimination of raccoon and skunk rabies variants. Merial's commitment to rabies control extends well beyond simply providing vaccine, technical and logistical support. Sanofi-Pasteur and Merial are global One Health leaders in the fight against rabies.

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Skunk Oral Rabies Vaccine – Proof of Concept Study

Tom Sidwa, Texas Department of State Health Services

Since 1995, The Texas Department of State Health Services (DSHS), in cooperation with USDA-APHIS, Wildlife Services (WS) and other federal, state, and local partners, has implemented an oral rabies vaccination (ORV) program to combat domestic dog/coyote (DDC) and Texas fox (TF) variants of rabies. This program resulted in the elimination of DDC from the United States, with the last reported case occurring in 2004. The last reported case of TF rabies was in 2013. The last remaining terrestrial variant of rabies in Texas is the South Central skunk (SCS) variant.

Since the initiation of the TF ORV program, skunks have been collected from within ORV zones as non-target species. A total of 62 skunks were collected from counties involved in this program during 2002, 2003, 2011, and 2012. Serum samples were evaluated for the presence of rabies antibodies by the diagnostic laboratory at Fort Sam Houston, Texas. In this laboratory, a titer ≥ 0.04 IU/ml indicates immune response to the rabies virus antigen. From this data set, 36 of 62 (58%) of skunks had detectable rabies antibody titers. It is hypothesized that the rabies antibody seropositive skunks collected from within the gray fox ORV zones are most likely vaccinated due to consumption of the RABORAL V-RG baits distributed for gray foxes.

Based upon historical data from Texas, a proof of concept study was developed in 2012 to determine if the same vaccine that had led to success with DDC and TF rabies virus variants would be efficacious in controlling SCS rabies. The study has provided an opportunity to develop equipment and techniques necessary to efficiently apply RABORAL V-RG coated sachets in a suburban environment to hopefully vaccinate a new target species, the striped skunk.

The 2012 application was in Fort Bend County, Texas in September. In the first year of this protocol, coated sachets (n = 37,500) were distributed by helicopter and hand baiting at two different baiting densities: 64 baits/mi^2 (25 baits/km^2) and 150 baits/mi^2 (58 baits/km^2).

In 2013, a study area in a contiguous county (Waller) was added at a baiting density of 300 baits/ mi^2 (116 baits/km^2) using helicopter and hand baiting.

In 2014 and 2015, baiting densities of 150 baits/mi^2 (58 baits/km^2) and 300 baits/ mi^2 (116 baits/km^2) were evaluated. The study was incorporated into the annual project that is carried out in January to maintain control of DDC and TF variants. The study area was significantly expanded (all or part of 17 counties) making the distribution by fixed wing aircraft necessary; supplemented by hand baiting.

Preliminary data thus far suggests successful vaccination of skunks in the study area with RABORAL V-RG. However, the titer levels, percentage of seropositivity in the population sample, and the ongoing reporting of rabid skunks in the study area, support the conclusion that the cycle of transmission is not being interrupted by ORV as currently structured.

DSHS has committed resources to continue the study for an additional year. In January 2016, the flight line separation in an area within the 150 baits/mi^2 (58 baits/km^2) zone will be reduced from 0.5 mile to 0.25 mile in an effort to improve bait presentation to skunks. The 300 baits/ mi^2 (116 baits/km^2) zone will once again be flown using 0.5-mile flight line separation with two passes, with lines perpendicular to each other.

National Association of State Public Health Veterinarians Compendium of Animal Rabies Prevention and Control, 2015

Tom Sidwa, Texas Department of State Health Services

Rabies is a fatal viral zoonosis and a serious public health problem. The disease is an acute, progressive encephalitis caused by viruses in the Genus Lyssavirus. Rabies virus is the most important Lyssavirus globally. In the United States (US), multiple rabies virus variants are maintained in wild mammalian reservoir populations such as raccoons, skunks, foxes, and bats. Although the US has been declared free of transmission of canine rabies virus variants, there is always a risk of reintroduction of these variants.

The virus is usually transmitted from animal to animal through bites. The incubation period is highly variable. In domestic animals it is generally 3-12 weeks, but can range from several days to months, rarely exceeding six months. Rabies is communicable during the period of salivary shedding of rabies virus. Experimental and historic evidence document that dogs, cats, and ferrets shed virus a few days prior to clinical onset and during illness. Clinical signs of rabies are variable and include inappetance, dysphagia, cranial nerve deficits, abnormal behavior, ataxia, paralysis, altered vocalization, and seizures. Progression to death is rapid. There are currently no known effective rabies antiviral drugs.

The recommendations in this compendium serve as a basis for animal rabies prevention and control programs throughout the US and facilitate standardization of procedures among jurisdictions, thereby contributing to an effective national rabies control program. This document is reviewed and revised as necessary. These recommendations do not supersede state and local laws or requirements.

Modifications of note in this updated version of the Compendium are: clarification of the language; explicit encouragement of an interdisciplinary

approach to rabies control; recommendation to collect and report additional data elements on rabid domestic animals to the national level; changes to the recommended management of dogs and cats exposed to rabies that are either unvaccinated or are overdue for booster vaccination; reduction of the six month quarantine period for dogs and cats; and updates to the list of animal rabies vaccines licensed and marketed in the US.

The most recent version of the Compendium of Animal Rabies Prevention and Control is posted at: http://www.nasphv.org/documentsCompendia.html.

Excerpts (not reflective of all changes):

Part I, A (6) Domestic Animal Vaccination

"…An important tool to optimize public and animal health and domestic animal rabies control is routine or emergency implementation of low cost or free rabies vaccination clinics. To facilitate implementation, jurisdictions should work with veterinary medical licensing boards, veterinary associations and the local veterinary community, animal control officials, and animal welfare organizations."

Part I, A (9) Rabies Surveillance

"…A comprehensive surveillance program should not be limited to testing only animals that have potentially exposed people or domestic animals to rabies."

"…To enhance the ability to make evidence-based recommendations using national surveillance data, additional data should be collected and reported on all rabid domestic animals. Essential data elements include age, sex, intact/not intact status, ownership status, quarantine dates (if any), date of onset, and complete vaccination history."

Part I, B (1) Pre-exposure Vaccination and Management

Following initial vaccination and booster vaccination one year later:

a) "Thereafter, booster vaccinations should be given in a manner consistent with the manufacturer's label. If a previously vaccinated animal is overdue for a booster, including the one-year booster, it should be revaccinated. Immediately after revaccination, the animal is considered currently vaccinated and should be placed on a booster schedule consistent with the label of the vaccine used…"

Part I, B (2) Stray Animals

"…mechanisms should be put in place to facilitate voluntary surrender of animals to prevent abandonment."

"…Stray and feral cats serve as a significant source of rabies exposure risk.[46] If communities allow maintenance of feral cat colonies despite this risk, they should safeguard the health of the cats and the communities in which they reside by requiring that cats receive initial and ongoing rabies booster vaccinations."

Part I, B (5) Post-exposure Management

a) "Dogs, Cats, and Ferrets…

(2) Dogs, cats, and ferrets that have never been vaccinated and are exposed to a rabid animal should be euthanized immediately…If the owner is unwilling to euthanize, dogs and cats should be placed in strict quarantine for 4 months and ferrets for 6 months...Rabies

vaccine should be administered upon entry into quarantine to bring the animal up to current rabies vaccination status as defined in Part I.B.1. Administration of vaccine should be done as soon as possible. It is recommended that the period from exposure to vaccination not exceed 96 hours. If vaccination is delayed, public health officials may consider increasing the quarantine period for the animal from 4 to 6 months, taking into consideration factors such as the severity of exposure, the length of delay in vaccination, current health status, and local rabies epidemiology.

(3) Dogs and cats that are overdue for a booster vaccination and with appropriate documentation of receiving at least one previous USDA licensed rabies vaccination, should immediately receive veterinary medical care for assessment, wound cleansing, and a booster vaccination. The animal should be kept under the owner's control, and observed for 45 days. If booster vaccination is delayed, public health officials may consider increasing the observation period for the animal, taking into consideration factors such as the severity of exposure, the length of delay in booster vaccination, current health status, and local rabies epidemiology.

(4) Dogs and cats that are overdue for a booster vaccination and without appropriate documentation of receiving at least one previous USDA licensed rabies vaccination, should immediately receive veterinary medical care for assessment, wound cleansing, and consultation with local public health authorities.

(a) The animal can be revaccinated immediately and placed in strict quarantine as defined above in section I.B.5.a.2, and observed for 4 months.

(b) Alternatively, prior to boostering, the attending veterinarian must contact the local public health authorities for guidance in the possible use of prospective serologic monitoring. Such monitoring would entail drawing paired serum samples to document prior vaccination by providing evidence of an anamnestic response to boostering. If an adequate anamnestic response is documented, the animal can be considered to be overdue as in Part I.B.5.a.3 above and observed for 45 days. If there is inadequate evidence of an anamnestic response, the animal is considered to have never been vaccinated and should be placed in strict quarantine as defined above in section I.B.5.a.2 and observed for 4 months."

Part II, C Adverse Events

"…While an ill animal may not have a full immunologic response to vaccine, there is no evidence to suggest that adverse events are more likely to occur with rabies vaccination than in a healthy animal. A veterinarian choosing to temporarily delay vaccinating an animal with an acute illness or condition should ensure that the animal is vaccinated as soon as possible. Animals with

a previous history of anaphylaxis can be medically managed and observed after vaccination. Severe adverse events related to rabies vaccination are extremely rare in animals. Decisions concerning rabies vaccination in animals with well-documented severe adverse events to rabies vaccine must be made within the context of a valid veterinary-client-patient relationship. Due consideration should be given to the attendant risks and benefits of not vaccinating including regulatory noncompliance. Animals not currently vaccinated that experience a rabies exposure are at greater risk for infection and death, and also put their owners and the community at risk."

Chagas Disease Ecology at the Intersection of Human, Animal, and Vector Populations

Sarah Hamer, Department of Veterinary Integrative Biosciences, Texas A&M University

Chagas disease is a cause of cardiac disease and death in humans and dogs across Latin America that is increasingly recognized in the southern United States. The disease is caused by infection with a protozoan parasite (*Trypanosoma cruzi*) that is spread by blood-feeding triatomine 'kissing' bugs and maintained by diverse wildlife species in nature. Starting in 2013, we implemented a citizen science program in Texas that is empowering the public and medical community with knowledge about the disease and its ecological determinants, and has resulted in the submission of over 2,000 kissing bugs from across the southern states to our laboratory. These bugs are characterized by over 70% infection prevalence with *T. cruzi*. We have found over 10% of dogs at animal shelters across Texas are exposed to the parasite. Our studies of the wildlife community in central Texas have revealed that nearly 50% of hunter-harvested raccoons, but few coyotes, bobcats, fox, bats, and urban rats, have *T. cruzi*-infected cardiac tissue. Additionally, we have initiated a new prevalence study of humans and dogs along the US-Mexico border in impoverished communities that may be at high risk for colonization by kissing bug vectors. We hypothesize that the parasite strains implicated as the cause of disease and death in humans and dogs represent only a subset of the strains that circulate among wildlife reservoirs and vectors in nature. Ecological studies of *T. cruzi* across different vector species, host populations and environments will provide data useful for assessing disease risk and developing disease intervention strategies.

Development of Anti-Rabies MAbs for Post-Exposure Prophylaxis

Eric Tsao, Synermore Biologics Co., Ltd.

SYN023 is a mixture of two anti-rabies humanized monoclonal IgG1κ antibodies which bind to distinct and non-overlapping antigenic sites on the rabies virus glycoprotein. The proposed indication for SYN023 is the post-exposure prophylaxis of rabies virus infection, in conjunction with rabies vaccine. SYN023 has been shown to neutralize more than 15 contemporary clinical isolates of rabies viruses collected in China, and the ten predominant

strains in the US. Protection against virus challenges was demonstrated in various animal models. The development, manufacturing, as well as results from in vitro and in vivo studies will be presented.

Table 1. Broad spectrum neutralization against the North American strains

Rabies Virus Isolate	CTB011	CTB012	Cocktail	HRIG
E Pipistrelle	+	+	++++	++++
Eptesicus Fuscus	+	+++	++++	+
Tadarida	+/-	+	++	++++
Lasiurus Borealis	+	++++	+++	+
Lasiurus Cinerus	+	++++	++	++++
SW Eptesicus Fuscus	+/-	+++	++++	++
NC Skunk	++++	+++	++++	+
SC Skunk	++	+	++++	+
Texas Grey Fox	+	++++	++	+
Florida Raccoon	+/-	++++	+++	+
CVS-11	++++	+	++++	+

Table 2. Broad spectrum neutralization against the Chinese Strains

Rabies Virus Isolate	CTB011	CTB012	Cocktail	HRIG
HN10, Human	+++	++	+++	+++
HuBei, Dog	++	++	+++	+++
ZJ-QZ, Dog	++	++	+++	+++
SX-HZ-6, Dog	+	+	+++	+++
BD06, Dog	+	+	+++	+++
JX13-189, Ferret Badger	+	+	+++	+++
JX08-45, Ferret Badger	+	+	++	+++
JX13-235, Ferret Badger	+++	++	++	+++
JX12-234, Ferret Badger	+++	+++	+++	+++
JX09-17, Ferret Badger	+++	+	+++	+++
JX13-417, Ferret Badger	+	++	+++	+++
JX10-37, Ferret Badger	+++	++	++	++
JX13-228, Ferret Badger	+++	++	+++	+++
ZJ12-03, Ferret Badger	+++	+++	+++	+++
ZJ13-431, Ferret Badger	+++	+++	+++	++

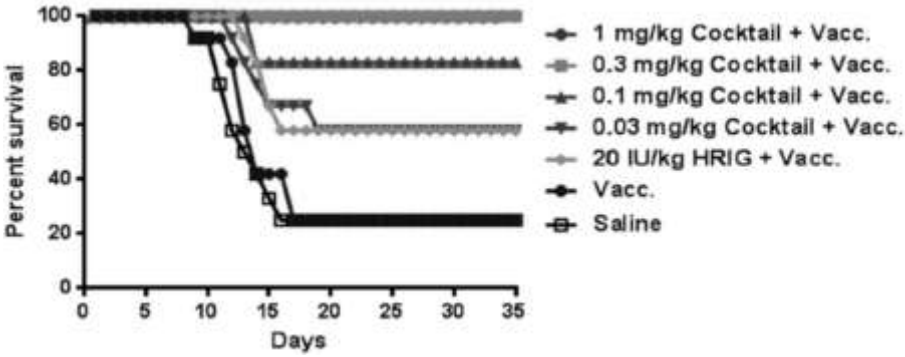

Figure 1. PEP in Syrian Hamsters challenged with US Tadarida bat strain

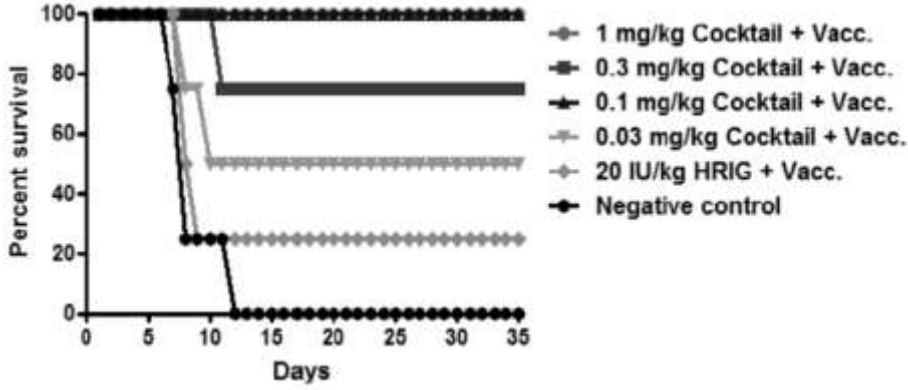

Figure 2. PEP in Beagle dogs challenged with Chinese BD06 dog strain

A One-Health Path to Prevent Zoonotic Disease

Steve Zatechka, US Biologic

According to the Centers for Disease Control and Prevention (CDC), scientists estimate that more than six out of every ten infectious diseases in humans are spread from animals. As such, utilization of safe, effective, and cost-efficient prevention methods becomes a necessary endeavor. Recognizing the complexities of addressing a range of species (human, animal, insect) diseases, and ecologies, a One Health approach is best suited to cause an effective change. This talk will focus on an example of a One Health program, effective oral delivery of vaccines and therapeutics to wildlife and food animals. Data will be presented from successful approaches, including a Lyme-disease reservoir-targeted vaccine, and a novel vaccine/antiparasitic solution to address the growing concern of antimicrobial resistance in vaccine and antiparasitic solutions to coccidiosis.

West Nile Virus - Impact of the 2012 Epidemic in Texas

Tom Sidwa, Texas Department of State Health Services

West Nile virus (WNV) is a flavivirus maintained in a cycle between mosquitoes (primarily *Culex* species) and birds. Mosquitoes with WNV can also bite and infect people, horses and a range of other animals. WNV is found in Africa, India, Australia, the Middle East, Europe, and most recently, North America. Since its arrival in 1999, WNV disease has been reported throughout the continental US causing a spectrum of disease ranging from asymptomatic infection (75%), to West Nile Fever (WNF) (≈20%), to West Nile neuroinvasive disease (WNND) (<1%).

WNV arrived in Texas in 2002. It easily surpassed Saint Louis encephalitis virus as the most common cause of arboviral disease in the state. The nadir of annual case counts in Texas was 2011 with 27 cases reported. There was nothing to suggest the magnitude of WNV's impact the following year.

In 2012, 1,403 WNV-positive mosquito pools, 211 birds, 121 horses and 1,868 human disease cases were reported. A total of 103 presumptive viremic blood donors (PVD) were identified by blood collection agencies. Eighty-nine Texas residents succumbed to the disease.

Of the 1,868 human WNV disease cases, 844 (45%) had WNND and 1,024 (55%) had WNF disease. Of the cases with WNND, 58% presented with encephalitis, including meningoencephalitis, and 42% presented with meningitis only. The median age of onset was 54 years (range: 1-100 years) for all cases. Cases with WNND tended to be older (median=63 years, range: 1-100), while cases with WNF were younger (median= 52 years, range: 3-94). The majority (67%) of all WNV disease cases were non-Hispanic whites, followed by Hispanics (17%). The most common symptoms reported by WNND cases were fever (99%), headache (77%), nausea or vomiting (64%), and stiff neck (59%). The most common symptoms reported by WNF cases were fever (99%), headache (85%), nausea or vomiting (57%) and myalgia (58%). The majority of WNND cases (97%) were hospitalized compared to 23% of WNF cases. Eighty-nine (5%) of all reported human WNV disease cases died, including 83 (10%) WNND cases.

In Texas, outbreak response is a local activity unless or until local resources are exhausted. This threshold was reached early in this epidemic. North Central Texas was heavily impacted and reached out through traditional emergency management channels to access regional, state, and federal assets.

Once it became clear that state involvement would be needed, the Texas Department of State Health Services engaged in a comprehensive approach to provide support.

Successes:

- Public Information and Communication: Multi-faceted communication campaign to reach the public and healthcare providers

- Coordination and Communication Among Response Partners: utilized emergency response structure and incident command system
- "Four Ds" Campaign: Dusk and dawn - stay indoors; Dress – long sleeves, light color; Defend – proper use of repellents; Drain – reduce mosquito habitat
- Laboratory – response to surge demand for mosquito and human testing: supplemental staffing through contracts; modification to methodologies employed

Challenges:

- Aerial Mosquito Adulticiding – controversial and costly, but CDC Epi-Aid Investigation supported its value in reducing new cases
- Communication complexity related to the Dallas/Fort Worth Metroplex (large number of independent jurisdictions
- Legal Issues – access to private property for mosquito abatement, e.g. need to address abandoned pools, stacks of car tires
- Lack of Historical and Current Data – needed to inform the creation of a science-based response plan for mosquito control; thresholds for action needed e.g. point at which transition from ground to aerial adulticiding is warranted

Development of a Valuable Tool:

- The volume of electronic laboratory reports (ELRs) can be used as a leading indicator for the trend in case counts over the subsequent two weeks
- This information may inform response activities and resource allocation
- Epi-Aid Investigation found value in this tool

Borrelia Miyamoto, an Emerging Vector-borne Pathogen

Sandy Bushmich, Pathobiology and Veterinary Science, University of Connecticut

Borrelia miyamotoi (Bm) was identified as a new Borrelia species transmitted by hard ticks in 1995 in Japan. It was found to be widely distributed globally, but was not associated with human disease until 2011, when it was linked with significant clinical disease in a group of Russian immunocompromised patients. Since that time, human cases of *Borrelia miyamotoi* disease (BMD) have been reported in immunocompetent human patients in the United States, Europe and Japan. Symptoms include fever, headache, chills, arthralgia, thrombocytopenia and leukopenia, often resembling Human Granulocytic Anaplasmosis, another tick-borne disease. Symptoms were often severe enough to require hospitalization. BMD related meningoencephalitis has been reported in immunocompromised patients. Antibiotic treatment similar to that recommended for Lyme borreliosis has been effective.

Little information regarding *Borrelia miyamotoi* infection in domestic animal species is available.

Borrelia miyamotoi is a member of the relapsing fever group of Borrelia. Members of this group, such as *Borrelia hermsii*, a cause of Tick Borne Relapsing Fever, more commonly infect soft ticks (genus *Ornithodoros*). *Borrelia miyamotoi* is unusual in that it shares hard tick vectors (*Ixodes scapularis* and *Ixodes pacificus* in the United States) and rodent reservoir hosts with *Borrelia burgdorferi,* the causative agent of Lyme disease. It's growth, transmission and clinical characteristics remain more typical of the relapsing fever group spirochetes, however. Much remains to be learned about this pathogen.

Borrelia miyamotoi tick infection rates reported in the literature range from 1-3% in regions endemic for Lyme borreliosis and Human Granulocytic Anaplasmosis, which is generally less than the tick infection rates for those two pathogens. Co-infection of ticks can occur. *Borrelia miyamotoi* disease may be underdiagnosed due to lack of awareness on the part of clinicians.

Preliminary results of a study investigating *B.miyamotoi* infection rates in archived ticks submitted for testing to the Connecticut Veterinary Medical Diagnostic Laboratory will be discussed.

Responding to the West African Ebola Epidemic

Barbara Knust, US Centers for Disease Control

It was late March of 2014 that undiagnosed severe disease in patients in Guinea were confirmed to be Ebola virus (species *Zaire ebolavirus*), and soon after confirmed cases were identified in Liberia. The US Centers for Disease Control and Prevention (CDC) quickly sent staff to provide support along with many governmental and non-governmental organizations, and over the course of the next year has continued to respond to the many challenges that this unprecedented epidemic has posed.

With more than 26,000 cases and 10,000 deaths, this epidemic far surpasses all cases from previously known Ebola outbreaks combined. The presence of widespread Ebola transmission in the capital cities of Guinea, Liberia, and Sierra Leone not only had disastrous impacts on the provision of health services but also meant that the epidemic could spread more easily to other countries. To date, Nigeria, Senegal, Mali, the United Kingdom, Spain, and the United States have diagnosed cases linked to the West African epidemic; fortunately, all transmission in these other countries was eventually contained. CDC was involved in the investigations in all affected African countries and the US, and additionally has sent staff to many unaffected countries across Africa to assist in surveillance and response preparations. The approach to Ebola epidemic control is unique in that multiple complex aspects must be addressed in an urgent time frame, involving a complex cast of governmental and non-governmental organizations. CDC's efforts overseas included the following major activities: national disease surveillance, case cluster investigation, contact tracing, border monitoring, airport exit screening, infection prevention and control in the hospital setting, laboratory diagnostics,

development of national and regional emergency operations centers, health communications, and advancing scientific understanding of the disease. Supporting such complex activities in the field led to the development of large field teams in each of the three “heavily affected” countries, and more than 1,000 CDC staff altogether who have deployed to West Africa thus far.[1]

The confirmation of the first US-diagnosed Ebola patient in October and three subsequent cases led to several additional control measures, most notably the establishment of entry screening of all travelers arriving from Ebola-affected countries at five US airports. In the United States, intense focus has been on protecting and preparing the healthcare system for possible Ebola patients. This includes support for clinicians, coordination of diagnostic testing, guidelines for patient care and healthcare worker protection, guidance for movement and monitoring of persons with Ebola exposures, and health communications and media relations. A network of hospitals was established and specifically trained to evaluate and care for Ebola patients. These efforts, in collaboration with state and local health departments, involved many thousands of people.

Ebola is a zoonotic virus. The reservoir species has not yet been identified, although virus RNA has been detected in fruit bats.[2] Ongoing ecologic investigations are needed to definitively identify the species that can consistently carry the virus and a better understanding of what kind of interactions with a virus-containing animal can lead to spillover into human populations. Similarly, little is known about if there are environmental drivers of spillover events.

Other animal species can be infected with Ebola virus—in nature, primate species and antelopes have been found to have detectable virus in carcasses, and primates have also been observed to develop clinical disease similar to Ebola virus disease in humans. In the Philippines, domestic swine were found to be naturally infected with Reston virus in 2007,[3] and experimental infections of pigs with Ebola virus have shown that severe respiratory disease can result, and have raised questions about whether infected swine could be a source of infection to humans.[4,5]

Less is known about the potential for canines to become infected with Ebola virus. A serosurvey in Gabon detected antibodies but no presence of virus in dogs.[6] A dog belonging to one US Ebola patient had exposure while the patient was symptomatic, and because of the lack of conclusive information about infectivity the dog was voluntarily confined for 21 days following this exposure. In conjunction with animal health and industry groups, guidelines were developed specifically to cover possible exposures of animals to people with Ebola.[7]

More than 1.5 years after the first confirmation of Ebola in patients from Guinea, the Ebola epidemic has slowed, and recent cases have been sporadic rather than originating from sustained chains of transmission. We also now are considering the next steps beyond response, considering the special health care needs and potential for virus to persist in survivors. The global health community is working to help build the public health infrastructure of Liberia,

Sierra Leone and Guinea so they will emerge stronger. This has been an extraordinary effort, and we will continue to work to fight this disease.

References:

1. Frieden TR, Damon IK. Ebola in West Africa-CDC's role in epidemic detection, control, and prevention. Emerging Infectious Diseases, 2015 Nov;21(11):1897-905.
2. Olson SH, Reed P, et al. Dead or alive: animal sampling during Ebola hemorrhagic fever outbreaks in humans. Emerging Health Threats, 2012.
3. Barette RW, Metwally SA, Rowland JM, et al. Discovery of swine as a reservoir for *Reston ebolavirus*. Science, 2009; 325:204-6.
4. Kobinger GP, Leung A, Neufeld J, et al. Replication, pathogenicity, shedding, and transmission of *Zaire ebolavirus* in pigs. Journal of Infectious Diseases, 2011.
5. Weingartl HM, Embury-Hayatt C, Hfon C, et al. Transmission of Ebola virus from pigs to non-human primates. Scientific Reports, 2012.
6. Alella L, Boury O, Pouillot R, et al. Ebola virus antibody prevalence in dogs and human risk. Emerging Infectious Diseases, 2011.
7. Spengler JR, Stonecipher S, McManus C, et al. Management of a pet dog after exposure to a human patient with Ebola virus disease. J Am Vet Med Assoc. 2015.

Committee Business:

The Committee passed three resolutions during the business portion of the meeting. One resolution requested an increase in funding for the USDA-APHIS, Wildlife Services (WS) oral rabies vaccination program. The next resolution requested the Secretary of Agriculture to encourage the USDA focus resources and build strong linkages with the Global Health Security Alliance. This resolution was also to be presented to other committees for review. The final resolution, submitted by the Northeast United Animal Health Association, requested that USDA-APHIS-WS initiate Phase 2 of the terrestrial rabies elimination with a raccoon rabies elimination program in the Northeastern United States. All resolutions were forwarded to the executive committee for approval. Don Lein provided background information and rationale behind all three resolutions.

At the close of the business meeting, Dr. Crnic encouraged committee members to send recommendations on topics for a 2016 One Health Symposium and annual committee meeting to either the chair or vice chair.

With no further business before the committee, the meeting was adjourned at 6:05 p.m.

REPORT OF THE COMMITTEE ON *SALMONELLA*

Chair: Doug Waltman, GA
Vice Chair: Richard Sellers, VA

David Ailor, DC; Chris Ashworth, AR; Deanna Baldwin, MD; Karen Becker, DC; Richard Breitmeyer, CA; Paul Brennan, IN; Dwight Bruno, NY; Brandon Doss, AR; François Elvinger, VA; Tony Frazier, AL; Mallory Gaines, DC; Eric Gingerich, IN; Jean Guard, GA; Scott Gustin, AR; Julie Helm, SC; Danny Hughes, AR; Eric Jensen, AL; Annette Jones, CA; Donna Kelly, PA; Jennifer Koeman, IA; Michael Kopp, IN; Elizabeth Krushinskie, DE; Dale Lauer, MN; Elizabeth Lautner, IA; Chelsie Lawyer, IN; Tsang Long Lin, IN; Rick Linscott, ME; Sarah Mason, NC; Patrick McDonough, NY; David Meeker, VA; Sarah Mize, CA; Alfred Montgomery, DC; Thomas Myers, MD; Steve Olson, MN; Kristy Pabilonia, CO; William Pittenger, MO; G. Donald Ritter, DE; Susan Rollo, TX; A. Gregorio Rosales, AL; Travis Schaal, IA; Joni Scheftel, MN; Tom Sidwa, TX; John Smith, GA; Patricia Stonger, WI; Belinda Thompson, NY; Alberto Torres, AR; Bob Tully, KS; Shauna Voss, MN; Liz Wagstrom, DC; Nora Wineland, MO; Ching Ching Wu, IN; Andrea Zedek, SC; Bereket Zekarias, KS.

The Committee met on October 27, 2015 at the Rhode Island Convention Center in Providence, Rhode Island, from 8:00 a.m. to 12:00 p.m. There were 23 members and 18 guests present. After the Chair opened the meeting and welcomed the attendees, he reminded those present to sign the attendance sheets. Members of the committee should check to see that their contact information was correct and if they were not members they were to sign the blank sheets and they could indicate if they would like to become a member of the committee. The Chair briefly overviewed the requirements of becoming a member and that only members could propose resolutions, recommendations and vote. However, everyone was encouraged to participate in the discussion. There were no pending Resolutions from the previous year.

2015 Enteric Zoonoses Outbreaks: Public Health Impacts and Challenges
Megin Nichols, Centers for Disease Control and Prevention (CDC)

The Enteric Zoonoses Activity group are investigating three *Salmonella* outbreaks, *Salmonella* Muenchen in crusted geckos, two outbreaks in small turtles, and four multistate outbreaks of live poultry. For the last several years there have been outbreaks due to live poultry, including this year, however there is a significant fewer number of cases this year. This reduction has been attributed to increased pressure on the hatcheries to reduce *Salmonella* and continued efforts and outreach from the National Poultry Improvement Plan (NPIP).

Another outbreak investigation was in Washington state and involved *Salmonella* 4,(5),12:i:- . This *Salmonella* was first seen in Europe in the 1990's. Human illness in the United States due to this strain has been increasing over the last ten years. The source of this outbreak was pork, and was traced back to one processing plant. There were actually five pulsed-field gel electrophoresis (PFGE) patterns seen in the outbreak strain. There was

also a market and restaurant found to be environmentally positive for the outbreak strain. Also beef was contaminated from a slicer used to cut the contaminated pork.

Salmonella I 4,(5),12:i:- Cluster Associated with Pork Consumption in Washington State

Karen Becker, Food Safety Inspection Service

Food Safety Inspection Service (FSIS) assisted in the investigation of the outbreak in Washington. They collected fecal samples from carcasses processed in the incriminated plant and isolated the outbreak strain. Additionally, carcass swabs were positive as well as pre-operational environmental swabs. The epidemiological findings led to a product recall.

An FSIS Update on Policy and Action to Prevent and Control Foodborne Disease Associated with _Salmonella_

Karen Becker, Food Safety Inspection Service, USDA

The Food Safety Inspection Service (FSIS) is the public Health agency in the USDA responsible for ensuring that nation's commercial supply of meat, poultry, and egg products is safe, wholesome, correctly labeled and packaged. FSIS develops microbiological performance standards designated by product class. In collaboration with public health partners, FSIS collects and evaluates epidemiological, microbiological, and traceback evidence during an outbreak investigation. Four objectives of an investigation include: implicating the food vehicle associated with illnesses, identifying the production establishment of origin, initiating control actions, and identifying root causes.

The largest outbreak attributed to a FSIS-regulated product was the *Salmonella* Heidelberg outbreak in chicken. Intensified sampling of the plant found high positive rates particularly in chicken parts. This called into question whether FSIS's verification sampling scheme could adequately monitor process control since the implicated establishments were considered Category 1.

Another outbreak investigation involved two clusters of *Salmonella* enteritidis in Minnesota. The clusters were associated with consumption of frozen, raw, stuffed and breaded chicken products. *Salmonella* was found in in both establishments. These outbreaks further highlighted the problem with foods that are not cooked or partially cooked, but have the appearance of cooked.

In 2014 FSIS targeted Food Safety Assessments (FSA) towards comminuted poultry establishments to increase understanding of interventions in use. FSIS conducted sampling to estimate prevalence of *Salmonella* in raw chicken parts and comminuted poultry. The resulting data was used to revise performance standards for these product categories. FSIS is drafting responses to comments requested in 80 FR 3940 and will consider changes on the proposed performance standards in chicken parts, comminuted chicken and turkey. These should be published in early 2016.

Annual *Salmonella* Report

Brenda Morningstar-Shaw, National Veterinary Services Laboratories, USDA-APHIS-VS

Salmonella serotypes isolated from animals in the United States: January 1-December 31, 2014

Contributing Authors: B. Morningstar-Shaw, T. Mackie, D. Barker, C. Brillhart, E. Palmer, Diagnostic Bacteriology Laboratory, National Veterinary Services Laboratories, USDA

The Diagnostic Bacteriology Laboratory within the National Veterinary Services Laboratories (NVSL) routinely serotype *Salmonella* isolates submitted by private, state, and federal laboratories as well as veterinarians, researchers and other animal health officials. Most submissions were from diagnostic laboratories across the US. This report summarizes *Salmonella* serotyping submissions to NVSL from January 1 through December 31, 2014. *Salmonella* isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (herd and flock monitoring programs, environmental sources, food). Serotyping data from isolates submitted for research purposes are not included in the source specific summaries. Based on information provided by the submitter the isolates were divided into animal source categories for analysis. The animal sources include Avian (avian of unknown origin, condor, crow, finch, hawk, goose, sparrow, partridge, parrot, parakeet, pheasant, pigeon quail, duck, and owl), Cattle, Chicken, Dog/Cat, Horse (horse, donkey, mule), Other Domestic (alpaca, ferret, goat, sheep, guinea pig, llama, mink), Pigs, Reptiles/Amphibians (iguana, lizard, reptile, snake, turtle, tortoise, amphibian, frog, alligator, crocodile), Turkey, Wild/Zoo (antelope, deer, fish, marine mammals, opossum, rabbit, raccoon, rodent, camel, monkey, lemur, tiger, zebra, rhinoceros, wallaby, cervid, cheetah, coyote, gazelle, jaguar, leopard, lion, warthog), and Other (environment, unknown).

Salmonella serotyping at the NVSL is an ISO 17025 accredited test Salmonellae are typed using polyvalent and single factor antisera to determine the O and H antigens. Approximately 60% of the sera used at the NVSL is produced in house as previously described. (Ewing) The remaining antisera are purchased from commercial vendors. All sera are subject to extensive quality control testing prior to use. *Salmonella* antigenic formulae are determined as previously described (Ewing) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I.

In 2014, 15,353 submissions were received for *Salmonella* serotyping. *Salmonella* isolates were divided into clinical isolates (4,897), non-clinical isolates (6,687), research and other (3,769). Isolates that were submitted for *S*. Enteritidis or *S*. Heidelberg rule-out testing are included in the clinical and non-clinical counts. The sources of clinical and non-clinical *Salmonella* isolates are shown in Table 1. There were 289 different serotypes identified in 2014. Table 2 lists the ten most common serotypes when all animal sources were

combined. The most common isolates from chickens, turkeys, pigs, cattle, and horses are listed in Tables 3-7.

The NVSL provided a *Salmonella* Group D proficiency test to assess the ability of laboratories to isolate *Salmonella* from environmental samples and determine the serogroup (specifically group D) of any *Salmonella* isolated. The test consisted of ten lyophilized cultures containing various combinations of *Salmonella* and common contaminants that simulated an environmental swab. The 2014 test included *Salmonella* serotypes Enteritidis, Javiana, Anatum, Oranienburg, Heidelberg, and an *sdf* negative Enteritidis. Contaminant bacteria included *Enterobacter cloacae, Citrobacter sedlakii*, *Citrobacter amalonaticus, Citrobacter freundii, Pseudomonas aeruginosa, and Providencia rettgeri*. Laboratories were instructed to test the samples according to the procedures used in their laboratories. The NVSL randomly retained 11% of the test kits and tested them blindly for quality assurance (QA) purposes. The results of the proficiency test are shown in Table 8.

Additionally, the NVSL offered a *Salmonella* serotyping proficiency test to allow laboratories to assess their ability to serogroup or serotype *Salmonella*. The panel consisted of ten pure *Salmonella* isolates, including *Salmonella* serotypes Berta, Saintpaul, Montevideo, Pensacola, Idikan, Essen, Liverpool, Fresno, Lille, and Enteritidis. Participants were given the option to perform serogrouping, partial serotyping, or full serotyping of the isolates and were graded based on appropriate identification to the level of typing they performed. The NVSL randomly retained 15% of the test kits and tested them blindly for QA purposes. The results of the proficiency test are shown in Table 9.

Table 1: Sources of submissions to the NVSL for *Salmonella* serotyping in 2014

Source	No. Clinical Submissions	No. Non-Clinical Submissions
Cattle	1,603	290
Chicken	220	4,468
Horse	305	201
Swine	1,790	181
Turkey	305	883
All others	674	664
Total	**4,897**	**6,687**

Table 2: Most common serotypes in 2014: All sources

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Typhimurium	683	Senftenberg	1,478
4,(5),12:i:-	489	Mbandaka	545
Cerro	401	Kentucky	525
Dublin	342	Enteritidis	311
Agona	197	Cerro	273
Derby	196	Typhimurium	254
Montevideo	180	Montevideo	253
Senftenberg	160	Anatum	232
Newport	136	Braenderup	211
Infantis	135	Newport	135
All others	1,978	All others	2,470
Total	**4,897**	**Total**	**6,687**

Table 3: Most common serotypes in 2014: Chickens

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Enteritidis	86	Senftenberg	1106
Kentucky	30	Mbandaka	473
Infantis	13	Kentucky	450
Typhimurium	11	Enteritidis	291
Senftenberg	9	Typhimurium	93
All others	71	All others	2055
Total	**220**	**Total**	**4468**

Table 4: Most common serotypes in 2014: Turkeys

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Senftenberg	87	Senftenberg	271
Heidelberg	37	Anatum	96
Albany	29	Hadar	93
Ouakam	22	Muenster	74
Montevideo	16	Agona	52
All others	114	All others	247
Total	**305**	**Total**	**833**

Table 5: Most common serotypes in 2014: Pigs

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
4,(5),12:i:-	383	Typhimurium	28
Typhimurium	332	4,(5),12:i:-	23
Derby	194	Derby	20
Agona	137	Bovismorbificans	18
Infantis	93	Havana	10
All others	651	All others	82
Total	**1790**	**Total**	**181**

Table 6: Most common serotypes in 2014: Cattle

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Cerro	375	Cerro	95
Dublin	325	Montevideo	34
Typhimurium	174	Typhimurium	22
Montevideo	138	Newport	18
Newport	64	Dublin	17
All others	527	All others	104
Total	**1603**	**Total**	**290**

Table 7: Most common serotypes in 2014: Horses

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Typhimurium	54	Typhimurium	56
Javiana	28	Newport	27
Newport	23	Anatum	19
Anatum	22	4,(5),12:i:-	10
Rubislaw/Thompson	12	Bovismorbificans	9
All others	154	All others	80
Total	**305**	**Total**	**201**

Table 8: Summary of NVSL *Salmonella* Group D proficiency test

	2010	**2011**	**2012**	**2013**	**2014**
Participants	55	70	73	61	80
Mean Score	92%	97%	92%	94%	98%
Score Range	100-44%	100-85%	100%-29%	100-68%	100-80%
Below Passing	3	0	N/A*	N/A**	0

Because of the change in grading method, a pass/fail designation was not assigned.

*2012 Seven individuals scored less than 80%

**2013 Four laboratories scored less than 80%

Table 9: Summary of NVSL *Salmonella* Serotyping proficiency test

	Serogrouping 2012	Serotyping 2012	Serogrouping 2013	Serotyping 2013	Serogrouping 2013	Serotyping 2014
Participants	22	13	18	14	34	23
Mean Score	98%	92%	98%	98.50%	99%	95%
Score Range	100-90%	100-70%	100-90%	100-90%	100-80%	100-80%

Ewing, WH. 1986. Edward and Ewing's Identification of Enterobacteriaceae. 4th edition. Elsevier Science Publishing Co., Inc., New York, US

Grimont, PAD, Weill, FX. 2007. Antigenic Formulae of the *Salmonella* Serovars. 9th edition. WHO Collaborating Centre for Reference and Research on *Salmonella*. Paris, France.

The FDA Egg Safety Rule: Progress and Update

June deGraft Hanson, Food and Drug Administration

The Food and Drug Administration's (FDA) Prevention of *Salmonella* Enteritidis (SE) in Shell Eggs During Production, Storage, and Transportation Rule (The Egg Safety Rule) is an effort to reduce the incidence of SE in shell eggs. The Rule is applicable to producers with 3,000 or more laying hens who produce eggs for the table market and do not sell all eggs directly to consumers. The Rule requires producers to register with the FDA and to have a working SE Plan. It requires that producers acquire pullets that are National Poultry Improvement Plan (NPIP) SE-monitored, have methods in place to control for rodents and pests, have a biosecurity plan, have an effective Cleaning and Disinfection (C&D) Program, have a system to ensure cooling of eggs within 36 hours of lay, be able to test the environment for SE at specific ages of birds, and maintain records till at least a year after flock depopulation.

FDA has been conducting farm inspections since the rule became effective in 2010. The two types of inspections are Targeted inspections which consist of walkthrough of layer house and record review, and Comprehensive inspections, which include environmental sampling in addition to walkthrough and record review. Approximately 60% of registered farms have been inspected by the end of 2014. Between 2011-2014 the majority of the inspections were classified as No Action Indicated (NAI), or Voluntary Action Indicated (VAI). Only about 4% of inspections were classified as Official Action Indicated (OAI). During the same period, 735 environmental samples were collected from 235 firms. Twenty-four samples from 22 firms were positive for *Salmonella.*

Due to the outbreak of Highly Pathogenic Avian Influenza (HPAI) in the spring, FDA suspended egg farms inspections after discussions with federal and state agencies as well as other stakeholders; and a Biosecurity Directive

to all field investigators with heightened biosecurity measures was issued. FDA is also revising its FD 107 Course accordingly for field investigators.

FDA received over 3,000 comments on the drafted Guidance for producers of layers with outdoor access. The comments have all been reviewed and the Guidance is currently being revised.

FDA is also working on several outreach materials to be shared with industry. Lastly, FDA plans to conduct 100 targeted inspections, and 50 comprehensive inspections in FY2016.

How an Open Access USDA Intergenic Sequence Ribotype (ISR) Database May Facilitate Routine Serotyping of *Salmonella enterica* rom Farm-to-fork

Jean Guard, US National Poultry Research Center, USDA -

Serotyping of the food borne pathogen *Salmonella enterica* by the Kauffman-White-LeMinor (KWL) scheme has been the fundamental method applied for conducting epidemiological investigations since approximately 1950 (Edwards and Kauffmann 1952; Grimont and Weill 2007; Le Minor and others 1982). The Centers for Disease Control (CDC) has compiled data on serotypes associated with food borne disease over the last 42 years (CDC-NCZEID 2013). Despite its history as a useful typing scheme, the KWL scheme has major problems. Private laboratories now charge about $200 per sample, government supported laboratories charge at least $40 per sample, high quality antisera is difficult to produce and becoming less available, lot variation in antisera exist, failure to serotype is common because target O- and H-antigens might not be expressed, mixtures of *Salmonella* serotypes in a culture contribute to false identifications, and classification of reactions according to agglutination reactions varies between operators. In our experience, turnaround time for larger groups of samples can exceed three months and yield less than 80% of samples as a named serotype.

Our laboratory receives field isolates of *Salmonella enterica* from around the world. Non-motile strains of what was submitted as serovar Pullorum were found to be serovar Enteritidis (Guard-Petter 1997). The number of submitted samples that were either misidentified or later classified as Pullorum and Gallinarum were also of concern, because of the risk associated with shipping regulated serovars out to testing laboratories for definitive serotyping. Research objectives and safety issues thus made it imperative to develop an in-house method for distinguishing avian-adapted serovars such as Pullorum and Gallinarum from serovar Enteritidis, which is the world's leading cause of food borne salmonellosis in humans. Deoxyribonucleic acid (DNA) based methods were being produced on a number of fronts, but either knowledgeable individuals from the CDC had not yet found them to be a replacement for KWL, they were not accessible and remained experimental, or they continued to be cost prohibitive often involving major equipment purchases.

Ribotyping has been a useful method for identification of the genus and species of bacteria, and thus further refinement was pursued to discriminate between closely related D1 serotypes of *Salmonella enterica* such as serovars

Pullorum, Gallinarum and Enteritidis. An initial assessment of the 7 ribosomal regions of *Salmonella enterica* indicated that one of them, namely the rrnH region located near the gene dkgB close to the 299,000 base pair marker, had exceptional sequence heterogeneity (Morales and others 2006). The region was eventually defined as beginning at the first nucleotide after the 23S ribosomal gene and ending the base pair before the start of transfer ribonucleic acid (RNA) gene aspU (Figure 1)(Guard and others 2012). It included a 5S gene in the middle plus flanking regions. Size of the region varied from about 250 to 550 bp depending on serotype. Not only did the region yield sequence that could distinguish between serovars Pullorum, Gallinarum and Enteritidis, it appeared to produce sequence specific to nearly all serotypes. Results were also confirmed by conducting DNA microarray hybridization as well as submission for KWL when needed. The sequencing approach is called dkgB-linked intergenic sequence ribotyping (ISR). The current database contains 187 ISR sequences, which includes the top 30 serotypes linked to food borne illness by the CDC. A commercial source incorporates the assay (http://www.neogen.com/FoodSafety/NS_Sal.asp), but for many laboratories cost can be further contained by learning to do the assay in-house.

After development of the database, ISR was applied with collaborators sponsored by a South American cooperative of veterinarians and avian specialists (AMEVEA) in three different countries. ISR revealed the complexity and uniqueness of serotype composition in each study. We suggest that widespread and frequent application of ISR for routine monitoring of *Salmonella* on-farm by producers, occurring in addition to regulatory requirements, is possible. Developing knowledge of individualistic on-farm ecology might help identify emerging issues with the top 30 serotypes causing food borne illness, improve vaccination strategies, and alert producers to risk.

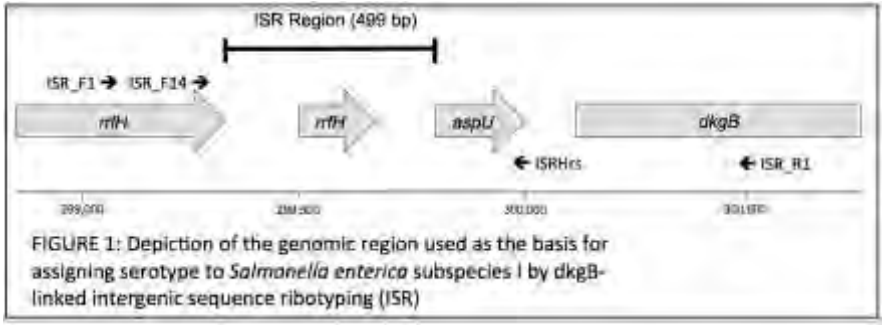

FIGURE 1: Depiction of the genomic region used as the basis for assigning serotype to *Salmonella enterica* subspecies I by dkgB-linked intergenic sequence ribotyping (ISR)

References:

CDC-NCZEID. Centers for Disease Control: An Atlas of *Samonella* in the United States, 1968-2011: Laboratory-based Enteric Disease Surveillance. Atlanta, Georgia: US Department of Health and Human Services, CDC, 2013, pp 246.

Edwards P.R. and Kauffmann F. A simplification of the Kauffmann-White schema. American journal of clinical pathology 1952; 22:692-7.

Grimont P.A. and Weill F.X. ANTIGENIC FORMULAE OF THE *SALMONELLA* SEROVARS. Volume 9th edition. Institut Pasteur: WHO COLLABORATING CENTRE FOR REFERENCE AND RESEARCH ON *SALMONELLA*, 2007, pp 166.

Guard J., Sanchez-Ingunza R., Morales C., et al. . Comparison of *dkgB*-linked intergenic sequence ribotyping to DNA microarray hybridization for assigning serotype to *Salmonella enterica*. FEMS microbiology letters 2012; 337:61-72.

Guard-Petter J. Induction of flagellation and a novel agar-penetrating flagellar structure in *Salmonella enterica* grown on solid media: possible consequences for serological identification. FEMS microbiology letters 1997; 149:173-80.

Le Minor L., Veron M. and Popoff M. [The taxonomy of *Salmonella*]. Annales de microbiologie 1982; 133:223-43.

Morales C.A., Gast R. and Guard-Bouldin J. Linkage of avian and reproductive tract tropism with sequence divergence adjacent to the 5S ribosomal subunit *rrfH* of *Salmonella enterica*. FEMS microbiology letters 2006; 264:48-58.

Just When You Think You Have *Salmonella* Figured Out…

Doug Waltman, Georgia Poultry Laboratory Network

A poultry breeder company decided to qualify for the National Poultry Improvement Plan (NPIP) US *Salmonella* Enteritidis Clean classification. This resulted in testing each of the company's flocks in a short period of time and then subsequently every 30 days. The *Salmonella* results for the last five years were analyzed to determine the relative rates for farms, flocks and even individual houses. Briefly, the *Salmonella* rate for the entire company has decreased dramatically. Even though the company has a *Salmonella* reduction plan, individual farms and even flocks on those farms have shown considerable variably. The remarkable findings were in the serotypes on the farms. It was not unusual for isolate 12 or more *Salmonella* serotypes from one flock (Figures 1 and 2). Many of these serotype introductions never established themselves in the house and were not found subsequently (Figure 3). Even more remarkable was the fact that different serotypes were isolated from each of the houses on the same farm.

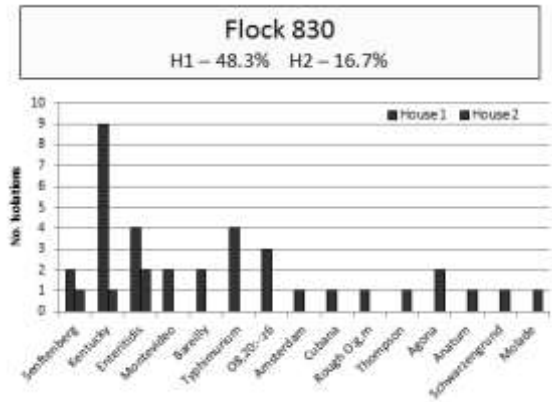

Figure 1. Fifteen different serotypes isolated from a single flock on a farm. Three serotypes isolated from both houses, but 7 sere isolated only in house 1 and 5 others only in house 2.

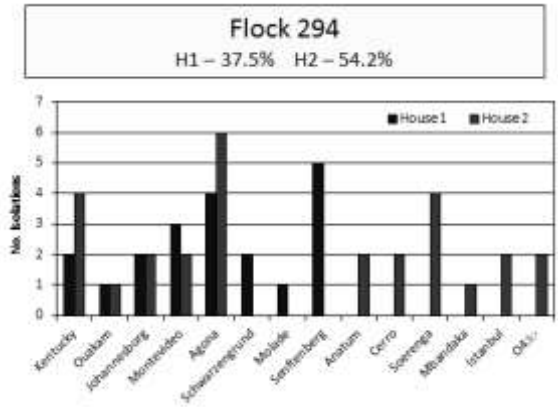

Figure 2. Fourteen different serotypes isolated from a single flock on a farm. Five serotypes isolated from both houses, but 3 were only isolated in house 1 and 6 only isolated in house 2.

Flock 294

Age (wks)	House 1 (37.5%)	House 2 (54.2%)
24-27	Senftenberg	Montevideo *
28-31	Senftenberg Schwarzengrund	Agona * Anatum Johannesburg *
31	25 birds cultured: 1/75 cultures Salmonella positive Montevideo (1)	
32-35	Negative	Cerro
36-39	Ouakam Johannesburg *	Ouakam Soerenga
40-43		
44-47	Montevideo * Kentucky	Mbandaka Kentucky
48-51	Montevideo Molade	Istanbul
52-55	Agona *	Agona
56-59	Negative	O4:i:-

Figure 3. The results of the monthly *Salmonella* test on a farm showing the serotypes isolated. Notice some serotypes may be isolated multiple time, but most of them get introduced and then never detected again.

NPIP Report

In the past the annual report of the National Poultry Improvement Plan (NPIP) as it relates to *Salmonella* has been published by this Committee, however it is redundant as it is also published in similar detail in the Committee on Transmissible Diseases of Poultry. Therefore, I refer to anyone interested to their report.

Committee Business:

The Committee did not discuss or put forth any Recommendations or Resolutions. The Chair announced that he and the Vice-Chair had completed their five-year term and would be rolling off. Dr. Donna Kelly and Dr. Shelley Rankin both of the University of Pennsylvania volunteered to take the Chair and Vice-Chair roles, respectively. Their names have been submitted to the President for approval.

REPORT OF THE COMMITTEE ON SCRAPIE

Chair: Kristine Petrini, MN
Vice Chair: Cheryl Miller, IN

James Averill, MI; Scott Bender, AZ; Deborah Brennan, MS; Minden Buswell, WA; Beth Carlson, ND; John Clifford, DC; Walter Cook, TX; Stephen Crawford, NH; Susan Culp, TX; Ignacio dela Cruz, MP; William Edmiston, TX; Anita Edmondson, CA; Dee Ellis, TX; Keith Forbes, NV; Larry Forgey, MO; Michael Gilsdorf, MD; William Hartmann, MN; Carl Heckendorf, CO; Amy Hendrickson, WY; Russell Iselt, TX; Paul Jones, AL; Susan Keller, ND; Eileen Kuhlmann, MN; James Leafstedt, SD; Mary Lis, CT; Jim Logan, WY; Shirley McKenzie, NC; Ronald Miller, PA; Elisabeth Patton, WI; Jewell Plumley, WV; Justin Roach, OK; Suelee Robbe-Austerman, IA; Paul Rodgers, WV; Susan Rollo, TX; Joan Dean Rowe, CA; Ben Smith, WA; Scott Stuart, CO; Diane Sutton, MD; Manoel Tamassia, NJ; Jeff Turner, TX; Stephen White, WA; Nora Wineland, MO; David Winters, TX; Cindy Wolf, MN.

The Committee met on October 27, 2015 in Room 553 of the Rhode Island Convention Center in Providence, Rhode Island from 9:00 a.m. to 12:06 p.m. There were 18 members and 20 guests present.

Time-Specific Paper

Dr. Diane Sutton, presented a time-specific paper on the Newly Published Proposed Revisions to Scrapie Rules 9 CFR, parts 54 and 79. Dr. Sutton summarized the changes and explained the process for submitting comments. The Committee discussed some of the highlights of the proposed changes. A full summary is included at the end of this report.

Presentations and Reports

USDA-APHIS Scrapie Program Update and Scrapie Surveillance Projects

Diane Sutton, USDA-APHIS, Veterinary Services (VS)

Scrapie Eradication Program Results

- The National Scrapie Eradication Program continued to make progress in FY2015.
- At the end of FY2014, the percent of cull sheep found positive at slaughter and adjusted for face color was 0.018 percent and is currently at 0.004 percent for FY 2015. This measure has decreased by 80 percent compared to FY2014 and by 98 percent compared to FY2003.
- Three source flocks and three infected flocks were designated in FY2014. One infected and three source flocks have been designated in FY2015, a decrease of 30 percent.
- In November 2014, the first positive goat found through regulatory scrapie slaughter surveillance (RSSS) was identified. Based on the goats sampled at slaughter to date, the prevalence of scrapie in US cull goats (2003 –

2015) was 0.0037 percent with an upper 95 percent confidence limit of 0.0097 percent.

- In FY2015 there was a decrease in the number of States meeting their sampling minimums for sheep and goats. This was likely due in part to the impact of highly pathogenic avian influenza (HPAI) response on resources.

Slaughter Surveillance

As of September 30, 2015, 40,862 animals were sampled for scrapie testing in FY2015:

- 38,671 RSSS samples and 2,191 on-farm samples;
- Of which 33,698 were sheep and 7,164 were goats.

Scrapie Surveillance Plan

- Implementation FY2016
  - States with RSSS collection sites will continue to sample all targeted sheep and goats.
  - The annual State-of-origin sampling minimum for sheep is 20 percent of the number required to detect a scrapie prevalence of 0.1 percent with 95 percent confidence or
    1 percent of the breeding flock in the State, whichever is less. The objective is to sample sufficient sheep in a 5-year period to detect a scrapie prevalence of 0.1 percent with 95 percent confidence or 5 percent of the breeding flock in the State, whichever is less.
  - The annual State-of-origin sampling minimum for goats is determined based on the States' goat scrapie case incidence.
    - If a State has not had a goat scrapie case in the previous ten years, its annual goat sampling minimum is its prorated share of 3,000 samples, based on its proportion of the US goat population as determined by the National Agricultural Statistics Service (NASS) Sheep and Goat annual report.
    - If a State has had a goat scrapie case in the previous ten years, its annual goat sampling minimum is determined using the same method as is used for determining its annual sheep sampling minimum.

Note: These are minimums. Plan is to continue to collect samples from the maximum number of targeted animals given the available budget.

ID Compliance:

- All scrapie positive animals in FY2015 were traced back to their flock of origin.

Proposed Rules Planned for Publication:

- VS published revisions to nine Code of Federal Regulations (CFR) parts 54 and 79. The proposed changes are intended to improving the effectiveness and cost efficiency of surveillance and to increase animal identification compliance by addressing gaps in identification and by requiring States to meet reasonable surveillance targets to remain consistent States. States must meet these targets for VS to demonstrate geographically appropriate surveillance to meet the criteria for freedom and have confidence that all of the remaining cases have been found.

- The rule would propose to:
  - Give the APHIS Administrator authority to relieve requirements for sheep and goats exposed to scrapie types, such as Nor98-like, that do not pose a significant risk of transmission;
  - Increase flexibility in how investigations can be conducted and allow the epidemiology in a specific flock to be given more consideration in determining flock and animal status;
  - Add a genetic-based approach to regulation;
  - Make goat identification requirements similar to those for sheep to support ongoing slaughter surveillance in goats (no changes will be made in the consistent State requirements regarding identification of goats in intrastate commerce);
  - Tighten the definition of slaughter channels;
  - Expand the individual identification requirement to all sexually intact animals unless moving as a group/lot (allows mixed-source groups moving in slaughter channels at under 18 months);
  - Limit the use of tattoos and implants to animals not moving through markets and not in slaughter channels; and
  - Reduce recordkeeping requirements by making them similar to the current uniform methods and rules compliance guidance.
- APHIS is also revising its scrapie import regulations to bring them more in line with the OIE scrapie chapter. This will ensure that we meet OIE criteria for free status and prevent the reintroduction of scrapie after free status is achieved.

Scrapie Flock Certification Program (SFCP)

- Implementation of the revised Scrapie Flock Certification Program (SFCP) in FY 2014 has increased the efficacy of the program while reducing program costs.
- At the end of FY2015 there were 441 producers enrolled in the program.

TSE: An Update

Linda Detwiler, Department of Pathobiology and Population Medicine, Mississippi State University, College of Veterinary Medicine

Dr. Detwiler reviewed and discussed recent transmissible spongiform encephalopathy research relevant to scrapie.

Update on Scrapie Research from the Animal Disease Research Unit

David Schneider, Animal Disease Research Unit, Agricultural Research Service (ARS), USDA

The USDA-ARS unit in Pullman, Washington, conducts an integrated research program involving studies on scrapie diagnostics, the role of prion protein *(PRNP)* genetics, and modes of transmission in domestic sheep and goats. In this update, we report on a comparison between sheep and goats on factors that affect the diagnostic quality of rectal biopsy; progress on determination of the role of *PRNP* genetics on the susceptibility, disease progression, and impact on diagnostics in goats inoculated with classical

scrapie; progress in evaluating potential modes of transmission for atypical (Nor98-like) scrapie in sheep and classical scrapie via goat's milk; and use of mouse models to discriminate sheep and goats with classical scrapie versus experimental chronic wasting disease.

Biopsy of the rectal mucosa is a sensitive and safe technique used world-wide in the live-animal diagnosis of classical scrapie infection in sheep and goats, but which is sometimes limited when biopsy samples contain insufficient follicles. Reported rates of biopsies with insufficient follicles have ranged from 3% to 33%, with a significantly higher rate reported in goats and indicating the number of follicles may depend on both procedural and animal factors. Using live-animal biopsies obtained from a cohort of research sheep and goats, we determined that laboratory handling had a minor effect on the number of the follicles observed in each section. The most important factor was the animal's age at the time of biopsy, decreasing at a steady rate of 13 percent per year during the first four years of the animal's life. There was no left versus right side difference in the age-related decline in follicle number and the findings were the same between sheep and goats.

Regarding prion protein genetics, we continue to monitor goats of different genotypes orally inoculated at birth with classical scrapie prions derived from naturally infected goats. Goats with the highly susceptible genotype all developed clinical disease within 24 months. Goats with the less susceptible or long incubation genetics (S146 or K222) have remained clinically normal with no evidence of prions in rectal biopsy tissues. These goats will be monitored for the duration of the natural lifespan. In addition, a related study was completed which demonstrates a doubly prolonged incubation period in inoculated goats bearing the GS127 polymorphism.

Regarding our studies on modes of prion transmission, we very recently completed and are finalizing analyses for a 7-year study on Nor98-like scrapie in breeding ewes. Ewes were experimentally inoculated with brain homogenate obtained from a US sheep with clinical Nor98-like scrapie. Recipient ewes were bred annually to examine the placenta for evidence of a transmissible agent. One recipient ewe developed an unrelated disease in her fifth year of scrapie incubation. At postmortem examination, a Nor98-like pattern of misfolded prion protein, PrP-Sc, accumulation was observed. Similar findings were recently confirmed through postmortem examination of the other three ewes in the seventh year of scrapie incubation. These results confirm that inoculation of these ewes was successful. Not all placental tissue analyses have yet been completed, but there has been no evidence of placental accumulation of PrP-Sc out to the sixth year of infection.

We have recently confirmed that the classical scrapie prions which accumulate in the placenta of goats are infectious to sheep. Similarly, transmission to sheep has also occurred via the milk of infected goats. Thus, both the placenta and milk of infected goats are significant transmission risks to sheep.

Finally, we are nearing the completion of a study to determine if transgenic mice can be used to differentiate the origin of prions in new cases of scrapie

disease in sheep and goats raised in regions with endemic chronic wasting disease (CWD) in cervids. The results show that transgenic mice bearing a susceptible prion protein are readily susceptible to classical scrapie prions derived from naturally infected sheep and goats but not to CWD prions derived from naturally infected cervids. The converse was true for transgenic mice bearing a susceptible cervid prion protein. Both types of mice were only intermediately susceptible to CWD prions derived from experimentally infected sheep. Thus, to date, the results suggest this bioassay model can discriminate between these sources of prions in new cases of prion disease in small ruminants from regions in which CWD is endemic in cervid populations.

Committee Business:

The Committee reviewed its mission statement and no alterations were suggested. There was a discussion about whether the Committee on Scrapie and the Committee on Sheep and Goats should be combined. The Committee members indicated that at this time the two committees should remain separate.

The Committee reviewed its 2014 Resolution that urged the Secretary of Agriculture to quickly publish and finalize the proposed rule amending 9 CFR Parts 54 and 79. This proposed rule is now published and open for public comment. The Committee passed a new resolution urging the Secretary of Agriculture to promptly publish a final scrapie rule in early 2016 following the appropriate review and comment period.

Note: Prior to the Committee on Scrapie meeting the following presentation was given by Dr. Diane Sutton as part of the National Scrapie Oversight Board meeting. A summary is included below supplemental to the Committee Report.

SFCP Participation

- As of September 30, 2015 there were 441 participating flocks in the SFCP.
    - 277 Select Monitored
    - 142 Export Monitored
    - 22 Export Certified
- In FY2015 four Export Monitored flocks advanced to Export Certified.
- 48 sheep breeds and 17 goat breeds are represented in the SFCP.
- As of September 30, 2015 there are active State SFCP boards in nine States.

Canada's Import Requirements

- APHIS still anticipates a change in Canada's import requirements, exact timeline of publication of new requirements not yet determined.
- The change will be an increase in the minimum time in status in the Export Category for eligibility to import US sheep or Goats into Canada.

Export Monitored Flock FY 2015 Review

- Export Monitored flocks in Standard or Alternative two sampling protocols must meet sampling thresholds to reach six years of status (Standard=15; Alternative 2=at least 50% foundation flock). In June 2015 Export

Monitored flocks with six or more years of status were reviewed. Ninety-six flocks were reviewed, and of these:

- APHIS identified 28 flocks with six or more years of status that had not met the sampling threshold;
- The status dates for these flocks were reset to five years; and
- Notification letters were sent to producers explaining their new status dates and steps they can take to regain six years of status by January 1, 2016.

- APHIS will continue to monitor flocks that are approaching six years. They must meet threshold and notify those that need to take action to maintain their status date.

Select Category

- Participation in the Select category was lower in FY2015 than in FY2014.
- APHIS' goal in FY2016 is to increase participation in this category, thereby increasing the SFCP contribution to scrapie on-farm surveillance.
- APHIS will also review Select Monitored flocks in FY2016 for compliance with sampling requirements.

SFCP Standards

In FY2015, APHIS revised the SFCP Standards. The revised standards are currently in clearance and are expected to be published in FY2016. Updates to the SFCP Standards included the following items:

- In the Select category, animals collected through Regulatory Scrapie Slaughter Surveillance (RSSS) will count toward the sampling requirement if at least ten animals are collected through RSSS in the same sampling period.
- Sampling requirements in genetically resistant Export Monitored flocks following the Standard sampling protocol: if there are no genetically susceptible animals in the flock (i.e. the flock is composed entirely of QR/RR ewes, RR rams, and no goats), the annual, 6-year, and 7-year sampling requirements are waived (assuming all other sampling requirements are met).
- Criteria for exempting lambs born in genetically resistant flocks from genotyping for Standard and Alternative 1 sampling protocol: if there are no genetically susceptible animals in the flock and the owner only has mature RR rams on the premises from that point forward lambs do not need to be genotyped. Note: these conditions will be confirmed at each subsequent annual inspection, and if an inspector believes at any time that one or more of the animals in the flock may be a QQ animal, the inspector will require that the animal(s) be officially genotyped.
- How to treat "Lost to Inventory" animals in Export Monitored flocks following the Alternative 1 sampling protocol:
    - The flock owner may elect to switch to the standard sampling protocol, and the flock's status date will be reset to the lesser of the flock's current status date or 12 months of status for each test eligible animal sampled and must meet the additional sampling

requirements of the standard sampling protocol to retain more than five years in status; or
    - The flock owner may elect to stay in the Alternative 1 category, and the flock's status date will be reset to the date the VS office was notified (or the lost to inventory animal became known to the VS office) that the animal was lost to inventory.
- Animals from Inconsistent States not in slaughter channels must be from either an Export Monitored/Export Certified flock or from a Select Monitored flock in which it was born. There are no changes for animals in slaughter channels.
- Retesting animals to meet the annual sampling requirement:
    - If a flock following the Standard sampling protocol has live-animal tested all genetically susceptible test eligible animals at least once and must test an additional animal to meet the annual sampling requirement, previously tested animals can be repeat live-animal tested.
    - If all genetically susceptible animals in the flock have been live animal tested four times, the annual sampling requirement is waived.
- Export category flocks must report the use of milk/colostrum from a lower status flock.
- Animals tested within 12 months of another animal being "Lost to Inventory" can meet the lost to inventory sampling requirement in Export Certified flocks if the flock had already tested 30 animals (this does not apply to "Found Dead" animals).
- How to treat previously live-animal tested "Found Dead" and "Lost to Inventory" animals in Export Monitored flocks:
    - Lost to inventory – if the animal had been tested in the previous 12 months, no change in status and no additional animals need to be tested (and if the flock is following the Alternative 1 sampling protocol it does not have to switch to the Standard sampling protocol).
    - Found dead – APHIS will determine if the animal reasonably could have been sampled. If so, the animal will be treated as any other found dead. If not the animal is considered lost to inventory and will treated the same as other lost to inventory animals.

REVIEW AND DISCUSSION OF NEWLY PUBLISHED REVISIONS TO SCRAPIE RULES 9 CFR, PARTS 54 AND 7

Diane Sutton
USDA-APHIS-Veterinary Services (VS)

Overview

The US Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) is proposing changes to its existing scrapie regulations. Scrapie is a degenerative and eventually fatal prion disease of sheep and goats, and APHIS regulations help prevent its spread and support its eventual eradication.

This is a synopsis of the proposed rule and should not be considered definitive. Please read the entire proposed rule http://www.regulations.gov/#!docketDetail;D=APHIS-2007-0127 to review all the proposed changes as well as APHIS' reasons for the proposed changes. Also, please read the draft "Scrapie Program Standards, Volume 1: National Scrapie Eradication Program" which is also posted at the link above. The rule proposes to:

1. Remove the low-risk commercial goat exemption and treat sheep and goats the same with respect to official identification requirements, the only differences are the allowed state exemptions which have not been changed.
2. Simplify the way the identification and movement requirements are presented and clarify the requirements. Also, adds tag replacement and use requirements from the ADT rule. Recommend reading proposed §79.2 and 79.3 in their entirety.
3. Add "Free" to "Scrapie Flock Certification Program" to read "Scrapie Free Flock Certification Program"
4. Change the **noncompliant** definition so that it now reads:
   Noncompliant flock. (1) Any source, infected, or exposed flock or flock under investigation whose owner declines to enter into a flock plan or post-exposure management and monitoring plan agreement within 30 days of being so designated, or whose owner is not in compliance with either agreement;
   (2) Any exposed flock or flock under investigation whose owner fails to make animals available for testing within 60 days of notification, or as mutually agreed, or whose owner fails to submit required postmortem samples;
   (3) Any flock whose owner has misrepresented, or who employs a person who has misrepresented, the scrapie status of an animal or any other information on a certificate, permit, owner statement, or other official document within the last 5 years; or
   (4) Any flock whose owner or manager has moved, or who employs a person who has moved, an animal in violation of this chapter within the last 5 years.
5. Remove concept of "separate contemporary lambing group".

6. Change certificate to **Interstate Certificate of Veterinary Inspection (ICVI)**. See proposed § 79.5 for ICVI requirements. Adds requirement for breeding animals that official genotype be included on the ICVI if known.
7. Change definition of flock sire to read:
   Flock sire. A sexually intact male animal that has produced offspring in the preceding 12 months or that was used for breeding during the current breeding cycle.
8. Change definition of scrapie positive animal to add ELISA
   Scrapie-positive animal. An animal for which a diagnosis of scrapie has been made by the National Veterinary Services Laboratories or another laboratory authorized by the Administrator to conduct scrapie tests in accordance with this chapter, through:
   (1) Histopathological examination of central nervous system (CNS) tissues from the animal for characteristic microscopic lesions of scrapie;
   (2) The use of proteinase-resistant protein analysis methods including but not limited to immunohistochemistry, and/or ELISA, and/or western blotting on CNS and/or peripheral tissue samples from a live or a dead animal for which a given method or combination of methods has been approved by the Administrator for use on that tissue;
   (3) Bioassay;
   (4) Scrapie associated fibrils (SAF) detected by electron microscopy; or
   (5) Any other test method approved by the Administrator in accordance with §54.10 of this chapter.
9. Add the concept of “classification or reclassification investigation” and moves details for conducting them to the APHIS website in the program standards. See proposed § 79.4 and the draft program standards for more information.
   Classification or reclassification investigation. An epidemiological investigation conducted or directed by a DSE for the purpose of designating or redesignating the status of a flock or animal. In conducting such an investigation, the DSE will evaluate the available records for flocks and individual animals and conduct or direct any testing needed to assess the status of a flock or animal. The status of an animal or flock will be determined based on the applicable definitions in this section and, when needed to make a designation under § 79.4 of this chapter, official genotype test results, exposure risk, scrapie type involved, and/or results of official scrapie testing on live or dead animals
10. Changes definition of **destroy**, removes slaughter option for indemnified animals
    Destroyed. Euthanized and the carcass disposed of by means authorized by the Administrator that will prevent its use as feed or food,

or moved to a quarantined research facility if the movement has been approved by the Administrator.

11. Change exposed animal definition:
    a. Adds embryo explicitly
    b. Sets criteria for setting date of infection
    c. Adds concept of further designation based on genotype and exposure risk.

    Exposed animal. Any animal or embryo that: (1) Has been in a flock or in an enclosure off the premises of the flock with a scrapie-positive female animal, (2) resides in a noncompliant flock, or (3) has resided on the premises of a flock before or while it was designated an infected or source flock and before a flock plan was completed. An animal shall not be designated an exposed animal if it only resided on the premises before the date that infection was most likely introduced to the premises as determined by a Federal or State representative. If the probable date of infection cannot be determined based on the epidemiologic investigation, a date 2 years before the birth of the oldest scrapie-positive animal(s) will be used. If the actual birth date is unknown, the date of birth will be estimated based on examination of the teeth and any available records. If an age estimate cannot be made, the animal will be assumed to have been 48 months of age on the date samples were collected for scrapie diagnosis. Exposed animals will be further designated as genetically resistant exposed sheep, genetically less susceptible exposed sheep, genetically susceptible exposed animals, or low-risk exposed animals. An animal will no longer be an exposed animal if it is redesignated in accordance with § 79.4.
12. Redefine exposed flock (divides old definition into Flock Under Investigation and Exposed Flock and references redesignation section:
    Exposed flock. (1) Any flock that was designated an infected or source flock that has completed a flock plan and that retained a female genetically susceptible exposed animal; (2) Any flock under investigation that retains a female genetically susceptible exposed animal or a suspect animal, or whose owner declines to complete genotyping and live-animal and/or post-mortem scrapie testing required by the APHIS or State representative investigating the flock; or (3) Any noncompliant flock or any flock for which a PEMMP is required that is not in compliance with the conditions of the PEMMP. A flock will no longer be an exposed flock if it is redesignated in accordance with § 79.4 of this chapter.

    Flock under investigation. Any flock in which an APHIS or State representative has determined that a scrapie-suspect animal, high-risk animal, or scrapie-positive animal resides or may have resided. A flock will no longer be a flock under investigation if it is redesignated in accordance with § 79.4 of this chapter.

13. Add definitions for genetically less susceptible exposed sheep, genetically resistant exposed sheep, genetically resistant sheep, genetically susceptible animal, and genetically susceptible exposed animal.

Genetically less susceptible exposed sheep. Any sheep or sheep embryo that is:

(1) An exposed sheep or sheep embryo of genotype AA QR, unless it is epidemiologically linked to a scrapie-positive RR or AA QR sheep or to a scrapie type to which AA QR sheep are not less susceptible where Q represents any genotype other than R at codon 171; or

(2) An exposed sheep or sheep embryo of genotype AV QR, unless it is epidemiologically linked to a scrapie-positive RR or QR sheep, to a flock that the DSE has determined may be affected by valine associated scrapie (based on an evaluation of the genotypes of the scrapie-positive animals linked to the flock), or to another scrapie type to which AV QR sheep are not less susceptible where Q represents any genotype other than R at codon 171 and V represents any genotype other than A at codon 136; or

(3) An exposed sheep or sheep embryo of a genotype that has been exposed to a scrapie type to which the Administrator has determined that genotype is less susceptible.

Genetically resistant exposed sheep. Any exposed sheep or sheep embryo of genotype RR unless it is epidemiologically linked to a scrapie-positive RR sheep or to a scrapie type to which RR sheep are not resistant.

Genetically resistant sheep. Any sheep or sheep embryo of genotype RR unless it is epidemiologically linked to a scrapie-positive RR sheep or to a scrapie type that affects RR sheep.

Genetically susceptible animal. Any goat or goat embryo, sheep or sheep embryo of a genotype other than RR or QR, or sheep or sheep embryo of undetermined genotype where Q represents any genotype other than R at codon 171.

Genetically susceptible exposed animal. Excluding low-risk exposed animals, any exposed animal or embryo that is also:

(1) A genetically susceptible animal.

(2) A sheep or sheep embryo of genotype AV QR that is epidemiologically linked to a scrapie-positive RR or QR sheep, to a flock that the DSE has determined may be affected by valine associated scrapie (based on an evaluation of the genotypes of the scrapie-positive animals linked to the flock), or to a scrapie type to which AV QR sheep are susceptible where Q represents any genotype other than R at codon 171 and V represents any genotype other than A at codon 136.

(3) A sheep or sheep embryo of genotype AA QR that is epidemiologically linked to a scrapie-positive RR or AA QR sheep or to

a scrapie type to which AA QR sheep are susceptible where Q represents any genotype other than R at codon 171; or

(4) A sheep or sheep embryo of genotype RR that is epidemiologically linked to a scrapie-positive RR sheep or to a scrapie type to which RR sheep are susceptible.

14. **High-risk animal redefined** as. The female offspring or embryo of a scrapie-positive female animal, or any suspect animal, or a female genetically susceptible exposed animal, or any exposed animal that the Administrator determines to be a potential risk based on the scrapie type, the epidemiology of the flock or flocks with which it is epidemiologically linked, including genetics of the positive sheep, the prevalence of scrapie in the flock, any history of recurrent infection, and other flock characteristics. An animal will no longer be a high-risk animal if it is redesignated in accordance with § 79.4 of this chapter. This in concert with the new low-risk exposed animal definition below gives a lot of flexibility in handling infected/source flocks and exposed animals minimizing the need to revise the regulations as scientific knowledge increases. It also allows APHIS to not restrict animals exposed to Nor98-like scrapie and to at some point if warranted by new scientific evidence establish a genetic based approach for goats.
Low-risk exposed animal. Any exposed animal to which the DSE has determined one or more of the following applies:

(1) The positive animal that was the source of exposure was not born in the flock and did not lamb in the flock or in an enclosure where the exposed animal resided;

(2) The Administrator and State representative concur that the animal is unlikely to be infected due to factors such as, but not limited to, where the animal resided or the time period the animal resided in the flock;

(3) The exposed animal is male and was not born in an infected or source flock;

(4) The exposed animal is a castrated male;

(5) The exposed animal is an embryo of a genetically resistant exposed sheep or a genetically less susceptible exposed sheep unless placed in a recipient that was a genetically susceptible exposed animal; or,

(6) The animal was exposed to a scrapie type and/or is of a genotype that the Administrator has determined poses low risk of scrapie transmission.

15. Change the first paragraph of the **suspect animal** definition to read:

(1) A mature sheep or goat as evidenced by eruption of the first incisor that has been condemned by FSIS or a State inspection authority for central nervous system (CNS) signs, or that exhibits any of the following clinical signs of scrapie and has been determined to be suspicious for scrapie by an accredited veterinarian or a State or USDA representative, based on one or more of the following signs and

the severity of the signs: (i) Weakness of any kind including, but not limited to, stumbling, falling down, or having difficulty rising, not including those with visible traumatic injuries and no other signs of scrapie; (ii) behavioral abnormalities; (iii) significant weight loss despite retention of appetite or in an animal with adequate dentition; (iv) increased sensitivity to noise and sudden movement; (v) tremors; (vi) star gazing; (vii) head pressing; (viii) bilateral gait abnormalities such as but not limited to incoordination, ataxia, high stepping gait of forelimbs, bunny-hop movement of rear legs, or swaying of back end, but not including abnormalities involving only one leg or one front and one back leg; (ix) repeated intense rubbing with bare areas or damaged wool in similar locations on both sides of the animal's body or, if on the head, both sides of the poll; (x) abraded, rough, thickened, or hyperpigmented areas of skin in areas of wool/hair loss in similar locations on both sides of the animal's body or, if on the head, both sides of the poll; or (xi) other signs of CNS disease. An animal will no longer be a suspect animal if it is redesignated in accordance with § 79.4 of this chapter.

16. Add definition of **tamper-resistant sampling kit** and changes definition of **Official genotype test** to allow sampling using an APHIS approved tamper evident eartag for official genotyping. Note: APHIS is not aware of tamper-evident versions of these devices being commercially available.
17. Add definition of **owner/hauler statement** in place of previous owner statement.

    Owner/hauler statement. A signed written statement by the owner or hauler that includes:

    (1) The name, address, and phone number of the owner and, if different, the hauler;

    (2) The date the animals were moved;

    (3) The flock identification number or PIN assigned to the flock or premises of the animals;

    (4) If moving individually unidentified animals, the group/lot identification number and any information required to officially identify the animals;

    (5) The number of animals;

    (6) The species, breed, and class of animals. If breed is unknown, for sheep the face color and for goats the type (milk, fiber, or meat) must be recorded instead; and

    (7) The name and address of point of origin, if different from the owner's address, and the destination.
18. Add definition:

    Restricted animal sale or restricted livestock facility. A sale where any animals in slaughter channels are maintained separate from other animals not in slaughter channels and are sold in lots that consist entirely of animals sold for slaughter only or a livestock facility at which

all animals are in slaughter channels and where the sale or facility manager maintains a copy of, or maintains a record of, the information from, the owner/hauler statement for all animals entering and leaving the sale or facility. A restricted animal sale may be held at a livestock facility that is not restricted.

19. Tighten up **slaughter channels** through revised definition and requirement for an owner hauler statement and addition of §79.3(g).
Slaughter channels. Animals in slaughter channels include any animal that is sold, transferred, or moved either directly to or through a restricted animal sale or restricted livestock facility to a slaughter establishment that is under continuous inspection by the Food Safety and Inspection Service or under State inspection that the Food Safety and Inspection Service has recognized as at least equal to Federal inspection or to a custom exempt slaughter establishment as defined by FSIS for immediate slaughter or to an individual for immediate slaughter for personal use or to a terminal feedlot. Any animal sold at an unrestricted sale is not in slaughter channels. Animals in slaughter channels must be accompanied by an owner/hauler statement completed in accordance with § 79.3(g) of this chapter. Animals in slaughter channels may not be held in the same enclosure with sexually intact animals from another flock of origin that are not in slaughter channels. When selling animals that do not meet the requirements to move as breeding animals, owners must note on the bill of sale that the animals are sold only for slaughter.
79.3(g) Animals moved to slaughter. Once an animal enters slaughter channels the animal may not be removed from slaughter channels. An animal is in slaughter channels if it was sold through a restricted animal sale, resided in a terminal feedlot, was sold with a bill of sale marked for slaughter only, was identified with an identification device or tattoo marked “slaughter only” or “MEAT” or was moved in a manner not permitted for other classes of animals. Animals in slaughter channels may move either directly to a slaughter establishment that is under continuous inspection by the Food Safety and Inspection Service or under State inspection that the Food Safety and Inspection Service has recognized as at least equal to Federal inspection or to a custom exempt slaughter establishment as defined by FSIS for immediate slaughter or to an individual for immediate slaughter for personal use, to a terminal feedlot, or may move indirectly to such a destination through a restricted animal sale or restricted livestock facility. Once an animal has entered slaughter channels it may only be officially identified with an official blue eartag marked with the words “Meat” or “Slaughter Only" or an ear tattoo reading "Meat." Animals in slaughter channels must be accompanied by an owner/hauler statement indicating the owner’s name and address; the name and address of the person or livestock facility from which and where they were acquired, if different from the owner; the slaughter establishment,

restricted animal sale, restricted livestock facility or terminal feedlot to which they are being moved, and a statement that the animals are in slaughter channels. A copy of the owner/hauler statement must be provided to the slaughter establishment, restricted animal sale, restricted livestock facility or terminal feedlot to which the animals are moved. Any bill of sale regarding the animals must indicate that the animals were sold for slaughter only.

20. Revises **Terminal feedlot** definition by revising paragraph 1 to include removal of organic material before use by other sheep or goats, by adding paragraph 2, and revising paragraph 3 (now 4) to increase the record retention requirement to 5 years and reiterate that the owner hauler statement or the information contained therein must be retained: **Terminal feedlot.** (1) A dry lot approved by a State or APHIS representative or an accredited veterinarian who is authorized to perform this function where animals in the terminal feedlot are separated from all other animals by at least 30 feet at all times or are separated by a solid wall through, over, or under which fluids cannot pass and contact cannot occur and must be cleaned of all organic material prior to being used to contain sheep or goats that are not in slaughter channels, where only castrated males are maintained with female animals and from which animals are moved only to another terminal feedlot or directly to slaughter; or

(2) A dry lot approved by a State or APHIS representative or an accredited veterinarian authorized to perform this function where only animals that either are not pregnant based on the animal being male, an owner certification that any female animals have not been exposed to a male in the preceding 6 months, an ICVI issued by an accredited veterinarian stating the animals are open, or the animals are under 6 months of age at time of receipt, where only castrated males are maintained with female animals, and all animals in the terminal feedlot are separated from all other animals such that physical contact cannot occur and from which animals are moved only to another terminal feedlot or directly to slaughter; or

(3) A pasture when approved by and maintained under the supervision of the State and in which only nonpregnant animals are permitted based on the animal being male, an owner certification that any female animals have not been exposed to a male in the preceding 6 months, or an ICVI issued by an accredited veterinarian stating the animals are open, or the animals are under 6 months of age at time of receipt, where only castrated males are maintained with female animals, where there is no direct fence-to-fence contact with another flock, and from which animals are moved only to another terminal feedlot or directly to slaughter.

(4) Records of all animals entering and leaving a terminal feedlot must be maintained for 5 years after the animal leaves the feedlot and must meet the requirements of § 79.2 of this chapter,

including either a copy of the required owner/hauler statements for animals entering and leaving the facility or the information required to be on the statements. Records must be made available for inspection and copying by an APHIS or State representative upon request.

21. In the indemnity sections proposed § 54.3 adds:
    a. Prohibitions:
       No indemnity will be paid for any animal, or the progeny of any animal, that has been moved or handled by the owner in violation of the requirements of the Animal Health Protection Act or the regulations promulgated thereunder. No indemnity will be paid for an animal added to the premises while a flock is under investigation or while it is an infected or source flock other than natural additions. No indemnity will be paid for natural additions born more than 60 days after the owner is notified they are eligible for indemnity unless the Administrator makes a determination that the dam could not be removed within the allowed time as a result of conditions outside the control of the owner. No indemnity will be paid unless the owner has signed and is in compliance with the requirements of a flock plan or PEMMP as described in § 54.8.
    b. Allows partial indemnity if cleaning and disinfection cannot be completed due weather or other factors outside the control of the owner make immediate disinfection impractical.
    c. Moves specific instructions for calculating indemnity to the program standards which includes specific language on late gestation and early lambing premiums as well as allows for the use of available price reports rather than specifying particular ones, which may become unavailable. See proposed § 54.6 and draft program standards for details.
22. Add language stating that APHIS may pay full disposal costs for indemnified animals
23. Add use of an EPA approved product should one be approved or new exempted products
24. Update section § 54.8 Requirements for flocks under investigation and flocks subject to flock plans and post-exposure management and monitoring plans (PEMMPs)
    a. Reorganized and reworded for clarity
    b. Adds flocks under investigation to the requirements for official identification
    c. Requires official identification on all animals in a flock under a flock plan or PEMMP
    d. Specifically allows APHIS to establish policies for retention of high-risk animals.
    e. Gives more flexibility on when a PEMMP will be used
25. Update section § 54.10 Program approval of tests for scrapie
    a. Adds information on appeals

   b. Moves test use guidelines to the APHIS website. See draft program standards for details.

26. Update section § 54.11 Approval of laboratories to run official scrapie tests and official genotype tests
    a. Adds ability for NVSL to waive tissue retention times in an SOP
    b. Adds additional information on appeals
    c. Adds that NVSL may recoup costs associated with laboratory approval from the approved laboratories
27. Change low-risk commercial sheep to low-risk commercial flock to include goats, but limits this exception to animals moving for slaughter
28. Require submission of tagging records by individuals who tag animals for others such as markets and veterinarians through a website or by other mutually agreed methods.
29. Revise information required to be maintained about animal dispositions/acquisitions and records of animals tagged. Remove requirement to record tags that are on animals when acquired unless an ICVI is required.
30. Add meeting surveillance targets as a requirement for remaining a consistent state and requires States to conduct of facilitate surveillance in State inspected mature sheep and goat slaughter establishments (see proposed § 79.6).
31. Simplify the requirements for inconsistent states and includes the option to use genotyping for movement of breeding sheep in addition to enrollment in SFCP (see proposed § 79.3(j)).
32. Move the Consistent State List to the website in the program standards and provides for notice and comment for changing the list. Specifically, the definition is changed to read:
    Consistent State. (1) A State that the Administrator has determined conducts an active State scrapie control program that meets the requirements of §79.6 or effectively enforces a State-designed plan that the Administrator determines is at least as effective in controlling scrapie as the requirements of § 79.6.

    (2) A list of Consistent States can be found on the Internet at http://www.aphis.usda.gov/animal-health/scrapie.

    (3) When the Administrator determines that a State should be added to or removed from the list of Consistent States, APHIS will publish a notice in the Federal Register advising the public of the Administrator's determination, providing the reasons for that determination, and soliciting public comments. After considering any comments we receive, APHIS will publish a second notice either advising the public that the Administrator has decided to add or remove the State from the list of Consistent States or notifying the public that the Administrator has decided not to make any changes to the list of Consistent States, depending on the information presented in the comments.

33. Add/revise definitions for **flock identification (ID) number, Premises identification number (PIN)** and **group/lot number**
Flock identification (ID) number. A nationally unique number assigned by a State or Federal animal health authority to a group of animals that are managed as a unit on one or more premises and are under the same ownership. The flock ID number must begin with the State postal abbreviation, must have no more than nine alphanumeric characters, and must not contain the characters “I”, “O”, or "Q" other than as part of the State postal abbreviation or another standardized format authorized by the administrator and issued through the National Scrapie Database. Flock identification numbers will be linked in the National Scrapie Database to one or more PINs and may be used in conjunction with an animal number unique within the flock to provide a unique official identification number for an animal, or may be used in conjunction with the date and a sequence number to provide a GIN for a group of animals when group identification is permitted.
Premises identification number (PIN). This term has the meaning set forth in § 86.1 of this subchapter. APHIS may also maintain historical and/or State premises numbers and link them to the premises identification number in records and databases. Such secondary or historical numbers are typically the State's two-letter postal abbreviation followed by a number assigned by the State.
Group/lot identification number (GIN). The identification number used to uniquely identify a unit of animals that is managed together as one group. The format of the GIN may be either as defined in § 71.1 of this chapter, or the flock identification number followed by a six-digit representation of the date on which the group or lot of animals was assembled (MM/DD/YY). If more than one group is created on the same date a sequential number will be added to the end of the GIN. If a flock identification number is used, the flock identification number, date, and sequential number will be separated by hyphens.
34. Revise definitions of **Animal identification number (AIN), Officially identified, Official identification device or method** and **Official Eartag** for clarity to specific the use of devices approved and distributed in accordance the scrapie rules and methods approved for use in sheep and goats by APHIS.
35. Explicitly allows an appeal of designation decisions see proposed § 79.4(c)(3). Draft rules of practice may be found in the draft program standards.
Prohibit transferring official eartags without the permission of APHIS or the State or applying official sheep and goat tags to animals other than sheep or goats. See proposed § 79.2 (b)(5)(d&e)
36. Does not allow use of back tags as official ID.
37. Provide for eartagging compliance agreements. See proposed § 79.3 (k).

38. Allow APHIS through the program standards or other web posting to establish the requirements for official identification devices and methods including:
    a. Establishing allowed colors and limiting certain colors to certain uses. For example only “slaughter only” official sheep and goat eartags can be blue and all “slaughter only” official sheep and goat eartags must be blue. Specifies that yellow metal official tags will be used for permanently exposed animals and that red metal official tags will be used for animals that have tested positive for scrapie.
    b. Requirements for use of tattoos. Proposed changes:
        i. Not allowed as a sole means of official identification on animals in slaughter channels or moving through livestock markets
        ii. Registry tattoos must be issued by a registry that has agreed to cooperate with APHIS in tracing scrapie positive and exposed animals or the registry tattoo prefix must be provide to APHIS for entry into the National Scrapie Database.
    c. Requirements for use of electronic implants. Proposed changes:
        i. Not allowed as a sole means of official identification on animals in slaughter channels or moving through livestock markets
        ii. If used as the sole form of official identification must be tattooed with “E” for implants in the ear or “ET” for implants in the tail
        iii. If used in an unregistered animal must also be tattooed with the flock identification number.
    d. Specifies that eartags must be placed in the ear.

    See the draft program standards (link) or the extract of materials (link) referred to in the proposed rule available on the web for more detailed information.

REPORT OF THE COMMITTEE ON SHEEP AND GOATS

Chair: Amy Hendrickson, WY
Vice Chair: Maggie Highland, WA

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The Committee met on October 27, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 1:00 to 5:45 p.m. There were 10 members and 25 guests present. Chairman Amy Hendrickson introduced herself and Maggie Highland as new chair and vice chair.

Presentations and Reports

Research Update - The Arthropod-Borne Animal Diseases Unit
D. Scott McVey, Arthropod-Borne Animal Diseases Research Unit

The Arthropod Borne Animal Diseases Research Unit's (ABADRU) research mission is to solve major endemic, emerging, and exotic arthropod-borne disease problems in livestock. The Unit completed the move to Manhattan, Kansas in 2010 and now the ABADRU is well established at the Center for Grain and Animal Health Research (CGAHR). All ABADRU research falls under the Agricultural Research Service (ARS) National Research Programs (NRP): NP103 and Animal Health and NP104, Veterinary, Medical, and Urban Entomology. The areas of research range from vector biology to virus-host interactions.

The potential introduction of Rift Valley fever (RVF) virus (RVFV) is the most significant arthropod-borne animal disease threat to US livestock. A number of challenges exist for the control and prevention of RVF in the areas of disease surveillance, diagnostics, vaccines and vector control. Understanding the epidemiological factors affecting disease outbreak and the inter-epizootic maintenance of RVFV is necessary for the development of appropriate countermeasures strategies. This includes the ability to detect and characterize emergent viruses. Outcomes of current research will potentially identify determinants of RVFV infection, pathogenesis and maintenance in mammalian and insect vector hosts. Information derived from these studies will also support vaccine development. Vaccine formulations will be developed to improve immunogenicity, onset of immunity and stability to provide better response to outbreaks and prevent RVFV epizootics. The Unit also has a similar, collaborative program investigating Schmallenburg Virus (SBV).

The viruses that cause bluetongue (BT) and epizootic hemorrhagic disease (EHD) are of concern to livestock producers in North America because of 1) the emergence of new serotypes, 2) increased reports of spillover and clinical disease in cattle, and 3) increased spread and adaptation to new geographical areas. Current projects in ABADRU include virus genotyping of more recent isolates, virus transmission and related pathogenesis, development of fluorescent microsphere assays for detection of virus-specific antibody and RNA, EHDV infection and transmission of whitetail deer, vector genetics, vector proteomics, vector transcriptomics, vector ecology/biology and vector control.

USDA in collaboration with Department of the Interior (DOI) organized a gap analysis workshop composed of international experts on Orbiviruses. The workshop participants met at the Arthropod-Borne Animal Diseases Research Unit in Manhattan, Kansas, May 14–16, 2013, to assess the available scientific information and countermeasures to effectively control and mitigate the impact of an outbreak of an emerging Orbivirus with epizootic potential, with special emphasis given to bluetongue virus (BTV) and epizootic hemorrhagic disease virus (EHDV).

The reference work has been published in *Vector-Borne and Zoonotic Diseases*:

Orbiviruses, Bluetongue and Epizootic Hemmorhagic Disease: Gap Analysis Workshop Report. 2013.

US Department of Agriculture, Agricultural Research Service, Washington, DC. http://go.usa.gov/BJ5F.

Q Fever Update

Don Knowles, Animal Disease Research Unit (ADRU), Agricultural Research Service (ARS) USDA

Coxiella burnetti is an obligate intracellular bacterium that causes disease in ruminants and humans. This zoonotic infection can cause flu-like symptoms in humans and abortion in ruminants and humans. The recent outbreaks of abortion caused by *C. burnetti* in small ruminants in the Netherlands and the United States have rekindled discussions concerning methods to control transmission. The primary problem related to *C. burnetti* is its environmental stability. Therefore, methods need to be found to decrease transmission from small ruminants into the environment. Future collaborative research will focus on genetic and immunological approaches to decrease small ruminant shedding of *C. burnetti*.

Eliminating the Effects of Foot Rot on Sheep Flocks in the Northeastern United States

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Foot rot in sheep was studied over a four-year period in an effort to eliminate the disease from flocks and in anticipation of identifying genetic resistance to the disease. The popularity of organic production methods and the trend toward reduction of antibiotic use in livestock informed this study, which did not include antibiotic treatment of sheep. The research team developed a 4-week protocol for implementation in flocks having signs and symptoms of lameness. The team and participating farmers actively implemented this protocol which included inspection, trimming, evaluation, segregation of sheep groups and weekly foot bathing with zinc sulfate. Twenty-two sheep farms in the northeast participated in this applied research project by providing their sheep for evaluation via farm visits. These farmers worked alongside the research team in handling the sheep, trimming feet and recording scores. Nearly 1,300 sheep were handled and evaluated over the life of the project. In addition to the protocol, blood was sampled from each sheep and sent with individual foot scores to the Agricultural Research Service (ARS) laboratory in Pullman, Washington for analysis in an effort to possibly identify a genetic marker for sheep showing resistance and/or susceptibility to the disease. Participating farmers were surveyed each year to determine foot health conditions in their respective flocks. Results from an end-of-project survey of these farms in December 2014 showed that the protocol was effective in 61% of the flocks. Willingness to cull “chronic” cases (animals with severely deformed hooves) was critical to success of the program. Preliminary evaluation of a subset of the sampled sheep suggests that susceptibility to foot rot may be genetically controlled. Initial genotyping was completed on approximately 240 animals using an Ovine SNP50 marker set that includes over 50,000+ single nucleotide markers. The results appear promising for additional genotyping and further genetic analysis. A more refined analysis is needed to determine a possible marker. Over the life of the project, materials were developed and presentations made to equip producers with knowledge and skills in addressing foot rot in their flocks. An on-line template for producers to design their own written biosecurity plan for disease prevention was initiated. To date, over 150 farms have used this tool. Informational items from the project web site have been used as a means to educate producers as well as agriculture service providers. Since its establishment, the project web site has received over 17,000 page views. The video on how to trim the feet of sheep received over 70,000 views. In addition, a 2-session webinar series on small ruminant foot health reached 36 and 33 individuals in the live broadcasts.

Records for the archived webinar sessions show that Session 1 was viewed over 900 times and Session 2 was viewed over 250 times. While genetic screening may become a useful tool, hands-on management and education will continue to be important for producers seeking help with this widespread disease. This project showed that even without the use of antibiotics, careful managers can eliminate foot rot by following a strict protocol of treatment and culling of chronic cases. The full text of the presentation is at the end of this report.

Insight into Mechanisms Regulating Immune Responses to *Haemonchus Contortus* Infection of Sheep

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Haemonchus contortus causes severe production losses in small ruminants and has become more problematic resulting from development of resistance to multipole drugs used to treat these infections. One approach to the problem is utilizing sheep that are resistant to gastrointestinal nematode (GIN) parasitism. One such breed is the St. Croix that we have shown to reduce fecal egg count to zero by five weeks after a primary infection and no detectable egg count during a challenge infection. Alternatively, Suffolk sheep generated high fecal egg count during both infections. The difference between the breeds lies in their ability to generate immune responses to invading larvae. Data generated in the West Virginia University laboratory has demonstrated that St. Croix sheep have greater cellular infiltrate, lymph node hypertrophy and cytokine production associated with a dramatic decrease in larvae compared to Suffolk sheep. There is a five-day delay in lymph node hypertrophy and a 7-day delay in production of the cytokine IL-4 in Suffolk sheep. These data have been further validated through in vitro studies that support the conclusion that early host immune responses prevent larval development to adult stages causing pathology observed by *H. contortus* infection. Failure of Suffolk sheep to mount immune responses to the infective larval stage permits adult establishment thus pathology observed in these sheep. To maintain productivity of economically-relevant breeds of sheep that utilize forage resources, exploration of immunomodulation of those breeds while grazing will be necessary.

Predictive Models in Policy and Decision Making

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This paper offers brief descriptions of modeling, as applied generally in risk assessments (RA) and specifically in some USDA RAs driving livestock policy. Issues are reviewed that relate to applications of science, model logic, validation, and representation of facts. Recommendations are offered for ways to prevent bad science in modeling and RA, and specifically, what can be done to ensure ‘best available science’ will be applied to studies from which livestock policies and decisions are formulated.

Risk Assessment

Risk assessment is a framework for processes used to obtain estimates of a projected magnitude and probability (risk) of an event (such as a disease outbreak) in some time period. Data, assumptions, and models that consider known causes of the event and possible mitigation steps are used to estimate predicted values for risk. If validated, results may be applied by governments to develop policy or to make decisions, as a means of managing or controlling risk. An RA offers a framework for viewing well-established information and data, and '---does not create new knowledge or information.'.[1] It is critical to understand that 'Risk assessment cannot be expected to compensate for lack of knowledge'[1], and to do so would be to operate under false pretenses.

Standards for RA --- the National Academies of Science:

In 1983, the National Academies of Science published guidelines for the science of RA, referred to as the 'Redbook'.[2] The report was motivated by stakeholder concerns that government policy considerations would distort '---scientific interpretations in risk assessments and [stakeholders] seek new institutional safeguards against such distortion.'.[1] It has been admonished further that '---risk managers should not attempt to alter those [Redbook] standards in specific cases simply to ensure that some pre-determined management objective is more easily achievable.'.[1] Different assumptions can be applied that manipulate and distort model results, which '--- lead to quite different predictions of risk.', and, thus, have '--- provided the opportunity for case-by-case manipulations of risk assessment results to achieve predetermined risk management objectives ---.'.[1]

Risk Assessment Steps:

The standard steps applied in an RA include hazard identification/assessment, dose response assessment, exposure assessment, and risk characterization. Hazard identification involves building a solid science-based case for the targeted agent, including specific information about the agent, clinical studies, mechanisms of action of the agent, and extensive evidence on the agent as the cause of the problem (i.e. disease). This step must provide solid scientific evidence for the hazard under question, and for all factors, including the agent of interest, known to contribute causally to the disease. Dose response assessment addresses how changes in the agent change risk of disease. Exposure assessment documents the population(s) under consideration, exposures in those populations, how individuals come into contact with the agent, sources of the agent, and mechanisms for transmission. This step also provides data about the doses observed in typical exposures, and temporal aspects of exposure and transmission.[1,2]

General Comments on Modeling:

Modeling has been used for decades to help understand biological processes and to predict what events might unfold following some alteration of factors that drive or influence those processes. Models often are used to provide a framework for thinking about relationship and dynamics of natural phenomena. With greater computational power offered by computers, modeling also has helped to gain insight into complex disease processes and to clarify voids or weak links in our understanding of those diseases. Providing

good quality data are available, computer generated models can offer a means to dis-entangle our view of causal pathways for complex and dynamic biological systems that operate through multiple and interacting factors. Use of models to predict future weather events is one classical example of predictive modeling.

Since the 1960's, models have been used to help policy and decision makers develop plans and projections that become the basis for government action. Engineering has had a long-standing history of modeling structural designs, engineering, and materials to project the most likely areas and times for failure. Risk assessment typically can involve use of models to identify and evaluate risks, the various components of risk, and the importance of each component in overall hazard assessment, where hazard is defined as the general threat being faced. An RA of salmonella in poultry, for example, could examine elements of carcass processing to identify the most likely (most probable) points for contamination by salmonella. The ultimate objective in an RA is to obtain validated estimates of probabilities that can be used to manage or mitigate the risks, in this example to reduce the hazard of salmonellosis in humans.

There are many varied applications of models and modeling being used to establish or influence livestock policy and decisions. For example, models are used in estimating diagnostic test accuracies, projecting the risk of importing foot-and-mouth disease (FMD) virus into the US, comparing hypothetical vaccination schemes for FMD in the face of an epidemic, and predicting transmission of pneumonia from domestic sheep to bighorn sheep, to mention a few. A basic rule-of-thumb, however, is that all models are wrong, but some models are less wrong than others.

Models used in these applications can be quite varied, ranging from statistical models (models applying mathematical theory of statistics), with generally well-developed theoretical underpinnings, to *ad hoc* mathematical models designed and crafted for the specific application, perhaps without much theoretical foundation and relying instead on fundamental biological knowledge and hypothetical pathways. Some models can be extraordinarily complex, such as those used in weather prediction that may consider a myriad of information involving data on ocean temperatures, jet stream location and speed, humidity, wind speed and direction, currents, etc. In contrast, models for diagnostic test accuracy may be comparatively simple.

Hazard assessment modeling:

In the hazard assessment step, an abundance of science should be presented such that solid, unambiguous documentation exists that the 'agent' causes the problem (i.e. disease) being considered.[1,2] Thus, prerequisites for any risk assessment are convincing data and studies anchoring cause-and-effect (the agent causes the disease in question). There are many approaches and experimental study designs that can be employed to address the question whether an agent or substance causes a disease. The National Academies, however, singles out one general type of evidence that must be included before cause-and-effect can be claimed in stating: 'Well conducted

epidemiologic studies that show a positive association between the agent and the disease are accepted as the most convincing evidence about ---disease.'.[2]

Epidemiologic studies involve the examination of multiple hypothesized factors as 'causes' of a disease. These studies utilize data and models that provide statistical evidence for factors *most likely* to affect disease occurrence, given the conditions of the study. The models will depend on the study design undertaken and on the specific type of data to be collected. Regardless of the approach, a general conceptual model must first be developed to layout a reasonably exhaustive list of potential (hypothesized) factors that could be causally connected to the disease. There should be scientific foundation for selection of the variables, where sound evidence can be found in the literature or highly compelling logic exists. As an example, consider an epidemiologic model for pneumonia in bighorn sheep, where emphasis here is on illustrating conceptualization and transition of an initial 'simple' model to more formal models, rather than correctness of the model.

Conceptual model of pneumonia in bighorn sheep might be:
First iteration (very general):
Pneumonia (clinical occurrence) = weather + stress + parasites+ bacteria + viruses + age + nutrition
More specific:
Pneu = min daily temp + cum snow + stress (qualitative) + worms (y/n) + OPP/CAEV (y/n) + bacteria + years from median herd age + daily Kcal intake.
General statistical model might be:
Prob $(pneu)_t$ =
$Y + X_1 Tmin_t$
$+X_2 Cumsnow_t+X_3 Stress_t+X_4 Worm_t+X_5 Virus_t+X_6 Bacteria_t+X_7 Age_t+X_8 Kcal_t+$ error.

In words, this expression says that the probability of a case of pneumonia occurring by time t (say after lambing) is a function of (is influenced by) some unknown value (intercept-Y) and the hypothesized variables observed at time t. The statistical analysis, in this case an event-history analysis, would indicate which variable(s) contributed in a statistically 'significant' way to the variation observed in the proportion of animals with pneumonia. The X's indicate the strength of an association. This simple model would examine only the 'main' effects of the variables, but not interactions between variables. For example, the effect of cold temperatures might be more likely to predispose to pneumonia if the animal was very young or very old, or if energy intake was low rather than high. Consequently, models can become somewhat complex in order to address real and important biological dynamics. When applied to modeling, the fallacy of *Occam's Razor*, which states that simpler is better, will greatly ease the work of the modeler, in not having to mess with biological detail, while simplifying-away the gist of the biology and important causality being considered. Predicting biological events, such as transmission of disease agents, must consider the complex interacting webs of causation, as

well as disease transition states in the pathogenesis of disease. Otherwise, the models only pervert to make-believe exercises.

Development of models, therefore, requires careful attention to pathogenesis and natural occurrence of diseases, where clinicians and other disease experts should be involved in design to assure the most biologically plausible models are considered. Typically, epidemiologic models undergo several iterations to ascertain various prediction scenarios and to run diagnostic tests to ensure the models hold up to the underlying mathematical assumptions. Results of a completed model may provide estimates of the effect of variables with significant influence on the outcome (e.g. pneumonia), which can be used to obtain estimates of attributable risk and other measures that provide pragmatic metrics for 'how much pneumonia' was due to a factor. A strong temptation is to conclude that results of such a study will apply to future pneumonia cases in that study herd, or worse--- to all pneumonia cases in all herds at all times. This problem relates to fallacies of inductive reasoning and to how we consider validity of the model (see validation below). The only truthful conclusion would be that results relate only to the herd studied for that specific study period when the observations were made. Thus, as the National Academies of Science notes,[2] well designed epidemiologic studies are prerequisite elements in hazard assessment in order to make confident claims that a factor is a cause of a disease.

Predictive-type Models:

Generally, predictive models are developed to project 'what if' scenarios where one wishes to obtain some sense for how an outcome might be altered if various exposures or elements of a process change. Risk assessments, and the models developed for RA, do not create new knowledge and cannot compensate for a lack of knowledge. As an initial step, a conceptual idea or model of the process at hand is crafted to identify elements and mathematical relationships that offer a logical depiction of the biological process of interest. The model indicates the parameters of interest and assumptions of the parameter values.

As an example, suppose we wish to 'predict' the likelihood (probability) that one will become infected with a cold virus after entering a room of people and occupying it for some period of time (t). The process being depicted involves the transmission of an infectious agent, which will be assumed here (for simplicity) to be transmitted only by physical contact with an infected person. We apply the disease transition states, namely susceptible, resistant, and infected-and-shedding, as well as infectious dose. In addition, we make an assumption about the likelihood of contact (Prob(con)), which we will assume to be 0.2 (20%), meaning that if a person entered the room ten times, on average, a contact would take place during two of those times. The model assumes, based on known infectious disease concepts, that a transmission event will take place under the following conditions: the person entering the room must be susceptible (not already infected) (probability=Prob(Susc)), and must make contact with an infected person (probability=Prob(Inf)). In turn, that infected person must be shedding the virus (probability=Prob(Shed if inf) at an

infectious dose to which the recipient is susceptible (probability=Prob(Dose if inf and shed)).

The probability of transmission in the time period t, Prob($Trans_t$), is the product of these probabilities, indicating all conditions must be met in order for transmission to take place, or

Prob($Trans_t$) = Prob(Susc) x Prob(Inf) x Prob(Shed if inf) x Prob(Dose if inf and shed) x Prob(Con).

Let the following probabilities (fictitious) be assumed here for the transition states:

Prob(Susc)	= 0.9
Prob(Inf)	= 0.1
Prob(Shed if inf)	= 0.5
Prob(Shed inf dose if shed)	= 0.5

-or-

Prob($Trans_t$) = 0.9 x 0.1 x 0.5 x 0.5 x 0.2 = **0.0045**. (one in 222).

Thus, in this contrived example, the estimated probability of a person becoming infected with a cold virus after entering a room of people is 0.0045, meaning that one out of 222 such experiences would result in infection with a cold virus. The realistic conditions that must be met are that the room must be occupied, and that no barrier exists to contact; the probability of transmission would be zero if the room were empty or if contact were not possible during the period of occupancy.

This estimate does not represent the probability of acquiring a cold (clinical symptoms), which would represent an additional step, or 0.0045 x Prob (clinical manifestation if infected). For diseases with more complex causes, such as pneumonia, as indicated in the above model, the predictive models for clinical disease following exposure to an infectious agent would require inclusion of all other factors known to cause the disease (e.g. weather, stress, nutrition, etc.). In this sense, we cannot say that diseases like pneumonia are 'transmissible' because they are caused in part by factors that are themselves not transmissible, such as weather, stress, nutrition, etc. Attempts to model complex diseases, like most respiratory diseases, as transmissible events would illustrate a lack of understanding of disease pathogenesis and epidemiology.

Note that the elements presented here, the logic for the sequence, and assumed probability values used are in part 'made up' or fictitious, for purposes of presentation. Any predictive modeling used in a RA, however, must include strong justification for the logic, elements, and assumed values of parameters, including citation of literature and/or presentation of actual data.[1,2] A RA should address the question: 'how accurate is the prediction model', and thus, a model should not be applied in a RA unless/until it has undergone a validation process to estimate accuracy (see validation below). Recall the rule of thumb; all models are wrong --- some are less wrong.

'Best available science --- and science ethics' in modeling:

One question that must be asked of any RA and model is whether it represents application and practice of 'best available science'. We see that

definitions of 'science' have many variations, including pursuit of knowledge and truth, and a highly disciplined practice involving dispassionate search for underlying mechanisms about the world and universe. Good science, whether undertaken by modelers or not, is expected to represent application of well-designed studies, with critical, truthful, and reasoned interpretation of scientific literature, non-fraudulent data and assumptions, and non-fallacious and logical conclusions. Such pursuits must employ a skeptical, but unbiased and non-prejudicial mindset, and a willingness to change one's mind when data and logic so dictate. What are some signs of bad science, or contradictions to 'best available science'?

A cornerstone anchoring the foundation for any scientific endeavor, including modeling, is the critical analysis of what is already known, or thought to be known. Scientific ethos dictate an honest understanding of the literature, including a faithful and truthful rendering and citation of findings (not mere parroting an author's opinion), as they follow from the methods and as they relate to the broader inferences being addressed. One-way counterfeit science and modeling is revealed is by a documented failure to accurately and truthfully support statements of fact. Citations may reveal misinterpretations of the results, reference to results that were obtained using improper methodology or data, or reference merely to an author's opinion or interpretation of results as fact. One who fails to truthfully characterize and cite published findings, regardless of intentions, is guilty of falsifying scientific testimony.

Another sign of bad science is use of fallacious reasoning to support statements of fact. Examples include the fallacy that 'correlation equals causation' and the *post hoc ergo propter hoc* fallacy (meaning 'after this therefore because of this'). The high correlation between smoking and lung cancer was, at one time, believed to mean that coffee consumption caused lung cancer, when in fact the strong correlation between coffee consumption and smoking was responsible for the erroneous conclusion. As an example of the *post hoc ergo propter hoc* fallacy, one would conclude that, if a man developed cancer after being observed riding a bicycle, the bicycle caused the cancer.

Validation of Models:

Validation in the context of modeling refers to the process of estimating accuracy of a model in predicting some event or outcome. Completion of a validation process does not mean a model is valid, correct, or accurate. Generally, a validation process compares the predicted number of outcomes with the number of outcomes observed under natural (real-life) conditions. One needs to know, for example, whether the model predicted 80%, 50%, or 5% of the real events/outcomes. Without validation information, one has no clue as to whether the model has any legitimacy. Weather models offer a unique perspective into validation, whereby the observed data always follow predicted data. Consequently, weather models undergo a continuous validation process to identify parameters and parameter values that need to be 'tweeked' to improve accuracy. The National Academies of Science 'Reference Manual on Scientific Evidence' admonishes that models should

hold little legal standing without validation, and that mere publication in a scientific, peer reviewed journal does not mean a study represents any sense of the truth or that findings can be viewed as having any validity.[3]

USDA Payette and Snow Mesa risk assessments and policy-decision:

Payette and Snow Mesa RAs:

The Payette and Snow Mesa RAs undertaken by the USDA Forest Service have been used to develop policy to close domestic sheep allotments in the Payette National Forest and the Snow Mesa region.[4,5] The USDA's presumption underlying the RAs is that contact of a bighorn sheep (BHS) with a domestic sheep will result in 'transmission of respiratory disease' that eventually results in die-offs of BHS. Review of these RAs reveals an absence of key steps, 'best available science', and ethics required in RA and modeling, and in science in general. Some of the more egregious issues revealed in these RAs are described below.

Presenting false testimony:

The Snow Mesa and Payette RAs make several statements of fact claiming domestic sheep transmit disease to BHS, including, for example the statement in the Snow Mesa RA: '--- extirpation [of bighorn sheep herds] due to respiratory diseases, *which can be transmitted by domestic sheep or goats (Besser et al. 2012b, Cassirer et al. 2013)*, appears to be the greatest concern for bighorn sheep population persistence on the Rio Grande National Forest (USDA Forest Service 2010).' There is no scientific foundation for this (italicized) statement based on USDA's citations. Neither publication[6,7] presents any methodology or results for 'transmission of respiratory disease', nor did either examine any domestic sheep as study subjects. Similar false testimonies persist throughout the Payette and Snow Mesa RAs. Such significant misrepresentation of published results is a serious scientific offence and violation of trust, and suggests the papers and literature as a whole were not reviewed by scientists or not read at all --- or findings were surreptitiously misrepresented. These falsifications are even more serious considering they refer to the core of the USDA hypothesis that domestic sheep are responsible for the decline of BHS. This deception casts a pall over ethics and quality of science applied overall in both of these USDA RAs.

False testimony also has been presented using fallacious reasoning. Throughout the RAs the USDA applies the classical *post hoc ergo propter hoc* fallacy to claim causality. The RAs say that because there was an observation of contact between a BHS and a domestic sheep, presumably before a BHS die-off was observed, a subsequent die-off must have been caused by that contact. The USDA also is specious in this argument because it ignores the other logical observations, including contacts observed after a die-off, die-offs with no observed contacts, and contacts with no observed die-offs. Similarly, studies finding that when BHS and domestic sheep are co-mingled in forced and highly stressful close confinement, BHS develop respiratory disease. The USDA has chosen to interpret such a correlation as evidence that contact with domestic sheep causes disease in BHS. These types of non-critical and

fallacious thinking have no place in 'currently available science', let alone in an elevated position at the core of a thesis.

Hazard identification/assessment and dose response:

Neither of these RAs met the minimal standards set forth in the Redbook for risk assessment, nor did they address or meet the indispensable, or *sine qua non*, requirement that 'Well conducted epidemiologic studies that show a positive association between the agent and the disease are accepted as the most convincing evidence about ---disease.'.[2] No attention was given to the causality of pneumonia, including the multitude of factors that can contribute to predisposition and onset (e.g. weather, nutrition, stress, etc.). Both RAs misrepresented disease processes and epidemiology of pneumonia by referring to transmission of pneumonia or respiratory disease, which itself is not transmissible, at noted above. No presentations were offered for dose response of the agent, mechanisms of action, mechanisms of disease, or exposures. In fact, the Snow Mesa RA made no mention of the agent the USDA had in mind as a cause of bighorn sheep pneumonia die-offs. In the Payette RA, *Mannheimia haemolytica* was offered as a putative agent, which the USDA noted is a commensal bacteria in many animal species. The RA did not address whether the agent was a *necessary* or a *sufficient* cause of pneumonia.[8] *M. haemolytica* is not a necessary cause of pneumonia because other agents also can cause pneumonia, and it is not a sufficient cause of pneumonia because not all animals with *M. haemolytica* have pneumonia. So, what causal relationship, if any, is there? In short, one must wonder how the USDA reconciles establishing a policy to prohibit contact between domestic sheep and BHS that is based on an inadequate RA that failed to provide a legitimate (without false testimony) case for cause-and-effect for an agent, a mechanism for exposure to domestic sheep, or an agent dose response, to mention a few omissions of vital information. Why were standards for 'best available science' in conducting an RA, known for more than three decades,[2] not applied in these USDA RAs? When such critical data cannot be obtained to achieve the minimal information necessary, ethics and good conscience science dictate that risk assessment efforts '---must be forsaken'.[1]

Model for probability of contact and subsequent disease:

The Payette RA[4] created a 'model' for the probability that a bighorn sheep would acquire pneumonia after crossing into a domestic sheep allotment. The model disregarded the transition state elements described above (e.g. fictitious cold virus example), and instead assumed only one parameter, namely the probability of contact and acquisition of pneumonia from a domestic sheep. The USDA assumed this probability ranged from 5% to 100%, meaning the probability of contact was assumed to be 100% (transmission could not occur without contact). The RA failed to consider the natural biological process of transmission, or to provide any valid foundation for the assumptions. It is quite easy, as noted above, to apply different assumptions in order to manipulate and distort model results, which '--- lead to quite different predictions of risk.', and, thus, have '--- provided the opportunity for case-by-case manipulations of

risk assessment results to achieve predetermined risk management objectives ---'.[1]

Not only do the high probability values indicate an ignorance of natural disease transition states, an assumed probability of contact of 1 (100%) also is nonsensical in that one would not expect the probability of contact to be the same, let alone 100%, if domestic sheep were ten feet from the allotment line and a BHS as if they were two miles from the line. Worse yet, the USDA assumed that contact and transmission would take place even if the allotment were not occupied by any domestic sheep whatsoever, which obviously is impossible. The Snow Mesa RA[5] was no better; it merely characterized the probabilities into low, medium, and high risk categories, again without any supporting data. In other words, using the analogous cold virus model above, the erroneous logic applied by the USDA would have one believe a person could become infected with a cold virus, which would require contact with an infected person, after entering an empty room. As aptly stated elsewhere, the models appear to involve '---the alleged distortion of science by government risk assessors, to ensure that risk managers received the answers they wanted, so that they could decide to regulate, or not to regulate, depending upon how they perceived the social, economic, and political pressures under which they were operating.'.[1]

Model for a bighorn sheep contacting an allotment:

In both RAs, the USDA assumed that BHS movement away from their home range and into a domestic sheep allotment would follow a model created for foraying BHS.[9] The model used data from captured, radio-collared BHS in Hells Canyon to estimate the extent of typical forays. The methods violated basic scientific standards by using data from animals (in Hells Canyon) that were not representative of animals in the Payette or Snow Mesa herds, as well as by using data that were not representative of foraying animals with normal foraying behavior or foraying inducements. A bias, akin to a Hawthorne effect,[10] was introduced whereby procedures imposed by the capture and radio-collaring would alter the outcome observed. That is, the traumatic and fear-inducing process by which BHS were trapped, captured, sedated, examined, and radio-collared could induce a change in foraying behavior. In an effort to flee their home range area, where they experienced the noxious event, they may well have forayed farther and more frequently, compared with non-radio-collared (normal) BHS. Because there were no 'control groups' in this study, as 'best available science' would dictate, one cannot truthfully claim or assume that the traumatic process of collaring did not itself explain the foraying data reportedly observed and modeled. Thus, a simple explanation for the foray results is that the act of being radio-collared induced an escape behavior resulting in frequent and long-distance forays, and the data would have no relevance to foray behavior of non-collared, normal BHS.

Validation:

None of the models or analytical methodologies used in the Payette or Snow Mesa RAs were validated. Consequently, there are no estimates of accuracy in projections of BHS home ranges, foraying proportions or

distances, or of contact and transmission probabilities, all of which were critical elements the USDA used to develop its policy to close domestic sheep allotments. Application of non-validated models not only does not square with expectations for the 'best science available', it also runs counter to explicit admonitions of the National Academies of Science, namely that models must undergo validation --- and peer-reviewed publication does not constitute validation.[3] These non-validated models build one upon another, further compounding falsehoods and corrupting truth, and, as a consequence, render baseless any policy emerging from these RAs.

In summary, legitimate and serious concern is raised about the poor quality of science revealed in the USDA's RAs and in their models. The issues include presenting false testimony about causes of respiratory disease in BHS, fallacious reasoning applied to interpretation of publications, and failure to provide minimal hazards identification or requisite vital information on causation. In addition, the RAs applied anomalous and nonsensical models to predict contact and disease. It is difficult to imagine why the USDA would undertake such flawed science, which only serves to present an appearance of deception or hoax. One would hope and expect that the USDA should set an example for good science, as is done through the ARS, in promoting and exemplifying rigorous and honest pursuits of truth, rather than contriving an impersonation of science aimed at justifying its policy agenda, namely exclusion of domestic sheep from government lands.

Other failures of government modeling and policy:

One of the most disastrous failures of modeling, as applied to policy and decision making, was use of a contrived model to dictate FMD eradication policy of the UK in 2001.[11] The model assumed incorrectly that a quarter of transmission was 'local', and thus predicted that culling contiguous herds near an infected herd would stop the epidemic. Convinced administrators directed that millions of uninfected livestock be killed, believing their 'science-based' policy would quickly put to end the epidemic and save millions. It did not happen. Instead, perhaps millions of uninfected livestock were destroyed.[12] In a related issue, USDA claimed its risk assessment showed it was safe to import beef from Argentina and Brazil, both of which have foot-and-mouth disease (FMD). Congress, however, found the risk assessment inadequate and disallowed budgeting until the Secretary of Agriculture '---conducts an updated comprehensive risk evaluation of importing beef produced in Argentina and Brazil---.'.[13] Just recently, an appeals court over-ruled an Environmental Protection Agency (EPA) RA of the pesticide, in failing to show necessary and substantial data that the pesticide was not toxic to honey bee colonies and 'The [EPA] did not adequately study the pesticide sulfoxaflor'.[14] As a likely prelude to requesting funds to control ebola in Africa, a Centers for Disease Control (CDC) model predicted 1.4 million deaths by last January 2015, which clearly failed the real-world validation test.[15] A Department of Homeland Security (DHS), USDA-sponsored RA projecting spread of FMD virus from the proposed National Bio and Agro-Defense Facility (NBAF) laboratory in Kansas was reviewed by the National Academies of Science,

which concluded the RA '---was inadequate due to flawed methods and assumptions which potentially underestimated the risk of an accidental FMD release from the NBAF in Manhattan, Kansas.'.[6] Considerable concern has been expressed for the abuse of these non-validated prediction models, referred to as 'the Emperor's new clothes',[17] particularly when basic disease biology has been ignored.

What can be done to ensure 'best available science' has been applied in livestock policy and decisions?

Suggestions for actions that collectively would help ensure that best available science has been and will be applied to livestock policy and decisions include:

1. AVMA and university graduate programs should require curricula to include instruction in research ethics and critical thinking.
2. USDA and DHS (and other agencies) should require research staff to complete an on-line course in research ethics and critical thinking.
3. Before commencing work, USDA, DHS, and other agencies should be required to submit for outside, independent scientific review and acceptance the proposed project plan for risk assessment or other studies that could be used in livestock policy and decisions.
4. Before implementing policy or decisions, USDA, DHS, and other agencies should be required to submit for outside, independent scientific review and acceptance the completed project.
5. Employees of USDA, DHS, and affiliated agencies should not be allowed to serve as reviewers for scientific journals or other review boards considering USDA or DHS-funded projects or of other projects that could form a basis for livestock policy or decisions.
6. USAHA should pass resolutions strongly recommending the above requirements.
7. USAHA should create a standing committee to address and review science-based government policy and decisions.
8. Congressional action on recommendations should be encouraged.

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The following presentations were given to the Committee. These presentations are available on the Committee web page.

Bacterial Pneumonia in Sheep, The Domestic –Bighorn Sheep Interface, and Research at ADRU
M. A. Highland, Washington State University

US Sheep Experiment Station (USSES) Research Update and Animal Disease Research Unit (ADRU), Agricultural Research Service (ARS), USDA Collaborative Research Overview
Presented by M. A. Highland, Washington State University (on behalf of Bret Taylor, US Sheep Experiment Station)

Determining Seroprevalence of *Brucellaovis*in US Sheep Flocks
Presented by M.A. Highland, on behalf of Kerry Sondgeroth, University of Wyoming, Wyoming State Veterinary Laboratory

Committee Business:

One resolution was discussed in regard to concerns over the need for established criteria in government agencies for evaluating research that is used to support animal health policy decisions. Resolution was moved by Paul Rodgers and seconded by Jim Logan. After extensive discussion the question was called. The committee voted in favor of the resolution with one nay vote. The individual voting against the resolution informed the other members that he is supportive of the concept but is concerned about the possible unintended consequences of the request as set forth.

There had been a request to place discussion of Veterinary Feed Directive but it was decided that the matters of concern had been addressed elsewhere during the full meeting.

With no further business to be discussed, the Committee adjourned at 5:45 p.m.

REPORT OF THE COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

Chair: Dale Lauer, MN
Vice Chair: Sarah Mason, NC

Bruce Akey, TX; Lyndon Badcoe, WA; Deanna Baldwin, MD; Richard Breitmeyer, CA; Deborah Brennan, MS; Paul Brennan, IN; Steven Clark, NC; Robert Cobb, GA; Stephen Crawford, NH; Tarrie Crnic, KS; Susan Culp, TX; Thomas DeLiberto, CO; Brandon Doss, AR; John Dunn, MI; Brigid Elchos, MS; Naola Ferguson-Noel, GA; Larry Forgey, MO; Tony Forshey, OH; Nancy Frank, MI; Tony Frazier, AL; Isabel Gimeno, NC; Eric Gingerich, IN; John Glisson, GA; Tanya Graham, SD; James Grimm, TX; Paul Grosdidier, KS; Scott Gustin, AR; Steven Halstead, MI; William Hartmann, MN; Julie Helm, SC; Michael Herrin, OK; Linda Hickam, MO; Heather Hirst, DE; Donald Hoenig, ME; Guy Hohenhaus, MD; Danny Hughes, AR; Dennis Hughes, NE; John Huntley, WA; Russell Iselt, TX; Mark Jackwood, GA; Jarra Jagne, NY; Eric Jensen, AL; Annette Jones, CA; Donna Kelly, PA; Bradley Keough, KY; Bruce King, UT; Michael Kopp, IN; Elizabeth Krushinskie, DE; Elizabeth Lautner, IA; Chelsie Lawyer, IN; Randall Levings, IA; Anne Lichtenwalner, ME; Tsang Long Lin, IN; Mary Lis, CT; David Marshall, NC; Rose Massengill, MO; Sara McReynolds, ND; Shelley Mehlenbacher, VT; Gay Miller, IL; Sarah Mize, CA; Lee Myers, GA; Thomas Myers, MD; Jamie Ng, NY; Steve Olson, MN; Kristy Pabilonia, CO; Mary Pantin-Jackwood, GA; Boyd Parr, SC; William Pittenger, MO; Jewell Plumley, WV; Willie Reed, IN; G. Donald Ritter, DE; Keith Roehr, CO; Susan Rollo, TX; A. Gregorio Rosales, AL; Yuko Sato, IN; Travis Schaal, IA; David Schmitt, IA; Andy Schwartz, TX; Sheryl Shaw, WI; Marilyn Simunich, ID; John Smith, GA; Diane Stacy, LA; Patricia Stonger, WI; Darrel Styles, MD; David Suarez, GA; Manoel Tamassia, NJ; Alberto Torres, AR; Susan Trock, GA; Shauna Voss, MN; Doug Waltman, GA; James Watson, MS; Steve Weber, CO; Richard Wilkes, VA; Ching Ching Wu, IN; Andrea Zedek, SC; Bereket Zekarias, KS; Ernest Zirkle, NJ.

The Committee met on October 26, 2015 from 1:00 to 6:00 p.m. and October 27, 2015 from 1:00 to 6:00 p.m. at the Rhode Island Convention Center in Providence, Rhode Island. There were 57 members and 69 guests present for a total of 126 participants. Chair Dale Lauer presided assisted by Sarah Mason, Vice Chair. The Chair welcomed the Committee members and summarized the 2014 meeting. Noteworthy events include the appointment of Dr. Alberto Torres to the National Animal Health Reporting System (NAHRS) Steering Committee, the meeting of the Poultry Respiratory Disease Coordinated Agricultural Project PRDCAP & NC 1180 Committee on Wednesday October 28, 2015 and a revised agenda format that would focus on the 2015 Highly pathogenic avian influenza (HPAI) event in the United States. There were no resolutions passed in 2014.

Presentations and Reports—Session 1
2015 HPAI Response and Analysis

USDA HPAI Response was presented by Dr. Burke Healy, USDA-APHIS-VS, Livermore, CO. A summary of the report is included in these proceedings.

California HPAI Response was presented by Dr. Annette Jones, California Department of Food and Agriculture, Sacramento, CA. A summary of the report is included in these proceedings.

Minnesota HPAI Response was presented by Dr. Shauna Voss, Minnesota Board of Animal Health, Willmar, MN. A summary of the report is included in these proceedings.

Wisconsin HPAI Response was presented by Dr. Myron Kebus, Wisconsin Department of Agriculture, Madison, WI. A summary of the report is included in these proceedings.

Use of Ventilation Shutdown for Mass Depopulation of Poultry in Emergency Situations was presented by Dr. Eric Gingerich, Diamond V, Zionsville, IN.

Highly Pathogenic H5 Avian Influenza Viruses in the Americas was presented by Dr. David Suarez, Agriculture Research Service, USDA, Athens, GA. A summary of the report is included in these proceedings.

Molecular Epidemiology of the H5 Clade 2.3.4.4 in the United States was presented by Dr. Mia Kim Torchetti, NVSL, USDA, Ames, IA. A summary of the report is included in these proceedings.

A Wild Bird Avian Influenza Surveillance report was presented by Dr. Tom Gidlewski, USDA-APHIS, Wildlife Damage, Fort Collins, CO. A summary of the report is included in these proceedings.

HPAI Epidemiology, USDA Perspective was presented by Dr. Brian McCluskey and Dr. Lindsey Garber, USDA-APHIS-VS, Fort Collins, CO. A summary of the report is included in these proceedings.

HPAI Epidemiology, Minnesota Perspective was presented by Dr. Michelle Kromm, Jennie-O Turkey Store, Willmar, MN. A summary of the report is included in these proceedings.

The Monday session adjourned at 6:00 p.m. The Committee reconvened at 1:00 p.m. on Tuesday, October 27, 2015.

Presentations and Reports—Session 2
2015 HPAI Recovery Activities / Moving Forward

2015 HPAI Assessment, Moving Forward was presented by Dr. John Clifford, USDA-APHIS-VS, Riverdale, MD. A summary of the report is included in these proceedings.

USDA HPAI Fall Planning Activities was presented by Dr. Patricia Fox, USDA-APHIS-VS, Raleigh, NC. A summary of the report is included in these proceedings.

USDA Biosecurity Perspective was presented by Dr. Lee Ann Thomas, USDA-APHIS-VS, Riverdale, MD. A summary of the report is included in these proceedings.

Minnesota HPAI Education and Biosecurity Reviews was presented by Mr. Steve Olson, Minnesota Turkey Growers Association, Chicken and Egg Association of Minnesota, Buffalo, MN. A summary of the report is included in these proceedings.

Layer Biosecurity was presented by Dr. Travis Schaal, Hy-Line International, Dallas Center, IA. A summary of the report is included in these proceedings.

HPAI Vaccines was presented by Dr. David Swayne, Southeast Poultry Research Laboratory, ARS, USDA, Athens, GA. A summary of the report is included in these proceedings.

Secure Poultry Supply Plans was presented by Dr. Julie Helm, Clemson University Livestock Poultry Health, Columbia, SC, and Dr. Eric Gonder, Butterball, LLC, Goldsboro, NC. A summary of the report is included in these proceedings.

Abstracts were made available to members of the Committee. There was no discussion made. These included:

Broiler Industry abstract by Dr. Deirdre Johnson, Mountaire Farms, Inc., Millsboro, DE was made available at the meeting. A complete report is included in these proceedings.

Table Egg Industry abstract by Dr. Eric Gingerich, Diamond V, Zionsville, IN was made available at the meeting. A complete report is included in these proceedings.

Turkey Industry abstract by Dr. Steven Clark, Devenish Nutrition, Fairmon, MN was made available at the meeting. A complete report is included in these proceedings.

Live Bird Marketing System report by Dr. Fidelis Hegngi, USDA-APHIS-VS, Riverdale, MD was made available at the meeting. A complete report is included in these proceedings.

Avian Disease and Oncology Lab (ADOL) Research Update was made available Dr. John Dunn, USDA-ARS-ADOL. A complete report is included in these proceedings.

AI and Newcastle Disease Subcommittee report was presented by Dr. David Suarez, ARS-USDA, Athens, GA. A summary of the report is included in these proceedings.

National Poultry Improvement Plan report was written by Dr. Denise Brinson, USDA-APHIS-VS, Conyers, GA, presented by Dr. Patricia Fox, USDA-APHIS-VS, Raleigh, NC. A summary of the report is included in these proceedings.

NVSL Avian Influenza and NDV Diagnostic Report was presented by Dr. Mia Kim Torchetti, NVSL-USDA, Ames, IA. A summary of the report is included in these proceedings.

NVSL Bacteriology Diagnostic Report was presented by Ms. Brenda Morningstar, NVSL-USDA, Ames, IA. A summary of the report is included in these proceedings.

Committee on Salmonella Report was presented by Dr. Doug Waltman, Georgia Poultry Laboratory Network, Gainesville, GA. A summary of the report is included in these proceedings.

Committee Business:

The Avian Influenza/Newcastle Disease Subcommittee Report as presented by Dr. David L Suarez was approved by Committee.

No Recommendations were proposed

Four resolutions were brought before the Committee for consideration. These resolutions included:

1.) PCR diagnostics for avian influenza in National Poultry Improvement Plan (NPIP) Authorized Laboratories;

2.) Use of Highly Pathogenic Avian Influenza Secure Egg Supply Plans, Secure Broiler Supply Plans and Secure Turkey Supply Plans during an HPAI event;

3.) Use of Ventilation Shut Down for Mass Depopulation of Poultry to Control Highly Pathogenic Avian Influenza;

4.) Incorporation of poultry industry biosecurity oversight into the National Poultry Improvement Plan (NPIP).

The Committee considered, reviewed and had a thorough discussion of each proposed resolution. Resolution (1) failed. Resolutions (2), (3) and (4) were approved by Committee and submitted to the Committee on Resolutions.

There being no further business the Committee adjourned at 6:00 p.m., October 27, 2015.

REPORT OF THE SUBCOMMITTEE ON AVIAN INFLUENZA AND NEWCASTLE DISEASE

David L Suarez, Chair
Agriculture Research Service (ARS), USDA

A review of World Organization of Animal Health (OIE), Food and Agriculture Organization (FAO), World Health Organization (WHO), Pro-Med Mail reports, and other sources were reviewed to provide an overview of avian influenza outbreaks of consequence worldwide for the past year.

The goose/Guangdong/96 H5N1 highly pathogenic avian influenza (HPAI) outbreak continues with several notable changes in the past year. The virus remains endemic in China, Vietnam, Indonesia, Egypt, and Bangladesh. The virus has also been reported in poultry from several other countries in Asia including Bhutan, Laos, North Korea, Israel, Palestine, and Iran and wild bird isolates were reported from Kazakhstan and Russia. This lineage of virus continues to antigenically drift, and viruses are characterized up to fourth order clade designations. However, little sequence information is available for these outbreaks, so it is difficult to determine the molecular epidemiology connections between the outbreaks. The most significant new outbreak of H5N1 is in West Africa where Nigeria, Niger, Burkina Faso, Cote D'Ivoire, and Ghana. The outbreak in Nigeria in particular is widespread throughout the country. Controls efforts in Nigeria include indemnity payments to affected farmers, but reports of insufficient payments and other logistical difficulties continue to hamper control efforts. The lack of a strong veterinary surveillance system in any of the countries likely masks the true extent of infection. The FAO has requested international support to help control the outbreaks. Another country with multiple outbreaks was India. India reported three separate outbreaks, in both poultry and wild birds, that geographically were widely distributed. Official reports describe the virus as being under control, but under reporting cannot be ruled out.

The H5N8 clade 2.3.4.4 virus that has caused such severe problems in the United States and Canada has also been found in many other countries. The virus has continued to be a problem in South Korea where it was first reported in early 2014 and new outbreaks were just recently reported. Outbreaks in Japan, Netherlands, United Kingdom, Germany, and Italy had reports of wild bird and poultry introductions in November 2014. Later reports from Hungary in February 2015 and Romania in wild birds in April 2015 were also reported. The outbreaks did not spread widely and were contained. H5N8 outbreaks and reassorted H5N2 viruses were also reported in Taiwan, where they have continued to cause outbreaks.

The closely related H5N6 2.3.4 viruses have been reported in several countries in 2014-15 including China, Vietnam, and Hong Kong. These viruses share a hemagglutinin gene that is closely related, but distinct form the H5N8 viruses, but it has a similar internal gene cassette. This virus lineage has been reported in poultry and in wild birds. Of some concern is the reports of several human infections with this lineage of virus in China and Hong Kong.

Other HPAI outbreaks have been reported. Taiwan has had a continuation of the Mexican origin H5N2 outbreak and a new H5N3 outbreak in 2015. Germany also reported a H7N7 HPAI outbreak in July 2015 on one farm. This outbreak is presumed to be caused by a low pathogenic avian influenza virus mutating to the highly pathogenic form of the virus. A similar but unrelated H7N7 HPAI outbreak occurred in the United Kingdom in June 2015. Both outbreaks appear to be contained. Mexico continues to suffer with H7N3 HPAI in spite of widespread vaccination. Some official reports from Mexico to OIE of outbreaks in backyard flocks were reported in 2015, but based on unofficial industry results, outbreaks in commercial poultry are common.

Two significant avian influenza zoonotic events occurred in 2015. First, the H5N1 outbreak continues to cause sporadic human cases. However, Egypt reported a large increase in human cases in 2015 with 136 cases and 39 deaths. The reason for this large increase in cases is unclear. The Chinese H7N9 outbreaks continues to follow a predictable pattern with the third wave of human infections occurring in 2014-15 season, and new human cases are already being reported as part of the fourth wave in the 2015-16 season. Currently there are 680 confirmed human cases with 271 deaths, almost all occurring in China. Most human infections are still linked to exposure to poultry in live poultry markets, and the principal control tool is to close markets associated with human deaths. Poultry surveillance continues within China, but with relatively few reported detections of the virus. Because the virus does not cause disease in poultry, little effort is being made to control the infection in poultry. Sporadic human cases of H9N2 continue to be reported, but disease severity in humans remains low. The H9N2 continues to be a major problem for poultry production in the Asia and the Middle East, and vaccination for control is commonly used.

Virulent Newcastle disease virus (NDV) continues to be a major poultry disease pathogen in Asia, Africa, South America, and Mexico despite the heavy use of vaccination. Previous work has clearly shown that homologous vaccination provides increased protection as measured by levels of viral shedding. However, when looking at protection from mortality in the laboratory, the commonly used vaccines, like B1 or LaSota, provide excellent protection. Studies were performed to compare LaSota vaccine and reverese genetics vaccines that are homologous to the challenge virus. In an attempt to show clinical differences in mortality, a high challenge dose with an early challenge was used. Vaccinated birds are usually challenged three weeks after vaccination, but in these studies birds were challenged either one or two weeks after vaccination. This earlier challenge did create statistically significant differences in mortality with better results seen with the homologous vaccines. It is recommended for better control of NDV that homologous vaccination be used.

REPORT SUMMARIES

USDA HPAI Response

Burke Healy, USDA-APHIS-VS

The United States experienced an outbreak of Highly Pathogenic Avian Influenza (HPAI) during 2014-2015 that was unprecedented in animal disease history. Twenty-one States with commercial, backyard poultry or wildlife had HPAI detections though there were none in the Atlantic flyway. Fifteen States reported commercial (9) or backyard (11) poultry HPAI detections. In total, there were 211 commercial premises with HPAI detections. Most are currently approved to restock.

Economic losses have totaled $1.6 billion in direct losses and $3.3 billion economy wide. Costs to federal taxpayers is $990 Million ($200 M indemnity; $600 M other response costs to date). The trade impact has been substantial, with 17 trading partners instituting a total US ban, and 38 partners instituting a regional ban.

HPAI response protocol involves placement of a quarantine to restrict movement of poultry into and out of an established control area, eradication of the infected flock, monitoring of domestic and wild birds in the control area, virus elimination within affected locations and testing to verify elimination of the disease agent. Depopulation of affected flocks can be achieved using fire-fighting foam, CO2 gas, or a form of ventilation cessation and heating. Disinfection of affected locations follows, with virus elimination as the goal. Farms which cannot be adequately cleaned with conventional methods may be allowed to lie fallow for a period of time sufficient to allow for virus destruction.

Highly Pathogenic Avian Influenza (H5N8) in California, 2015

Annette Jones, California Department of Food and Agriculture

After watching highly pathogenic avian influenza (HPAI) detections in wild birds and backyard flocks move down the western US in late 2014 and early 2015, California experienced the first US spill over into a commercial turkey flock in late January and again into a mixed chicken and duck farm supplying live bird markets in February 2015.

Fortunately, or perhaps unfortunately, California had experienced an outbreak of notifiable avian influenza in 2014 in a duck and quail farm, so most California personnel involved, including laboratory staff, were fairly experienced. Also, fortunately, local USDA personnel had not been deployed to other outbreaks, so California was able to immediately stand up blended Incident Management Teams (IMT's) and quickly establish Incident Command Posts (ICP) in close proximity to the outbreaks. A long history of emergency response to Exotic Newcastle disease, multiple avian influenza outbreaks, and multiple bovine tuberculosis outbreaks forged close working relationships between federal and state first responders, so integration was seamless.

Because later outbreaks in 2015 were much more significant, this summary will not include the various elements of response replicated there, but

will focus on some elements unique to detecting the first positive commercial flock in what became a much larger outbreak.

At the time the first and second flocks were detected, there was hope that these would be the only positive flocks in the US, so besides disease control and eradication, there was a premium placed on accurate and optimal early public communication and communication with trading partners.

Besides establishing a blended IMT within hours of the presumptive positive and developing an initial Incident Briefing and Incident Action Plan (IAP), a Joint Information Center (JIC) was immediately established to ensure consistent information was shared by all involved parties. The JIC was established in a virtual environment and included USDA, the California Department of Food and Agriculture (CDFA), the California Department of Public Health (CDPH), the Governor's Office of Emergency Services, Stanislaus County, and the impacted company's Public Relations. USDA also coordinated with the Centers for Disease Control (CDC). Before initial announcements, all parties ensured their facts and talking points were correct and consistent and agreed to the timing of notifications. Because this strain of influenza was not known to be a human pathogen, it was critical that public safety reassurance was provided BEFORE any misinformation began to circulate. Getting this right up front is critical! The company wanted to notify their customers before public announcements were made and, true to their ethic, wanted to be transparent, so they publically self-identified. Trade notices, State Veterinarian notices, poultry industry notices, political notices and public notices occurred almost at the same time and in a well-coordinated manner.

With regard to trade, the immediate goal was to minimize inappropriate trade sanctions and protect exports for the rest of the country. Remember, at that time, there was hope that this outbreak would only affect the Pacific migratory flyway. As always, the demand for real-time information from US trading partners was intense. Because a fairly strong IMT was in place, and this was the first US positive commercial flock, and initially was a single flock, a different approach was taken. Initially situation updates were filtered through several management levels before getting to those negotiating trade, but information was changing quickly and the multiple steps lead to delays. After just a couple of days, all agreed that the Incident Commander (IC) should directly communicate with the trade staff. This communication would normally not be considered ideal because an IC needs to be focused on response, but in this situation, it did help drive accurate information more quickly and helped to minimize trade impacts for other states. If the larger outbreak in April had not occurred, this shift in communication could have been very significant and may need to be explored further for future outbreaks.

While this last point is not unique to the first commercial detection, it is a lesson learned that has been a challenge to mitigate. Historically in the face of an initial detection of a highly transmissible disease, all resources have been directed to the Operations Section for depopulation and decontamination. Most recognize the importance of reducing risk where it is known to exist – the

"virus factory" embodied by an inflected flock - but the risk of missing silently spreading disease elsewhere is often neglected. For these HPAI outbreaks in California, a concerted and successful effort was made to begin epidemiology and surveillance as quickly as depopulation. To accomplish this goal, the Plans Section had to be adequately staffed immediately. In the past, California has struggled to accomplish this goal, but had more success in 2015. Fortunately, no spread was detected from either introduction.

Minnesota HPAI Response

Shauna Voss, Minnesota Board of Animal Health

On March 2, 2015, the Minnesota poultry industry experienced their first introduction of H5N2 Highly Pathogenic Avian Influenza (HPAI) virus in a commercial turkey breeding operation in Pope County. Three weeks later, the second and third cases were identified in commercial turkey operations in a Lac Qui Parle and Stearns Counties. By April 13, there were 13 confirmed cases of H5N2 in the state with new cases being identified daily. Between March 2, 2015 and June 6, 2015 a total of 110 premises in 23 counties were classified as positive for H5N2 HPAI. Of the 110, 104 were commercial turkey premises (75 commercial turkey flock premises, 23 breeding turkey flock premises and 6 that were characterized as Dangerous Contact Premises), 4 were commercial chicken layer premises, 1 commercial chicken pullet premises, and 1 backyard flock. Over 9 million birds were depopulated during the event.

RESPONSE

The Minnesota Board of Animal Health was the lead response agency for HPAI events in Minnesota and initially utilized a small State Incident Management Team (IMT) to organize the response. However, because state resources were quickly overwhelmed, the Board made a request to USDA to receive help through the deployment of USDA IMTs. At the height of the incident, over 600 people from across the country were working on the ground in Minnesota to control and eventually stop the spread of the virus.

As part of response efforts, a 6.2-mile radius control area was established around each infected premises. All premises with poultry within each control area were quarantined and surveillance was performed. Non-infected flocks that were quarantined needed to receive a permit from the Board prior to movement of poultry or poultry products off the farm. Hatching eggs, day-old poults, table eggs and birds moving to slaughter also had to have a permit to move from or into control areas. The Secure Poultry Supply Plans were utilized as guidelines for permitted movement with over 2,555 permitted movement documents issued.

The majority of all HPAI testing in Minnesota was performed at the University of Minnesota, Veterinary Diagnostic Laboratory in St. Paul, Minnesota. A total of 16,451 PCR tests were performed for HPAI between March 1, 2015 and June 30, 2015. Other NAHLN laboratories in the region were utilized for additional surveillance testing. Sample drop-off sites were established in three counties, close to where most of the control areas were

located, to collect samples in a biosecure manner and courier them to the laboratory twice daily.

RECOVERY

As of October 16, 2015, 101 out of the 110 Positive Premises have restock agreements signed and 67 of those premises have had their quarantines released. A number of premises have had a delay in restocking due to the nationwide shortage of poults. Six premises have elected to fallow; as a result, those quarantines will be released 120 days after the compost pile was capped.

LESSONS LEARNED

1) It is critical to know before an outbreak what resources you have and where you can get more. An Incident Command Post was established at an Emergency Operation Center in Kandiyohi County that had been used for previous other low pathogenic avian influenza response efforts. While we thought we were prepared for depopulation (the state of Minnesota owns a foaming unit and exercises it regularly), the Board was unable to keep up with the number of positive premises. We were also under prepared to handle efficient depopulation of large layer complexes. Water became a precious commodity for depopulation. On April 23, 2015, the Governor declared a Peacetime Emergency which allowed the National Guard to assist in sourcing and delivering water for depopulation efforts.
2) Obtaining a rapid diagnosis and being able to effectively complete surveillance activities requires having people trained to collect samples and a way to get those samples to the laboratory. Because Minnesota has an established Authorized Poultry Testing Agent (APTA) program, only a small number of people needed Just-In-Time (JIT) training to collect samples. Having trained personnel who work on the farms to collect samples reduces the likelihood that surveillance crews may contribute to disease spread. In addition, established drop-sites and a courier to bring samples to the laboratory twice daily facilitated rapid diagnosis and compliance in the required testing protocols.
3) Because HPAI is considered a Foreign Animal Disease (FAD), USDA will be involved and therefore, National Premises Identification Numbers and the USDA Emergency Management Response Services (EMRS 2.0) will be used. Valuable time can be saved if there are response personnel familiar with EMRS 2.0 and if PINs are established before an outbreak.
4) A key component in a successful response is being able to deliver a consistent message, in a timely manner, to those who need to know. A communications group of state and industry personnel had worked for over a year before HPAI arrived in Minnesota on a plan to communicate about avian influenza. This allowed for a seamless relay of information to the public and ensured a consistent message.
5) The 2015 HPAI H5N2 virus was unlike any infectious agent that the poultry industry in Minnesota or the upper Midwest had experienced

before. As a result, biosecurity practices employed by producers on farm were often inadequate to prevent introductions. In addition, responders must be certain that they are employing and practicing biosecurity measures that will prevent spread off of infected premises. Due to the numbers of responders during the event, JIT training on biosecurity will have to be utilized and compliance must be monitored to prevent complacency.

6) Unforeseen circumstances will present themselves during any response. Therefore, it is important that your HPAI plan is flexible. For Minnesota's response, it was valuable to have industry partners at the table to provide feedback on current industry practices and to ensure that there were no unnecessary hindrances to business and production practices.

Wisconsin HPAI Response

Myron Kebus, Wisconsin Department of Agriculture, Trade and Consumer Protection

The Wisconsin Department of Agriculture, Trade and Consumer Protection's (DATCP), Division of Animal Health, managed a highly pathogenic avian influenza (HPAI) outbreak that included ten different infected poultry flocks. There were 1.9 million birds depopulated, 265 premises tested twice in the control zones, over $8.6 million paid out in federal indemnity. The farms included a cage free layer farm, caged layer farms, turkey farms, and one backyard flock.

On Friday, April 10, 2015 the Division received notice of a presumptive positive, which was confirmed as H5N2 on April 13, 2015. The first premise was a 200,000 bird cage free layer facility in Jefferson County, in southern Wisconsin. The farm noticed a slight increase in mortality that began on Monday, April 6, 2015 followed by increasing mortalities over the next several days. The next was a small flock of 33 chickens in Juneau County in western Wisconsin was confirmed on April 17, 2015. This flock housed feral ducks that would leave the farm for weeks and return. The third infected premises followed on virtually the same day as the second premises. It was a 130,000 bird commercial turkey operation in Barron County in northwestern Wisconsin. These were followed by four more commercial turkey farms, a caged egg layer farm, and finally a pullet farm confirmed on May 3, 2015.

Along with the ten confirmed positive HPAI poultry infected premises, 265 premises within a 10km control zone of the infected premises were quarantined and 1,445 poultry on those premises were tested twice two weeks later in order to confirm the disease had not spread. The Division evaluated requests for movement of poultry and poultry products from producers within the control areas. The process included conducting an onsite biosecurity assessment of the requesting flock, completing the required testing, and approval by the state veterinarian in the state of destination. The USDA permitting team handled the issuance of the approved permits and captured

the information in EMRS. The Division estimated that more than 700 permits were issued during the 2015 spring HPAI event.

Press releases were issued upon confirmation of infected premises, release of control areas, and quarantine release of infected premises. Fact sheets were posted on the DATCP website on topics including: HPAI and human health, poultry industry in Wisconsin, protecting your farm from HPAI, and others. The DATCP Public Information Officers issued a daily HPAI briefing, distributed electronically to over 5,000 subscribers and posted on the DATCP website. All quarantine releases were accompanied by a letter and pamphlet reminding poultry owners to continue to be diligent in regards to biosecurity and protecting their flock from infection. The Wisconsin State Veterinarian issued a Summary Special Order on June 6, 2015 prohibiting poultry movement to swap meets or open shows in Wisconsin unless part of a county, district, or state fair. An additional order, also issued June 10, 2015, requiring participants in poultry shows associated with fairs to certify that no poultry mortalities have been found on their premises within ten days prior to movement of poultry to the fair.

Wisconsin Governor, Scott Walker, declared a State of Emergency for Wisconsin's response to HPAI. This declaration opened the full resources of the state Emergency Operations Center and the National Guard to assist in the response.

By August 8, 2015 all infected premises were released from quarantine and were eligible to restock following guidelines agreed upon between the USDA-APHIS, the State of Wisconsin, and the farm.

Planning continues for the next outbreak. Major concerns are the ability to mobilize enough staff to manage a large incident. Discussions continue with Wisconsin Emergency Management and other state agencies. The Division hosted four poultry workshops statewide that were attended by over 300 producers from all industry sectors. An overview of the outbreak was presented, questions were answered and biosecurity guidelines were discussed.

Use of Ventilation Shutdown for Mass Depopulation of Poultry in Emergency Situations

Eric Gingerich, Diamond V

During the highly pathogenic avian influenza (HPAI) outbreaks during the spring of 2015 in the upper Midwest, many problems occurred that did not allow timely depopulation of turkey and layer flocks. USDA has stated that a flock infected with HPAI should be put down within 24 hours after confirmation. This stops the shed of virus and does not allow the increase in shed rate of HPAI virus seen in the outbreaks if flocks are allowed to remain alive. Ventilation shutdown (VSD) is being considered as one solution should this problem arise again.

During the HPAI outbreaks of 2015, the large number of outbreaks occurring at one time overwhelmed the ability to depopulate flocks on a timely basis using the approved methods of CO2 carts for layers or firefighting foam

for turkeys. It is felt that many flocks could have been spared being infected with HPAI had flocks been put down in a timely manner and suppressed the high levels of virus shed from them.

An option to quickly cause death of all birds in a house is to shut off the ventilation fans (VSD) that will allow the heat from the birds to increase rapidly and result in hyperthermic death. A precedent has been set by the United Kingdom's Department for Environment, Food, and Rural Affairs (DEFRA) for use of this method in emergencies. DEFRA set forth guidelines for VSD use in their document "Guidelines for Killing Poultry Using Ventilation Shutdown (VSD) in September 2009 (http://www.slideshare.net/charmkey5/operating-guidance-vetilation-shutdown-procedure-defra).

Besides the reduction in shedding of virus, other reasons for deciding to use VSD are that 1) it greatly reduces the time of exposure of workers depopulating flocks using standard methods to potentially zoonotic agents, and 2) reduces the amount of birds suffering from the disease during slower depopulation methods.

It is agreed that VSD is not the ideal method for mass depopulation as it results in longer periods of time for suffering compared to other methods. The decision to use VSD is only to be made after all other more humane methods have been considered and it has been determined that the time taken for other methods will allow the amount of virus to become excessively high and results in undue spread of the disease.

The USDA-APHIS developed and announced its position on the use of VSD on September 18, 2015. This document contains a decision tree for determining if a particular depopulation situation should use VSD or not. This document is available at the USDA-APHIS website - https://www.aphis.usda.gov/animal_health/emergency_management/downloads/hpai/ventilationshutdownpolicy.pdf.

The VSD process as defined by DEFRA is to raise the temperature in the house to 104F within 30 minutes and to hold this temperature for at least 3 hours. Water is not turned off during the process. Sealing the house is required to help hold heat in the house. Supplemental heat may be required and guidelines are being developed using predictive modeling in different scenarios. More research is needed to make this procedure as humane as possible.

The American Association of Avian Pathologists (AAAP), at their annual meeting in the summer of 2015, approved a position statement drafted by their animal welfare and management committee to approve the use of VSD, with appropriate veterinary consultation, in cases of emergency when deemed necessary in order to control the spread of a foreign animal disease (FAD). The AAAP position statement, Frequently asked questions (FAQs), and background information are available to AAAP members on the website www.aaap.info under Committees/Animal Welfare/Emergency Mass Depopulation Guide and Avian Influenza Resources.

The American Veterinary Medical Association's (AVMA) Panel on Depopulation will be developing their guidelines for mass depopulation over

the next two or more years. More information can be seen at the AVMA website - https://www.avma.org/KB/Resources/Reference/AnimalWelfare/Pages/Depopulation.aspx

Highly Pathogenic H5 Avian Influenza Viruses in the Americas

David Suarez, Southeast Poultry Research Laboratory, Agriculture Research Service (ARS), USDA

In late 2014 highly pathogenic avian influenza (HPAI) was detected first in Canada and then in the United States associated with wild birds, commercial poultry, and backyard flocks. The H5N1 highly pathogenic avian influenza virus lineage can be traced back to as early as 1996 with the first isolation of virus in geese in Guangdong province, China. The viral lineage had multiple basic amino acids at the cleavage, which is a marker for a virus having a highly pathogenic phenotype. The hemagglutinin gene for all the Asian lineage HPAI viruses can be traced back to these original viruses, but all the other gene segments for this virus have reassorted from the original virus. The drift became so important that a revised nomenclature system was developed to account for all the genetic changes in the virus, the clade system. Each clade is at least 2% different in nucleotide sequence which does correlate with antigenic differences. As the virus continued to mutate, the clade system continued to evolve into different subclades, so that now we have as many as nine different clades that branch to fourth order, i.e. clade 2.3.2.1. Although we think of HPAI as being restricted to poultry, we have detected on at least three occasions where the virus has spilled over from poultry back to wild birds where the virus has persisted in wild birds for several years. This first occurred in 2005, and then again in 2008, and the most recent example occurred in 2014-2015. These were clade 2.2, clade 2.3.2.1, and clade 2.3.4.4 respectively. The most recent virus with a N8 replacing the N1 gene was first reported from South Korea where the virus infected commercial poultry, primarily ducks causing a large outbreak. The timing of the virus infection suggested that wintering birds were infected with the virus and spread the virus to commercial poultry. The virus appeared to move to the wild bird breeding grounds in the summer, which includes breeding grounds in North America (Alaska). The virus appeared to spread among wild birds in North America, and when the birds moved south for the winter, they carried the virus with them and infected poultry in Canada and the United States.

The viruses identified in the Americas all had similar hemagglutinin genes, but some variation was seen in other gene segments. One type of virus, the H5N8, was similar in all eight genes with the viruses that were detected in South Korea and were also closely related to viruses from Russia and Europe. The H5N8 virus was detected multiple times from apparently healthy wild ducks in the United States and was associated with at least two outbreaks in commercial poultry and several backyard birds. Another variant was a reassortment between the H5N8 virus and a North American low pathogenic virus, such that the neuraminidase gene and several internal genes were

replaced. This new virus, a H5N2, was also detected in wild birds and commercial turkeys in Canada and the Midwest United States. Several other minor variants have been detected, but most viral isolates have been the H5N8 or H5N2 viruses.

Representative H5N8 and H5N2 viruses have been used in experimental laboratory studies in several different species of birds. Based on these studies several observations can be made. The virus when given by the standard intravenous (IV) pathogenicity test is highly pathogenic causing 100% mortality in chickens, confirming that these viruses are highly pathogenic viruses. However, field observations in South Korea, has suggested that the virus was not as virulent in chickens as other H5N1 HPAI viruses. In laboratory challenge studies of chickens, it was shown that high doses of virus were needed to infect birds by the oro-pharyngeal challenge model, which more closely matches field exposure. The virus also poorly transmitted to uninfected cage mates by direct contact. However, when a chicken became infected, the bird died. Clinical signs typically were depression and rapid death, but more classic lesions of HPAI were seen in some birds including hemorrhages in the legs and petechial hemorrhages in the myocardium, pancreas, and proventriculus. Rarely neurological lesions were observed. In contrast to the chicken studies, mallard ducks were extremely susceptible to infection with both viruses, and the viruses transmitted efficiently to uninfected cage mates. However, no clinical disease was observed in any birds although all experimental birds became infected. Pathology did show some systemic infection, but not enough to cause disease or mortality. Studies with isolates later in the outbreak showed the H5N2 viruses were more infectious to chickens and killed birds faster showing evidence of adaptation of the virus to chickens.

The H5N8 and H5N2 viruses tested in the United States shows that the virus is extremely infectious in mallard ducks without causing clinical disease. Although there are many wild duck species where the virus has been detected, it appears based on the experimental data that these HPAI viruses are well adapted to many duck species and behave more similarly to low pathogenic avian influenza viruses (LPAI). This likely explains why this virus lineage has been detected on three different continents, and also suggests the virus is likely to persist in wild birds for a while. Although commercial turkeys and chickens have been infected in the United States and Canada, the viruses tested did not seem well adapted to gallinaceous poultry and required a high infectious dose. This correlates with field data where the initially infected farms have geographically have been far away from each other. However, later during the outbreak, partly through changes in the virus and inadequate biosecurity, farm to farm spread probably was more important source of spread. Because of the likelihood of persistence of the virus in wild birds for several years, biosecurity will need to remain at enhanced levels to protect the poultry industry.

Molecular Epidemiology of the H5 clade 2.3.4.4 in the United States
Mia Kim Torchetti, NVSL-USDA

HPAI virus (H5N8 clade 2.3.4.4) originating from Eurasia (EA) spread rapidly along wild bird migratory pathways in the Eastern Hemisphere during 2014. Introduction of this virus into the Pacific Flyway of North America sometime during 2014 allowed mixing with North American (AM) origin low pathogenicity avian influenza A viruses generating new (novel) combinations with genes from both EA and AM lineages (so-called “reassortant” H5Nx viruses). To date, the H5Nx viruses have been detected in the Pacific, Central, and Mississippi Flyways (Figure 11). These findings are not unexpected as the H5Nx viruses continue to circulate.

USDA’s NVSL collaborated with the USDA ARS Southeast Poultry Research Laboratory (SEPRL) and the Influenza Division of the Centers for Disease Control and Prevention (CDC) to generate the analyses for this report. Consensus data from whole genome sequence is used to monitor the virus evolution and assess risk to veterinary or public health based upon presence/absence of specific amino acid substitutions or protein motifs.

All viruses analyzed to date are highly similar, have an HA gene derived from the EA H5 clade 2.3.4.4, and are highly pathogenic in poultry. Both H5N2 and H5N8 were implicated in recent poultry outbreaks. Where there is molecular evidence that independent introductions as well as “common source” exposures are occurring concurrently, further field epidemiologic investigation is warranted.

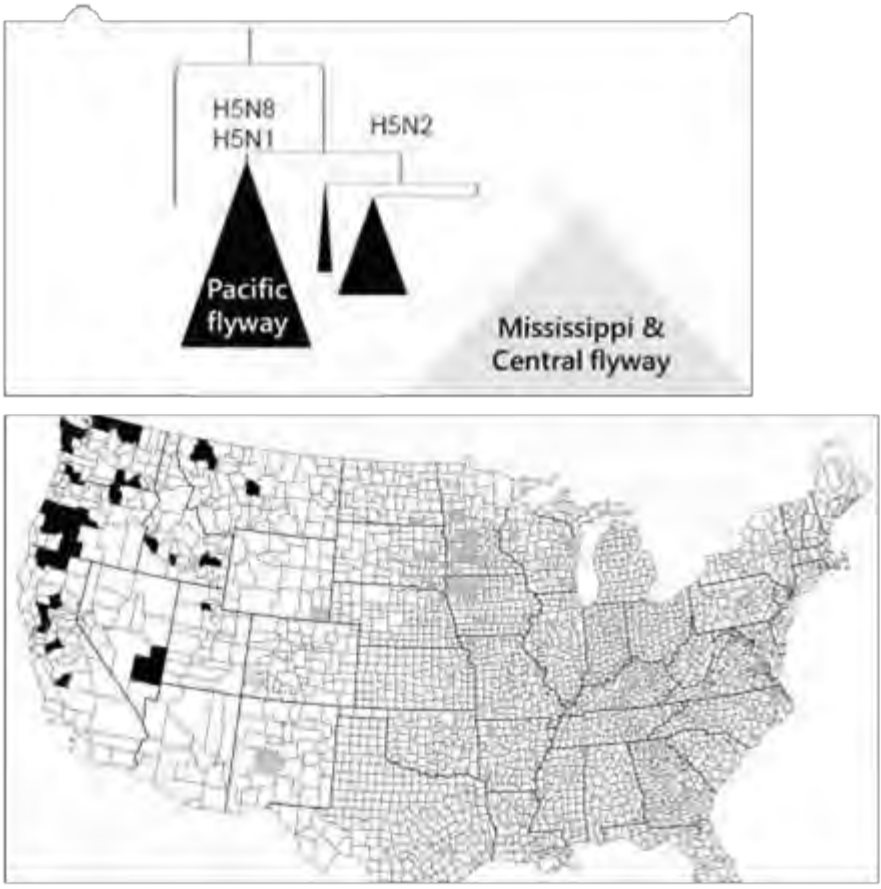


Figure 11. Phylogeny of the PB2, HA, and matrix genes of the H5Nx viruses and geographic distribution by subtype

Poultry events in Pacific Flyway appear to be largely due to point source/independent introductions as were early Midwest events based upon network analysis and available epidemiologic data. Data for later Midwest events suggest point source as well as “common source” exposures occurring concurrently. States affected last appear to be largely due to common source/human activity.

Presently the risk to human health remains low; molecular markers associated with antiviral resistance or increased virulence and transmission in mammals have not been detected. However, CDC continues virus monitoring.

This analysis includes samples collected between December 2014 to early June 2015 (Figure 12) from 17 States (>240 viruses distributed as in Table 37). While these viruses remain highly similar overall (>99% similar to the index

viruses within subtype as well as to the nearest Asian isolate A/crane/Kagoshima/KU1/2014[H5N8]), analytical tools that identify substitutions along the hemagglutinin (HA), neuraminidase (NA) and internal proteins can improve our understanding of the virologic, antigenic, and epidemiologic features of the virus. The section on Diagnostics and Characterization for H5Nx viruses in this report offers further information.

Table 37. Distribution of viruses by region, subtype or virus group, and sector/type with state/county affected and duration from sample collection

Region	Virus subtype or group	layer, commercial	turkey, commercial	backyard	wild bird+raptor	# states affected	# counties affected	Duration from sample collection	Mode of spread based upon molecular analysis
Midwest H5N2	1					5	36	27 Feb to 20 Apr 2015	independent + limited lateral
	2a					4	16	6 Apr to 4 May 2015	independent + limited lateral
	2b					5	18	25 Mar to 4 Jun 2015	ind+lat | 78% MN turkey
	2c					5	22	13 Mar to 25 May 2015	ind+lat | 85% IA chicken+turkey
	2d					4	10	26 Mar to 19 May 2015	ind+lat | 91% MN turkey
Pacific	H5N2					4	16	8 Dec 2014 to 11 Feb 2015	independent
	H5N8					6	13	7 Dec 2014 to 6 Feb 2015*	independent
	H5N1					1	1	7 Dec 2014 to 6 Feb 2015	independent

* not including Indiana BY 5 May 15

Figure 12. Duration of detection from sample collection date by virus subtype/group

Summary of H5Nx Molecular Analysis

All viruses detected to date have an HA gene derived from the EA H5 clade 2.3.4.4 and are highly pathogenic for poultry. Pacific and early Midwest detections appear to be largely independent introductions and later events include potential for human involvement.

Pacific Flyway Findings

- Three different subtypes were detected (Table 37); the EA/AM H5N2 viruses predominated.
- No H5N2 was detected in commercial poultry in the Pacific flyway.
- The H5N8 viruses have wholly Eurasian gene constellations except two from Oregon (Jan 2015) with two North American internal genes (PB1 and PA).
- H5N8 was detected in both poultry and wild bird populations in the Pacific flyway.
- Long branches (representing nucleotide differences) observed by network analysis for all H5Nx viruses in the Pacific flyway are suggestive of independent or point source introductions (Figure 13).
- These findings are consistent with both the movement of the virus in wild bird flyways and the low infectivity in gallinaceous poultry.

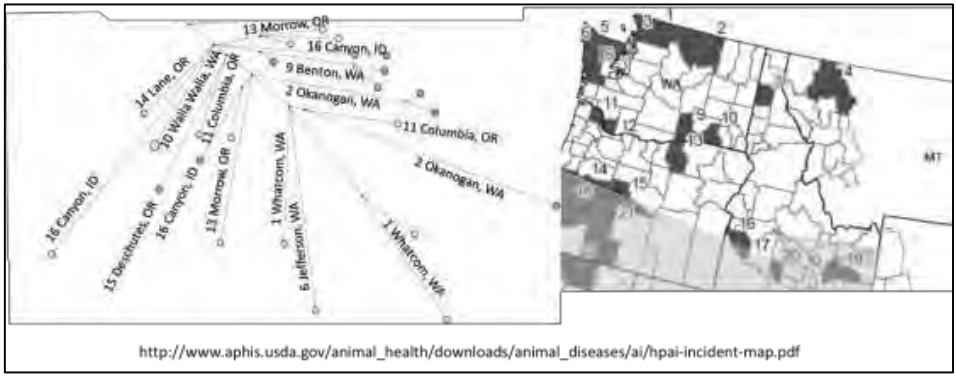


Figure 13. 8-gene network: Selection of 24 Pacific flyway detections spanning 3 States and 13 counties from December 8, 2014, to February 11, 2015; long branches suggest independent or point source introductions (greyed area = H5N8). Numbers on network correlate to map, which is available at web site above; yellow circle = wild bird, purple = backyard, red = poultry. Numbering indicates order of county detection; subsequent detections in positive county are not numbered.

Midwest Findings

- The Midwest viruses cluster into major groups 1 and 2 with four subgroups in group 2 indicated in Table 37.
- Groups 1 and 2a span several States and counties and contain long branches similar to that observed in the Pacific group suggesting largely independent or point source introductions in addition to limited evidence of lateral spread (Figure 14).

- The remaining groups (2b, c, and d) have a mixture of long branches suggestive of independent or point source introductions alongside shorter branches and highly similar viruses consistent with common source or lateral spread. The network and map in Figure 15 demonstrate the relatedness of the 2d.1 subcluster (ex-Stearns cluster), which gained in number and has confirmed epidemiologic links for many of the premises.
    - Minnesota viruses are predominantly group 2b, 2d from turkeys
    - Iowa viruses are predominantly group 2c from layers and turkeys
    - All Midwest subgroups may be found in turkeys compared to layers (Table 37), suggesting there may be increased risk for a broader range of potential exposures
    - Only a single detection of EA H5N8 has been made outside the Pacific flyway (IN); molecular evidence suggests it may not have been present in the Mississippi, but further data are needed.

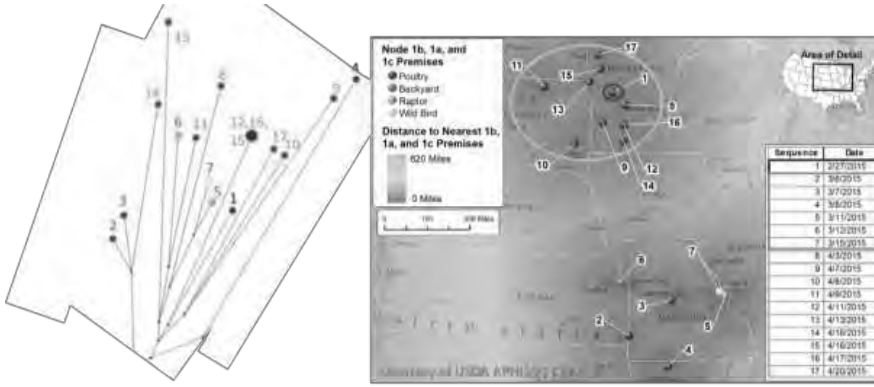


Figure 14. Network analysis (8 gene) of H5N2 Midwest Group 1: 17 detections spanning 5 States and 16 counties from February 27 to April 20, 2015; long branches suggest largely independent or point source introductions with limited evidence of lateral spread. Colored boxes match colored circles on map and colored numbers on network. Yellow circle = wild bird, purple = backyard, red = poultry.

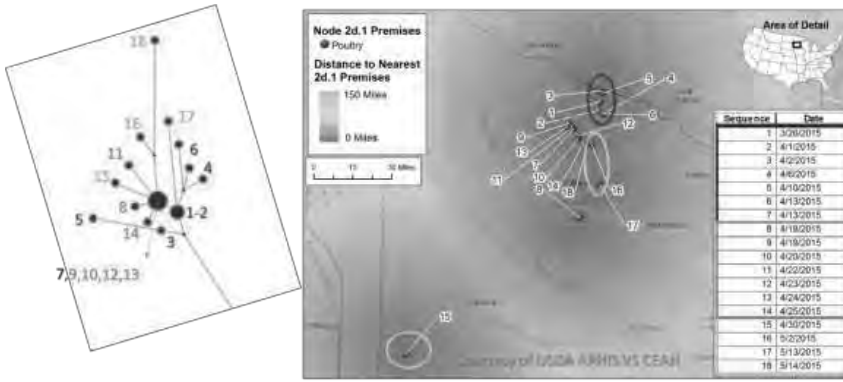


Figure 15. Network analysis (8 gene) of H5N2 Midwest Group 2d.1: 18 detections in single State across 4 counties from March 26 to May 14, 2015; highly similar viruses and shorter branches consistent with common source or lateral spread, viral change is consistent with the date of detection. Colored boxes match colored circles on map and colored numbers on network; red circle = poultry.

Other General Findings:

- Over 240 viruses analyzed have been >99% similar to the index case across entire genome within subtype and for HA across subtypes.
- The majority of poultry viruses are nearly identical across the HA1 protein and have a change in the HA1 protein at a putative antigenic site (HA S141P; numbering per mature H5 HA; Table 38). Such substitutions may be more easily sustained in small virus populations (e.g., poultry flock).
- The molecular evidence reported on June 15, 2015, for two viruses that spanned a State boundary between Minnesota and South Dakota was not supported by epidemiologic data, and further molecular analysis across the entire genome suggests they may represent point source events. This emphasizes the challenges of interpreting data from highly similar viruses.
- One H5N2 virus with a NA stalk deletion (previously associated with poultry adaptation in HPAI H5 viruses) was isolated from a wild Cooper's hawk but has not been seen in US poultry.

Where there is molecular evidence that independent introductions, as well as "common source" exposures, are occurring concurrently, further field epidemiologic investigation is warranted.

Public Health Aspects

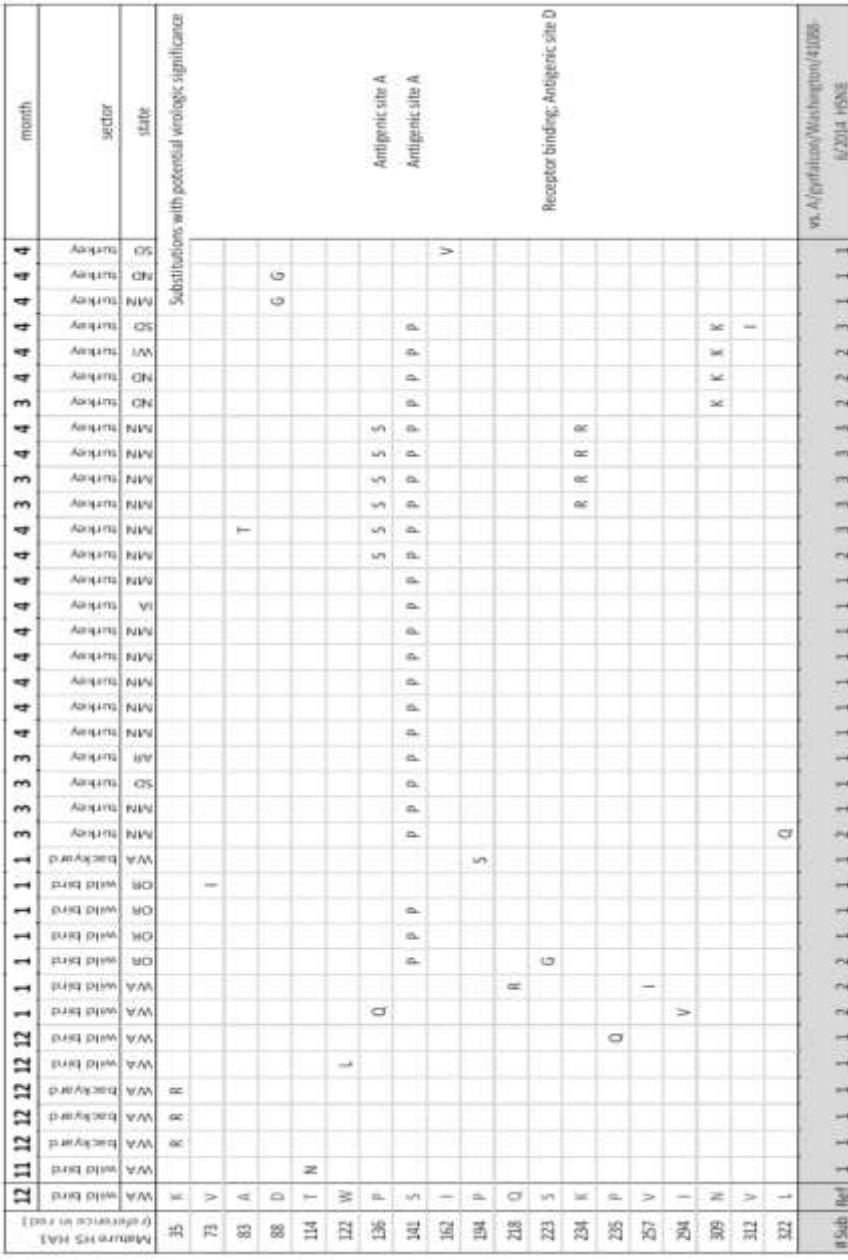
- All viruses to date lack key amino acid substitutions associated with human-like receptor binding or substitutions in the polymerase or other internal genes associated with increased virulence and transmission in mammals.

- No known markers of neuraminidase inhibitor (Oseltamivir) resistance have been identified.

Poultry Vaccine Strain Selection Considerations

The H5Nx viruses continue to remain highly similar overall, and ongoing detection of both the H5N2 and H5N8 HPAI viruses indicates that a strain with broad antigenic coverage is needed. Additionally, the expectation is that the poultry adapted strains have been eradicated and that if viruses return with migratory waterfowl in the fall or spring they would have waterfowl adapted strains. Genetic, antigenic, and growth characteristics are considered for selection of poultry candidate strains. Experimental studies in poultry indicate that antibody to the neuraminidase protein does not play a significant role in protection. Antigenic characteristics and challenge studies will be used to evaluate protection of candidate vaccines; ongoing evaluation of viruses for antigenic drift will continue.

Table 38. Clade 2.3.4.4 H5Nx viruses through early April 2015 with one or more amino acid substitutions in the HA1 protein (38/92 viruses) compared to the US index virus A/gyrfalcon/Washington/41088- 6/2014(H5N8). Month of detection, sector type, and State are listed.



Diagnostics and Characterization for H5Nx Viruses

Eurasian H5 clade 2.3.4.4 viruses (aka H5Nx), more specifically the "Intercontinental Group A viruses[-1] (icA), were initially detected in the United States during December 2014 and are known to be highly pathogenic to poultry. No other Eurasian H5 viruses have been detected in the United States to date (August 2015). The index viruses are A/gyrfalcon/Washington/41088-6/2014(H5N8) and A/Northern pintail/WA/40964/2014 (H5N2).

Molecular diagnostics for influenza A virus (IAV) used across the NAHLN in the United States have been confirmed to work well to detect these Eurasian H5Nx viruses[2] . As a primary surveillance tool, the NAHLN H5 assay is broadly reactive and not intended to distinguish geographic lineage or pathotype. NVSL also uses a highly specific H5-icA assay[3]developed by SEPRL, which targets the Eurasian H5 clade 2.3.4.4 gene and conducts Sanger sequencing protocols to generate partial HA/NA sequence directly from the sample for confirmation, pathotyping, and subtype determination. Select viruses are also processed for in vivo pathotyping in specific pathogen free chickens. Results from in vivo testing is specific to the species tested (e.g., chickens).

Additionally, whole genome sequencing is conducted to monitor viral evolution. Both Ion Torrent and MiSeq technologies are used. A brief summary of the procedure for IAV follows. All eight segments of isolates were amplified using gene-specific and universal primers for each segment. The cDNA was purified and cDNA libraries were prepared for the Ion Torrent using the IonXpress Plus Fragment Library Kit (Life Technologies) with Ion Xpress barcode adapters. Prepared libraries were quantitated using the Bioanalyzer DNA 1000 Kit. Quantitated libraries were diluted and pooled for library amplification using the Ion One Touch 2 and ES systems. Following enrichment, DNA was loaded onto an Ion 314 or Ion 316 chip and sequenced using the Ion PGM 200 v2 Sequencing Kit.

Analysis of sequence data includes phylogeny of all eight segments, determination of amino acid substitutions across the HA1 protein, and network analysis of three gene segments (PB2, HA, MP). Phylogenetic trees are generated using neighbor-joining algorithms with a kimura-2 parameter nucleotide substitution model. Amino acid differences in the HA1 portion of the HA protein compared to the A/gyrfalcon reference virus with potential virologic significance are annotated based on previous experimental studies with HPAI H5 viruses that have demonstrated changes in virus phenotype using various in vivo and in vitro systems. The NA and internal protein genes are aligned to H5N8 and H5N2 reference virus genomes using MUSCLE (i.e., A/gyrfalcon/Washington/41088-6/2014 and A/Northern pintail/WA/40964/2014) and screened for the presence of amino acid substitutions or protein motifs that have previously been associated with either poultry or mammalian host adaptation.

References:

1. 2015 Lee et al, Intercontinental Spread of Asian-origin H5N8 to North America through Beringia by Migratory Birds, epub ahead of print *JVirol* *http://jvi.asm.org/content/early/2015/04/02/JVI.00728-15.long.*
2. Influenza A protocols including Spackman 2002 targeting the matrix, VetMax Gold AIV and the H5 subtyping assays (2008 and 2014 protocols).
3. The H5-icA assay protocol is available from SEPRL and positive control is available from NVSL for standard user-fee; note that this assay has a very narrow in spectrum specific to H5 clade 2.3.4.4 viruses and should be used in conjunction with the NAHLN H5 assay, not as a replacement.

Avian Influenza Wildbird Surveillance

Tom Gidlewski, USDA-APHIS, Wildlife Services (WS)

This presentation describes the national surveillance plan for avian influenza virus (AIV) in wild waterfowl. Collaborating entities include the USDA, APHIS, Wildlife Service (WS), National Wildlife Disease Program (NWDP) and VS; the United States Geological Survey (USGS); the United States Fish and Wildlife Service (USFWS); and the National Flyway Council. This national level surveillance directly supports the United States Interagency Strategic Plan for Early Detection and Monitoring for Avian Influenzas of Significance in Wild Birds (2015), and is based on the Surveillance Plan for Highly Pathogenic Avian Influenza (HPAI) in Waterfowl in the United States (2015).

HPAI Surveillance Goals

The goals of this surveillance effort are: to maximize our ability to detect AIV in wild waterfowl so that we can identify the distribution of avian influenzas in the United States; to detect spread of influenzas to new areas of concern; to provide a flexible surveillance framework to monitor wild dabbling duck populations for reassortments of influenzas and introductions of new viruses; and to estimate apparent prevalence of important influenzas once detected.

The plan focuses on sample collection at the watershed level (sub-regional watersheds) and specific watersheds have been identified for sample collection. This selection is based on areas that have high mixing of wild bird populations (sometimes from multiple flyways) and historic low pathogenicity AIV presence. This allows targeted sample collection in high priority watersheds where AIV dynamics will likely be indicative of what is also occurring in nearby areas that are not sampled. If the targeted numbers of samples are collected from dabbling ducks within each specified watershed, we will be able to determine with 95% certainty whether the avian influenza viruses of interest are present at the time of the surveillance.

2015 Implementation Plan

1. SPECIES AND SAMPLE NUMBERS:

a. The target number applies only to dabbling ducks.

b. Target species is dabbling ducks. The Fulvous Whistling duck is not taxonomically a dabbling duck but because of its foraging habits it is

included in the same functional group for purposes of this surveillance plan.

Target Species by Functional Group Dabbling Ducks:

American Green-winged Teal	Mallard
Northern Pintail	American Black Duck
Wood Duck	Blue-winged Teal
Cinnamon Teal	Northern Shoveler
Gadwall	American Wigeon
Mottled Duck	Muscovy Duck
Fulvous Whistling Duck	

c. Captive-reared and released ducks that are subsequently live-captured or hunter harvested may be swabbed like any other dabbling duck and will be counted in the watershed target numbers.
d. In biological year 2015 (BY2015: April 1, 2015 through March 31, 2016) approximately 41,000 wild bird samples will be collected nationwide.

2. WHAT TO COLLECT:

a. The target sample numbers represent samples collected from agency harvested birds, hunter harvested birds and live wild birds.
b. One cloacal and one oropharyngeal swab will be collected from each wild bird sampled. Cloacal and oropharyngeal swabs will be combined in the same tube of media.

3. WHEN TO COLLECT:

Sample collection will occur during three different time periods during BY2015. This differs from previous sampling protocols in an effort to capture wild migratory bird movements at different times of the year. A month of overlap has been added to the seasons to allow flexibility in reaching the targets. Birds sampled in August or December may be counted toward the target for either season.

a. *Summer breeding season* (May-August),
b. *Fall migratory season* (August-December),
c. *Over-wintering season* (December-February).

4. WHERE TO COLLECT:

Target watersheds for HPAI sampling are at the watershed level (sub-regional watersheds). This is a departure from our previous AIV collection protocols which allowed samples to be collected anywhere within a state. There is flexibility in watersheds and seasonal targets. The program has modified targets in approximately half of the states in response to logistical feedback from the field.

5. SAMPLE SUBMISSION:

All samples will be submitted to one of seven approved National Animal Health Laboratory Network (NAHLN) laboratories. Samples will be screened to determine if type A influenza virus is present; if the test is positive, the sample

will be further analyzed using H5 and H7 specific assays. Samples testing H5 or H7 positive at a NAHLN laboratory will be sent to the NVSL for confirmatory testing and final diagnosis.

6. PERMITS:

The NWDP has a "blanket" scientific collecting permit from USFWS that includes all states, except Hawaii, for the swabbing of most species collected as live birds or hunter harvest. Agency harvest for the sole purpose of disease sampling is not permitted.

7. STATE AGENCIES, TRIBAL AGENCIES and USFWS:

Close collaboration with state and tribal game agencies, and the USFWS is vital. Sample collection should include efforts by federal, state, tribal, local, university and non-governmental participants. Local expertise should be utilized to assess the watersheds and targets in this plan and determine adjustments that are needed. It will be necessary for state wildlife agencies and WS programs to communicate their sampling plans in the various watersheds in order to optimize sample collection goals throughout the summer, fall, and overwintering seasons.

8. REPORTING FIELD DATA:

Each participating agency, university, or other entity is responsible for entering field data directly into the APHIS Veterinary Services Laboratory Submission System website (VSLS) (http://vsapps.aphis.usda.gov/vslabsub/login.do) within 24 hours of submitting samples to the laboratory. Once the field data have been entered into the system, results will be entered online and available for viewing. Collectors and submitters can also run reports and queries. Positive cases as well as the total number of birds sampled are posted on the website. (https://www.aphis.usda.gov/wildlife_damage/downloads/JULY%202015%20-%20JUNE%202016%20WILD%20BIRD%20POSITIVE%20HIGHLY%20PATHOGENIC%20AVIAN%20INFLUENZA%20CASES%20IN%20THE%20UNITED%20STATES.pdf)

9. MORBIDITY AND MORTALITY SURVEILLANCE:

Morbidity/mortality events should be investigated regardless of the time of year, species involved, or the number of samples already collected in the state. Morbidity/mortality samples do not count towards meeting the watershed targets and are not entered into the VSLS database. Morbidity/mortality events have a different disease risk associated with them and the data cannot be analyzed in the same way as apparently healthy birds (live-capture and hunter harvest).

The USGS National Wildlife Health Center (NWHC) in Madison, Wisconsin is the primary partner for performing diagnostics related to mortality events and can provide guidance on the investigation, sampling, and diagnostics for observed avian mortality. Contact at 608-270-2480, NWHC-epi@usgs.gov

State veterinary diagnostic laboratories may also be used in morbidity/mortality investigations rather than the NWHC and should be contacted directly.

Additional information is available on the USDA-APHIS-AI website. (https://www.aphis.usda.gov/wps/portal/aphis/ourfocus/animalhealth?1dmy&urile=wcm%3apath%3a%2Faphis_content_library%2Fsa_our_focus%2Fsa_animal_health%2Fsa_animal_disease_information%2Fsa_avian_health%2Fct_avian_influenza_disease).

HPAI Epidemiologic Findings, USDA Perspective: What They Tell Us about Prevention and Control

Brian McCluskey, Dr. Lindsey Garber, USDA-APHIS-VS

Since the expansion of Highly pathogenic avian influenza (HPAI) viruses into commercial poultry occurred in January 2015, APHIS Veterinary Services (VS) has initiated a number of epidemiologic and laboratory based investigations to better understand the factors associated with HPAI virus transmission. These investigations include:

- Field-based observational studies with data collected through surveys and site visits;
- Geospatial analyses;
- On-farm sampling efforts; and
- Phylogenetic investigations.

With the data from these reports, APHIS concludes that there is not substantial or significant enough evidence to point to a specific pathway or pathways for the current spread of the virus. This is further supported by the molecular analysis of the virus.

In a case series investigating 81 turkey farms across the Midwestern United States, we found turkey farms typically follow biosecurity protocols, which are established by the company with which they work. Common procedures include spraying vehicle tires with disinfectant at the farm entrance, requiring visitors and employees to wear coveralls and disposable boot covers (or dedicated footwear) before entering the barns, using disinfectant footbaths at barn entrances, using rodent control, and caring for younger birds before caring for older birds. The objective is to establish a clean-dirty line where outside contaminants are not carried into the barn.

Fomites, such as equipment, are probably playing a role in this outbreak. In the majority of cases in this study, feed trucks, live haul loaders, pre-loaders, and other items were shared by multiple farms. While equipment sharing makes economical and logistical sense, it also increases the risk of lateral spread of HPAI between farms. Wild birds, another possible route of disease transmission, were observed inside barns on 35 percent of the farms, with the frequency ranging from daily to occasionally.

While most of the 81 farms surveyed had biosecurity protocols in place, only 43% of case farms reported that biosecurity audits or assessments were conducted on the farm by the company or a third party. Farms can decrease their HPAI risk by verifying that biosecurity procedures are being followed properly.

We conducted a case-control study focused on egg layer flocks in Iowa and Nebraska. A number of risk factors for HPAI introduction and factors

associated with lowering the risk of introduction were identified in our multivariable analysis at both the farm and barn levels. At the farm level, being located in an existing control zone was highly associated with farm status. Rendering dead birds was a risk factor; 39% of case farms (compared to 13% of control farms) reported that the renderer came onto the farm. Although a similar percentage of case and control farms reported that garbage trucks came to the farm, 61% of case farms (compared to 23% of control farms) reported that the garbage trucks came near the barns. Having visitors change clothing was protective. Visits in the past 14 days (see prior report for the definitions of time periods for data collection) by a company service person were associated with farm status.

At the barn level, three variables remained statistically significant in the final multivariable model. Having a hard-surface barn entry pad that was cleaned and disinfected was protective when compared with all other levels combined (i.e., not having a hard surface, or no cleaning or no disinfection). Dead bird disposal within 30 yards of a barn remained a statistically significant risk factor. Although we identified a ventilation type that was protective, we are continuing to analyze that data due to a number of related factors that influence the effect of ventilation type.

We investigated the potential for airborne transmission by multiple methods. When aerosol exposure indices and distance measures were assessed together, the effect of the aerosol exposure index was often no longer statistically significant. These two variables are by nature correlated, as distance is an inherent part of the aerosol exposure index in addition to wind direction and speed. As a result, it was not possible to separate their effects in this analysis, and we were not able to determine with certainty whether aerosol transmission was responsible for a farm becoming infected. Other mechanisms associated with proximity could also have resulted in HPAI spread between nearby farms. Findings from these and other studies form the basis for recommendations on prevention strategies at the farm and barn level.

HPAI Epidemiology: Minnesota Perspective

Michelle M. Kromm, Jennie-O Turkey Store

In 2015, an unprecedented outbreak of highly pathogenic avian influenza (HPAI) occurred in the United States, greatly impacting the turkey industry in the Upper Midwestern United States. A case-control investigation was initiated by industry, government, and academic partners to describe epidemiologic features of the outbreak on turkey operations in the Upper Midwest. A comprehensive questionnaire was developed and administered to farm managers and supervisors to review farm biosecurity, litter handling, dead bird disposal, farm visitor and worker practices, and presence of wild birds on operations two weeks prior to HPAI confirmation. Case farms were HPAI-infected farms associated with a turkey company and control farms were non-infected farms with turkeys of similar stage of production associated with the same company.

The final analysis included 63 (37 case farms and 26 control farms) farms. Of the case farms, 21 (57%) were company farms, 5 (14%) were contract farms, 4 (11%) were lease farms and 7 (19%) were independent farms. The control farms were either company (73%) or contract (27%) operations. The median size of case and control farms was 56,930 (range: 7,200 – 315,000) and 51,847 (range: 7,200 – 328,148) birds per farm, respectively.

Multivariable modeling through backward selection identified several factors associated with increased odds of case status, including: close proximity of the farm to other turkey operations, field work nearby in the 14 days prior to the outbreak, rendering of dead birds, and wild mammals observed near turkey barns. In a sub-analysis separating early and late periods of the outbreak, early period factors identified that actively working a nearby field in the 14 days prior to the outbreak and a high level of visitor biosecurity were associated with increased odds of case farm status, while high level of worker biosecurity had a protective effect. Late period factors associated with increased odds of case farm status included a non-asphalt road being used by vehicles coming onto the farm and use of a vehicle wash station or spray area, while wild birds observed near dead bird disposal was associated with reduced risk of case farm status in the late period. Commonly shared equipment such as feed trucks and bird moving equipment were not found to be risk factors in this study; however, a USDA observational study associated shared equipment with increased risk for an HPAI introduction (USDA-APHIS-Epidemiologic and Other Analyses of HPAI-Affected Poultry Flocks: July 15, 2015 Report). Study results indicate that the initial introduction of the virus likely occurred through both environmental and between-farm pathways and the outbreak was perpetuated by multiple factors. These factors need to be further evaluated to prevent future large-scale outbreaks.

Table 1. Factors associated with case farm status (from multivariable analyses)

Multivariate Model	No. of Controls (%)	No. of Cases (%)	Variables	P-Values	Odds Ratio (95% CI)
Full Period	10 (38.5)	21 (56.8)	Tilled in last 14 days	0.02	6.46 (1.36 – 30.78)
	9 (34.6)	4 (11.1)		0.06	
	15 (57.7)	30 (81.1)	Wild mammals near barns	0.02	0.14 (0.02 – 1.06)
	3 (11.5)	23 (62.2)	Render dead birds	<0.01	9.80 (1.46 – 65.96)
			Close proximity to other farms		46.14 (5.96 – 357.55)
Early Period[a]	4 (40.0)	15 (83.3)	High visitor biosecurity	0.07	7.92 (0.88 – 71.41)
	7 (70.0)	5 (27.8)		0.05	
	3 (30.0)	12 (66.7)	High worker biosecurity	0.05	0.07 (0.01 – 0.96)
			Tilled in last 14 days		13.88 (1.04 – 184.85)
Late Period[b]	12 (75.0)	17 (94.4)	Non-asphalt roads	0.10	10.05 (0.65 – 156.49)
	10 (62.5)	18 (94.7)		0.06	
	12 (75.0)	6 (31.6)	Use of vehicle wash/spray stations	0.02	12.40 (0.94 – 163.52)
			Wild birds near dead bird disposal		0.12 (0.02 – 0.72)

[a]Farm proximity in the area could not be included in the early model because no control farms were in high farm proximity area. Therefore, proximity of farms alone may be a comparable or better predictor of being a case in the early period than the set of variables together in the multivariable model shown. However, that cannot be determined with the given data.

[b]The model shown was the result of not including farm proximity in the area in the multivariate model selection process. When high farm proximity is included, the model reduces to only including the high farm proximity variable. Therefore, similar to the early model, proximity of farms alone in the area may be a comparable or better predictor of being a case than the set of variables together in the late period multivariable model shown here.

2015 HPAI Assessment: Moving Forward

John Clifford, USDA-APHIS, Veterinary Services (VS)

Current Status:

This outbreak has been unprecedented in the annals of animal health in the United States. APHIS has confirmed H5/H7 highly pathogenic avian influenza (HPAI) in a total of 232 premises: 211 commercial operations and 21 backyard flocks. Approximately 50 million birds have been culled as a result of the presence of these HPAI strains. Current response activities are well over half a billion dollars for depopulations, indemnity, and cleaning and disinfection. According to a Congressional Research Service Report released late this summer, the value of egg-laying hens lost is $1.04 billion, and $530 million for turkeys. That's about $1.6 billion dollars in direct losses. This outbreak has had a far-reaching impact on the larger economy as well, including the lost business incurred by sectors that work with the poultry industry, such as feed and trucking. The economy-wide impact is estimated at $3.3 billion. At the height of the outbreak, the response involved over 3,600 State and Federal responders, including: over 700 APHIS employees deployed; 200 State personnel; and 2,900 contractors.

Key Issues:

Trade Impact. With respect to trade, 17 trading partners have suspended all US poultry and poultry products. The major closures are China ($391 million), Russia ($153 million (already shut off under preexisting trade restrictions), and South Korea ($123 million). Trade has continued from areas of the United States not affected by HPAI. US poultry and poultry product exports to these 38 trading partners in 2014 were valued at $4.4 billion.

Travel Impact. Veterinary Services employees traveled to Asia, Africa, the Middle East, and Europe to provide updates on the status of the US response to HPAI and discuss potential impacts on trade of that response. The meetings provided VS with the opportunity to clarify the host country's previous misconceptions on US policy. In many cases, the countries agreed to lift remaining bans, consider regionalization, and allow the use of vaccines, but each country provided specific follow-up requests for official written requests from the United States and further information on our protocols and plans for HPAI response. Many host countries were sensitive to the global aspects of HPAI and receptive to a multi-pronged approach for contingency. They also demonstrated great interest in the scientific aspects of the HPAI situation.

2015 Assessment and Lessons Learned:

Through the spring and summer, we engaged in weekly planning and information-sharing calls with State and industry partners and participated in several conferences and workshops to plan for fall. All of these activities have helped us identify gaps and lessons, and address them in time for possible detections this fall. APHIS has spent numerous hours developing a comprehensive planning document that we provided to Secretary Vilsack on August 15th. This is a "living document," and we have continued to refine it. A version of the plan was released to the general public on September 18th. We have conducted considerable outreach to ensure that States, industry, and

producers are aware of our efforts. Our planning activities assumed a worst-case scenario beginning in September 2015, with HPAI occurring simultaneously in multiple sectors of the poultry industry throughout the Nation.

Future HPAI Planning:

Promoting improved on-farm biosecurity practices in order to prevent future HPAI cases to the greatest extent possible; improving HPAI surveillance in wild birds as a means to provide "early warning" risk information to States and industry; expanding Federal, State and industry response capabilities, including availability of personnel, equipment, and depopulation, disposal and recovery options; improving our capabilities to rapidly detect HPAI in domestic poultry and to depopulate affected flocks within 24 hours to reduce the environmental load of HPAI viruses and their subsequent spread; streamlining the processes for payment of indemnity and the cost of eliminating viruses so that producers receive a fair amount quickly, to assist them in returning to production; enhancing our ability to communicate in a timely and effective way with producers, consumers, legislators, media, and others regarding outbreaks and other information; and making preparations to identify and deploy effective AI vaccines should they be a cost beneficial addition to the eradication efforts in a future HPAI outbreak. This plan builds upon the Foreign Animal Disease Preparedness and Response Plans (FAD PReP) and Continuity of Business/Secure Food Supply plans that were already in place and used during the 2015 outbreak.

USDA Federal Fall HPAI Planning Activities

Patti Fox, USDA-APHIS, Veterinary Services (VS)

The Fall 2015 HPAI Response Plan was published on September 18, 2015, but is a living document, and thus, subject to change. It was developed based on lessons learned in the recent highly pathogenic avian influenza (HPAI) outbreak, and supplements but does not replace the "Red Book." The Plan assumes a worst-case scenario of 500 infected premises for the fall of 2015 with no zoonotic spread. Four key areas are covered: 1) Preventing or reducing future outbreaks; 2) Enhanced Preparedness; 3) Improved and streamlined response capabilities; and 4) Preparing for the potential use of AI vaccines.

Enhanced biosecurity has been identified as an important way to prevent future outbreaks. Risk factors associated with poor biosecurity were identified in epidemiology studies. Educational materials and a biosecurity self-assessment tool have been developed with Iowa State University and US Poultry and Egg Association and are available on the USDA Avian Influenza website. An interim rule will be published soon requiring that in order to receive indemnity for an infected flock, a producer must self-certify that biosecurity procedures were in place and followed. This is the first step towards requiring stronger accountability for producers in prevention of infection.

The Interagency Strategic Plan for wild bird HPAI surveillance was published in June, 2015. According to the plan, 40,000 samples from wild birds will be collected between July 2015 and July 2016.
Plans include stakeholder announcements and web posting if any new findings of HPAI occur.

In order to improve state and industry response capabilities, surveys were sent to these groups asking for details on their current readiness for response.

To enhance diagnostic laboratory preparedness, NAHLN laboratories reviewed and updated their staffing plans, surge capacity plans, and barcoding and shipping protocols.

Capacity and training for deployed Federal personnel have been increased by plans to hire 350 veterinary medical officers (VMOs), Animal Health Technicians (AHTs) and support personnel. In addition, IMTs will be reconstituted and expanded and NAHERC will be used in the future.

Steps are being taken to improve capacity for depopulation and disposal. Towards this end, Federal and State rules on carcass disposal have been researched and compiled, and maps created showing landfill, incineration and rendering facilities in various states. The National Veterinary Stockpile (NVS) has improved its inventory of depopulation and disposal equipment, assessed water and carbon sources for composting and updated their inventory of personal protective equipment (PPE) and other response supplies.

To improve public communications in an outbreak the agency is hiring additional Public Information Officers (PIOS) and is working on message development and dissemination. Plans include deployment of a site manager to each affected facility.

Modeling studies indicate that rapid detection, depopulation and disposal have the greatest impact on reducing outbreak size and duration. In order to increase the speed of detecting affected premises, the agency now accepts presumptive positives at a National Animal Health Laboratory Network (NAHLN) laboratories as sufficient for depopulation. In addition, they are implementing the antigen capture immunoassay to identify suspect cases. A decision could be made to depopulate if clinical signs present in a flock with an antigen capture test positive result.

The agency has put forward a goal of depopulating affected flocks within 24 hours of positive test. Firefighting foam or CO2 gas are preferred methods, but we are prepared to use ventilation shutdown (VSD).

To speed the completion of cleaning and disinfection of infected sites, dry cleaning and heating are now preferred for virus elimination. A flat (per bird) rate is being developed for C/D (dry cleaning/heat) payments to producers.

Streamlining of indemnity payments to affected producers will be achieved by allowing Electronic submission of flock inventories. Indemnity calculators will be continually reevaluated. In order to obtain indemnity for an infected flock, the owner and grower (if applicable) sign an Appraisal and Indemnity Request Form. The form includes self-certification that a biosecurity plan was in place and being followed when the outbreak occurred. The producer agrees

to the current calculator values for the birds and to the process (interim rule language) for the splitting of payments between owners and growers. In addition, the producer agrees to provide documentation to allow verification of inventory and expected contract value for the flock. **This is the only document needed to depopulate. A signed 1-23 form or flock plan will NOT be required.** There will be one document outlining all of the payment processes, including a flat rate payment for virus elimination (formally C&D) based on number of birds and facility type. The VS 1-23 form will be used for all items that must be destroyed (birds, eggs, feed, corn, items that cannot be C&D'd). We expect very limited use of Cooperative Compliance Agreements (CCAS) (only for depopulation and disposal activities).

In preparation for the potential use of AI vaccines, two companies were awarded contracts for vaccine manufacture on October 13, 2015. Additional "requests for proposals" (RFPs) will be released quarterly. No current decision has been made to use vaccination in a future HPAI outbreak. Vaccine use would require careful consideration of the efficacy of the vaccine, any impacts of using HPAI vaccine in the field, and the potential trade impacts. Vaccination, if approved, would be part of an eradication effort, not a replacement for it.

USDA Biosecurity Perspective

Lee Ann Thomas, USDA-APHIS, Veterinary Services (VS)

Biosecurity is a broad term to mean that encompasses those operational or structural measures or procedures intended to protect humans or animals against disease. While standard biosecurity efforts practiced by the poultry industry may have been sufficient in the past, evidence of farm-to-farm spread of the highly pathogenic avian influenza (HPAI) virus strain circulating in the Midwest shows that stricter biosecurity is needed.

To facilitate stricter biosecurity, APHIS has developed educational materials including Spanish translations and a biosecurity self-assessment checklist, which are available online through the US Poultry and Egg Association. As of October 23, 2015, 531 self-assessments had been completed. The majority were submitted by layer (270), broiler (118), pullets (77), or turkey (70). The number of responses "in progress" indicates the efforts that producers are taking to improve biosecurity, although additional efforts are still needed.

Additionally, APHIS is publishing an interim rule on HPAI indemnity that will contain a provision requiring all future HPAI-affected commercial poultry producers to self-certify that biosecurity procedures were in place at the time HPAI was detected. This represents the first step in creating a system of greater accountability for biosecurity. Following this, we will collaborate over the next year with stakeholders to design a biosecurity auditing system. An industry-driven initiative, an addition to the National Poultry Improvement Plan (NPIP), or a third party auditor is possible approaches.

Minnesota HPAI Biosecurity Education

Steve Olson, Minnesota Turkey Growers Association

One of the last steps required for poultry farms to resume business is to meet the requirements outlined in USDA's Restocking document. These requirements include biosecurity practices. The Education Committee of the Minnesota Turkey Research and Promotion Council (Council) initiated a highly pathogenic avian influenza (HPAI) and Biosecurity Education program to provide information and an opportunity for dialog on HPAI and farm-specific biosecurity. The Council, with financial support from the Minnesota Board of Animal Health, hired veterinarians to provide education on HPAI to growers that had infected flocks and to review their biosecurity. A veterinarian met one-on-one with the grower, farm manager or flock supervisor. A fact sheet with information on HPAI was provided and discussed during the meeting, followed by a tour of the farm. Reviews were conducted, in almost all cases, on farms that had restocked. This enabled a more valuable review of the implementation of biosecurity practices. The intent of these meetings was educational. Feedback from growers has been overwhelmingly positive.

The Process

A team of poultry veterinarians (and one swine veterinarian) made slight modifications to an existing biosecurity review tool. The tool was uploaded to iAuditor application. Smartphones and/or ipads were used for the onsite review. The iAuditor application enabled the reviewer to complete the report on-site. For each question/area of review, the reviewer identified whether the practice was Safe or At-Risk. The reviewer was able to photograph Safe and At-Risk practices to clarify with the flock supervisor and enter notes/comments into the report. Reports were sent electronically to the farmer owner and flock supervisor.

As of October 2, 2015, 58 reviews had been completed which included 63 farms of the 104 HPAI introductions on Minnesota turkey farms. Some farms conducted a review with their veterinarian but are not included in this project because the review tool was slightly different. Other farms had not yet restocked.

The review tool is available to all Minnesota turkey growers on our members-only website. Dr. Sally Noll with the University of Minnesota's Animal Science department will be providing a summary report and publishing findings as fact sheets through the University of Minnesota Extension.

The review team commented during a debrief that they were very impressed with the commitment of the growers, farm managers and flock supervisors to take the necessary steps to prevent future introductions by building upon their existing biosecurity practices.

Commercial Layer Biosecurity

Travis Schaal, Hy-Line International

The biosecurity practices at Midwest layer complexes before spring 2015 was adequate to efficiently produce large volumes of eggs. As the layer industry consolidated into the central US over the last 20 years, major

infectious disease challenges (Marek's, infectious bursal disease, *E. coli,* avian encephalomyelitis*, Mycoplasma gallisepticum*, fowl pox, infectious laryngotracheitis, infectious bronchitis, and Newcastle disease) were adequately controlled through robust vaccination programs. The biosecurity of complexes was likely never fully challenged by a devastating pathogen such as highly pathogenic avian influenza (HPAI) until the recent outbreaks. It should be noted that *Mycoplasma synoviae* has often been found on layer complexes, and moved between sites, displaying some potential weaknesses in on-farm biosecurity. Several complexes and off-line producers had incorporated seemingly stringent biosecurity practices such as "shower in/shower out" for personnel, but these practices appear to have failed in preventing some sites from becoming infected during the 2015 HPAI outbreak.

Layer complexes have an exorbitant number of inputs and outputs on a daily basis including: contract crews, farm personnel, lunches, tools, personal vehicles, pullet trucks/carts, crews and carts to deplete of end of lay hens, feed trucks, feed ingredients, farm deliveries (UPS, FedEX, USPS, etc.), office supplies, egg packing materials, liquid egg hauling equipment, manure removal equipment, manure, dead bird disposal, etc. A single complex may receive over 100 semi deliveries of feed ingredients per day to produce feed on-site, and more than one hundred personnel to work in houses and egg processing/packing plants. Addressing all of these factors presents an enormous task for egg companies. Making the task more difficult is the potential sharing of equipment, staff, and contract crews between locations and firms. Much attention has been given to vehicle tire disinfection at farm the perimeter, but this practice does not address the risk of dirty vehicle bodies, boxes, cabs, and contaminated drivers.

Manure handling and spreading a major risk factor in spread of disease between layer operations. Belted style housing has become more common allowing for a drier manure product that can be land applied throughout the year. Traditional high- rise caged housing is usually cleaned out on a less frequent basis. Manure handling equipment (semis, trailers, loaders, tractors, etc.) and personnel to handle the manure present challenges for cleaning and disinfection due to complexity and size of machinery, and frequent trips on and off a complex. Furthermore, land application of manure between poultry sites on windy days increases the risk of contaminating other nearby poultry houses and vehicles with infectious organic matter. Manure handling equipment and personnel may be shared between complexes and even between companies introducing major risk if no specific interventions are taken to effectively decontaminate vehicles and people between sites.

Contract crews used for moving pullets, vaccine application, flock depletions, and other tasks present a unique challenge for the layer industry. Crew work is sporadic on any given site and activities are time sensitive. This creates a labor surplus during "downtime" when the crew is waiting between tasks and locations. Third party crews have established a niche market by providing ample labor supplies to achieve a given task, on demand; however, cross over between companies exists as crews seek out work to provide full-

time employment. Policies requiring downtime between companies are common corporate biosecurity measures (usually 72 hours from other poultry exposure), however, crews cannot maintain staffing without constant work opportunities and may not adhere to requested downtime. If contract crews are not truthful or forthcoming about previous bird contact, they increase risk to the industry. Crew clothing, footwear, and personal vehicle traffic all present risks to disease introduction to a site. Often, contract crew staff resides in a specific geographic region where they may interact with farm staff from other companies or people from other industries such as swine, turkey, or broiler production. Cross traffic between farm staff and contract crews at their homes, gas stations, churches and school functions should not be overlooked.

In addition to potential operational biosecurity gaps, the unprecedented spread of HPAI virus may have been due to geographic and meteorological events after large scale viral amplification on layer complexes. Some negative farms may have received contaminated “wind plumes” or dust particles that travelled some distance on the wind from infected premises. Although modeling presented wind-borne transmission of the virus, filtration of air for layer complexes would be a major financial investment that would be better spent on structural and operational measures to decrease links to other poultry facilities.

Quality and auditing programs on layer facilities have been focused on Food and Drug Administration (FDA) *Salmonella* requirements (SE Rule) and welfare compliance, but both of these types of audit programs are limited in scope and relevance to operational biosecurity. Attention should be focused on biosecurity programs that address a hazard analysis and critical control (HACCP) style program for individual layer facilities to address specific risk factors that may introduce pathogens on each site. Programs must be maintained with standard operating procedures and adequate staff training. Clear demarcation of farm AND barn clean/dirty lines is paramount. Color coordinated clothing and footwear allow for a simple visible inspection. Addressing vehicle traffic may require structural accommodations, taking into account seasonality (example, truck washes in Iowa winters). Staff should police their actions and all levels of the corporate structure must buy in to the biosecurity program. Short cuts should not be tolerated and addressed accordingly.

High Pathogenicity Avian Influenza Vaccines

David E, Swayne, Southeast Poultry Research Laboratory, US National Poultry Research Center, USDA, Agricultural Research Service (ARS)

Since 1959, there have been 36 epizootics of high pathogenicity avian influenza (HPAI) in the world with 31 of 36 epizootics using stamping-out programs leading to rapid eradication. Five of the epizootics have used vaccines as a means to control the disease and reduce infection pressure and spread of the disease. If used properly, vaccines can be an effective tool in control that can lead to eradication. However, field outbreaks of H5N1 HPAI have occurred in vaccinated flocks from both failure of the vaccines (i.e.

vaccine efficacy) and failure in administration or immune response of the target species (i.e. vaccination effectiveness). Antigenic drift in field viruses has resulted in failure of protection by classic H5 vaccines strains in Mexico, China, Egypt, Indonesia, Hong Kong and Vietnam. This challenge has been met by developing new vaccine strains that provide protection against ever changing HPAI viruses. In a comprehensive assessment of AI control methods under the World Organization for Animal Health (2002-2010), >113 billion doses of AI vaccine were used in poultry in 15 countries. The majority of vaccine (>91%) was used in China while significant amounts were used in Egypt, Indonesia, and Vietnam. The other 11 countries used less than 1% of the vaccine. Inactivated AI vaccines accounted for 95.5% and live recombinant virus vaccines for 4.5% of vaccine used. Since 2010, Bangladesh (H5N1) and Mexico (H7N3) have begun HPAI vaccination campaigns.

In 2015, USDA began experimental vaccination studies to assess vaccines as a potential tool for future use in control of H5N8 and H5N2 HPAI outbreaks. Initial studies indicated the historic USDA H5 vaccine bank strains could provide protection from mortality, but varied greatly in their ability to reduce the number of poultry and the quantity of oral and cloacal replication and shedding of challenge virus; i.e. raising concerns at the ability of the heterologous H5 vaccines to reduce infection and the spread of field HPAI virus. Three licensed technologies have shown the greatest potential for use: reverse genetic laboratory generated H5 low pathogenicity avian influenza (LPAI) virus for inactivated vaccine (rgH5-inactivated), recombinant herpesvirus of turkey with H5 hemagglutinin gene insert (rHVT-H5) and recombinant alphavirus RNA particle vaccine with H5 hemagglutinin gene insert (RP-H5). The favored H5 inserts are from a homologous clade 2.3.4.4 H5 HPAI virus with cleavage site altered to LPAI virus. Among all experiments, the rgH5-inactivated vaccine (clade 2.3.4.4) gave the best results in preventing mortality and reducing North American clade 2.3.4.4 HPAI challenge virus shedding in chickens and turkeys, either in single or prime-boost regimes. The rHVT-H5 (Clade 2.2) and RP-H5 (clade 2.3.4.4) worked best in a priming vaccine application followed by booster vaccinations with rgH5-inactivated or RP-H5. The reduction in virus shedding was associated with hemagglutination inhibiting antibodies. In young birds, the RP-H5 may require a higher vaccine dose for and optimal protective response. *In ovo* applications are most promising with rHVT-H5. Collectively, studies support a prime-boost regime for initial optimal protection.

Secure Poultry Supply Plans and the NPIP

Eric Gonder, Butterball LLC

The Secure Poultry Supply (SPS) Plans represent a major step forward in advancing business continuity in the face of an outbreak of highly pathogenic avian influenza (HPAI). However, there is a need for a mechanism to incorporate changes in the Plans as the disease, the industry, and control mechanisms continue to evolve. This requires a collaborative effort of Federal, State and Industry segment participants.

The National Poultry Improvement Plan (NPIP) presents a structure suitable to addressing these issues moving forward. Previous experience with the low pathogenic avian influenza/notifiable avian influenza plans within NPIP and the collaborative structure of NPIP should allow the organization to fill this role suitably and provide industry segment specific advice to the Secretary of Agriculture on future modifications of the Secure Poultry Supply Plans.

NPIP is also uniquely structured and reasonably experienced in the development and execution of biosecurity procedures by industry segment. Expanding those efforts into the future control of HPAI would likewise represent an expansion of NPIP's mission, but it is uniquely structured to address that issue as well. One suggestion currently under discussion is to create a Subpart E "Biosecurity" in the NPIP Program Standards to be addressed for the subparts wishing to participate. There will surely be other suggestions.

Comparison of Operational Plans from the Secure Poultry Supply Plans (Egg, Broiler, Turkey)

Julie Helm, Clemson Livestock Poultry Health

The Secure Poultry Supply (SPS) Plans consist of the Secure Egg Supply Plan, the Secure Broiler Supply Plan and the Secure Turkey Supply Plan. The detailed plans, biosecurity check lists and movement permit examples can be found at:

- Egg -- http://secureeggsupply.com/
- Broiler -- http://www.securebroilersupply.com/
- Turkey -- http://www.secureturkeysupply.com/

The Plans are meant to be used as a tool to help guide decisions on moving poultry and poultry products from negative premises during a highly pathogenic avian influenza (HPAI) event to allow for business continuity. The plans make specific science- and risk-based recommendations that emergency decision makers (e.g. Incident Commanders) can use to rapidly decide whether to issue or deny movement permits of table egg, broiler and turkey industry products during an event. The plans outline surveillance, biosecurity, and cleaning and disinfection practices for moving product into, within, or out of a HPAI Control Area.

These plans are living documents and will be updated as needed. The original risk-based recommendations were based on past HPAI H5N1 events. New risk assessments, as observed in the recent HPAI H5N2 event, will continue to be evaluated and added in future updates and will change some of the procedures.

The Secure Egg Supply Plan is ten years old and was initially developed as a business continuity model in the era of "Stamping Out" in which whole zones of infected and non-infected premises would be depopulated as a way to control an outbreak. The Secure Egg Supply Plan is the most complete of all the plans. All the risk assessments (for HPAI H5N1) and the movement permit guidance were completed for the poultry and products listed in the plan. The Secure Broiler and Turkey Supply Plans began development a few years ago.

Both plans were still evaluating risk assessments and developing guidance when the 2015 HPAI event started in the US. The permit guidance for broilers and turkeys was released prematurely because of the need to move these birds and products.

The three plans are similar in guidance, but also contain unique features based on the different management styles and perceived risks between the three different industries. The three plan working groups include members from academia (University of Minnesota, Iowa State University), USDA-APHIS, Veterinary Services (VS), Center for Epidemiology and Animal Health (CEAH), USDA-APHIS-VS, industry veterinarians, commodity groups (United Egg Producers, National Turkey Federation) and State officials.

All three plans require negative testing of flocks to move birds or products off of the facility and to move within or out of the Control Area, with the exception of a few eggs products in the Secure Egg Supply Plan. Samples consist of oropharyngeal swabs (including swabbing the choanal cleft) and testing with the real-time reverse transcription-polymerase chain reaction (RRT-PCR or PCR for this summary). The numbers of PCR tests (pooled tube of oropharyngeal swabs) is always determined on the number of dead or sick birds in each house. The sample size is either 5 or 11 dead or sick birds for one pool of brain heart infusion (BHI) broth. Target sampling the dead birds first and then sampling sick birds to fill the PCR pool.

The discrepancy between sampling 5 or 11 birds in the plans is taking in consideration that the 11 bird pooled sample in 5.5 ml of BHI broth was only authorized by the National Veterinary Services Laboratory (NVSL) in 2013 versus the previous method of a maximum 5 bird pool sample in 3 ml of BHI broth. Sampling of 11 birds in a pool is preferred as it increases the confidence level of detecting the virus.

The number of negative PCR tests needed prior to moving birds or products will vary in the plans. No testing is required to move pasteurized liquid eggs or inedible egg products to a non-poultry facility since there is no threat of spreading the avian influenza virus. One negative PCR test is needed from table egg layers for moving non-pasteurized liquid eggs, dry eggshells and wet eggshells or for placing turkey poults in a brooder house within a Control Area. Two negative PCR tests prior to move is needed for most of the birds and products, including testing table egg, broiler and turkey breeders to move hatching eggs and turkey semen; testing table egg layers to move table (eating) eggs; and testing the meat broilers and turkeys to move to slaughter. Some bird movement was not considered at the time and is not listed in plans, but will be developed and added to the plans (e.g. spent table egg layers or spent breeders moving to slaughter or rendering).

There are two options for frequency of sampling prior to move. One PCR pool collected on the two consecutive days before moving or two PCR pools collected 24 hours before moving. The latter option has a slightly higher confidence level of detecting the virus and requires less potential outside visitations to the farm.

Table eggs and hatching eggs require a holding period prior to moving off of the facility. A one-day hold is needed when first starting up a Control Area before washed and sanitized table shell eggs can move from a table egg layer farm to a storage/holding facility, but not allowed to move into the egg market. A two-day hold is needed for hatching eggs on all breeder farms before moving to the hatchery, and washed and sanitized table shell eggs and nest run eggs on table egg layer farms before moving to the egg processing plant.

The plans describe in detail the specific biosecurity requirements listed for trucks and drivers moving birds and eggs and product-specific biosecurity for pre-movement flock isolation periods and procedures at the breeder farm, hatchery, grow-out farm and table egg farm.

Permitted movement requirements include traceability information, normal flock production parameters (e.g. mortality, egg production), truck and driver biosecurity measures, product-specific biosecurity measures, completed epidemiology questionnaire with no dangerous contact to infected premises, any holding or isolation requirements, and any testing requirements. The State Animal Health Official (SAHO) of the Destination State receives a copy of movement permit within 24 hours of issuance. Examples of permits are located in the plans or as supplemental information on-line.

The Secure Poultry Supply (SPS) Plans were used successfully during the 2015 HPAI H5N2 event. Initially, the SAHOs potentially receiving birds and products from the Control Areas were unfamiliar with the details of the plans and wanted a uniform method of procedures for interstate movement out of a Control Area. The HPAI permitting working group was formed on April 16, 2015 at the request of the National Assembly of State Animal Health Officials (NASAHO). The charge of the working group was to develop a document summarizing the recommendations for permitting interstate movement of poultry and eggs from a HPAI Control Area, to include frequency of surveillance testing, number of tests per premises and biosecurity procedures for movement. The recommendations, which contain guidance procedures from the Secure Poultry Supply Plans, were finalized on May 20, 2015, and approved by the National Assembly. The USDA-APHIS-VS, Surveillance Preparedness and Response Services (SPRS) has incorporated the working group's recommendations into a critical response activities document entitled Testing Requirements for Movement from the Control Area and included it as part of the Foreign Animal Disease (FAD) PReP Materials and References for HPAI Response & Policy Information: 2014-2015 Outbreak.

Recommendations for interstate permitted movement of poultry and eggs out of or within an HPAI Control Area (Infected and Buffer Zones), include:

1. Delay moving live poultry (including hatching eggs) after a new Control Area is established until such time as the Control Area testing of *commercial premises is completed.
2. States should avoid placing additional restrictions on interstate movement of poultry and poultry products from outside of the Control Area in HPAI affected States. These recommendations do not supersede existing state regulations or requirements.

3. Traceability information is required for the premises of origin and premises of destination [each premises will need a Federal Premises Identification Number (PIN) or (USDA's Emergency Management Response System (EMRS) will create one).
4. The flock has normal flock production parameters as described in the Secure Poultry Supply Plans (Egg, Broiler and Turkey).
5. All movement should follow biosecurity procedures for Truck and Driver and Product Specific Biosecurity as described in the Secure Poultry Supply Plans (Egg, Broiler and Turkey).
6. The premises of origin is not an Infected, Suspect or Contact Premises (refer to *Section 5.5, Epidemiological Investigation and Tracing in USDA's HPAI Response Plan*).
    a. The Incident Commander should determine the need for an epidemiology questionnaire if the flock has normal production parameters and negative tests.
    b. Receiving State may require information from the epidemiology questionnaire prior to granting permission to move.
7. Egg Movements:
    a. Hatching eggs should follow the two day holding procedure as described in the Secure Poultry Supply Plans (Egg, Broiler and Turkey), provided the Control Area testing of commercial premises is completed (refer to #1), and should use the recommended testing procedures (refer to #8).
    b. Table eggs (non-hatching eggs) should follow the two day holding procedure as described in the Secure Poultry Supply Plans (Egg, Broiler and Turkey) and the recommended testing procedures (refer to #8).
8. Testing of poultry should consist of a minimum of two 11-bird AI negative PCR pools per house.
    a. The sample size consists of one pool of 11 dead/sick birds sampled per 50 dead birds per house.
    b. Frequency of sample collection:
        i. Collect all pools within 24 hours prior to movement, or
        ii. Collect one set of pools within 48 hours prior to movement and the second set of pools within 24 hours prior to movement.

*Commercial poultry premises defined from NPIP §146

1. Meat type chicken slaughter plant (broilers) – 200,000 or more chickens are slaughtered in an operating week (*all the broilers that feed that plant are considered commercial*),
2. Table egg laying premises – 75,000 or more chickens on a premises,
3. Meat type turkey slaughter plant – 2 million or more turkeys are slaughtered in a 12-month period (*all the turkeys that feed that plant are considered commercial*),

4. Commercial meat waterfowl/upland game bird slaughter plants – 50,000 or more birds are slaughtered annually (*all the birds that feed that plant are considered commercial*),
5. Raise for release waterfowl/upland game bird premises (e.g. hunting purposes) – 25,000 or more birds are raised annually on a premises, and
6. Breeder flocks that produce any of the above birds.

Broiler Industry Report

Deirdre Johnson, Mountaire Farms

Broiler Production: Production thus far in 2015 is ahead of the same period for 2014 by 4.7%. Average broiler age and weight are increased. Average feed cost is reduced from 2014.

Mortality: First week mortality has increased from 2014. Increased removal of hatchery antibiotics may be contributing to this increase. The same trend was reported last year. Chick quality/early mortality ranked third in the 2015 American Board of Veterinary Practitioners (AVBP) poll as displayed later in this report.

Total mortality thus far in 2015 is increased compared to the previous two years. This was reflected in all weight classes but more pronounced in the heavier broiler class. This same trend was reported last year.

Condemnations: Whole Body Farm Condemnations + Parts Condemnations increased from 0.592% in 2014 to 0.654% in the first half of 2015. Septicemia/Toxemia and Infectious Process account for the majority of this increase.

Key Broiler Health Issues: Even through HPAI has not been detected in commercial broilers, it was the top ranked disease issue in 2015. This same ranking affected the non-disease issues as biosecurity efforts have increased to prevent the introduction of HPAI into commercial broilers.

Coccidiosis ranked second amongst broiler Veterinarians as a major disease concern. Historically, it has ranked first. This reflects not only the actual frequency of diagnosis but also the cost and challenge of maintaining effective anticoccidial programs. *Eimeria* maxima was the coccidial species most often mentioned by broiler Veterinarians. Necrotic enteritis ranked fifth as a disease issue and would often be associated with inadequate control of E. maxima.

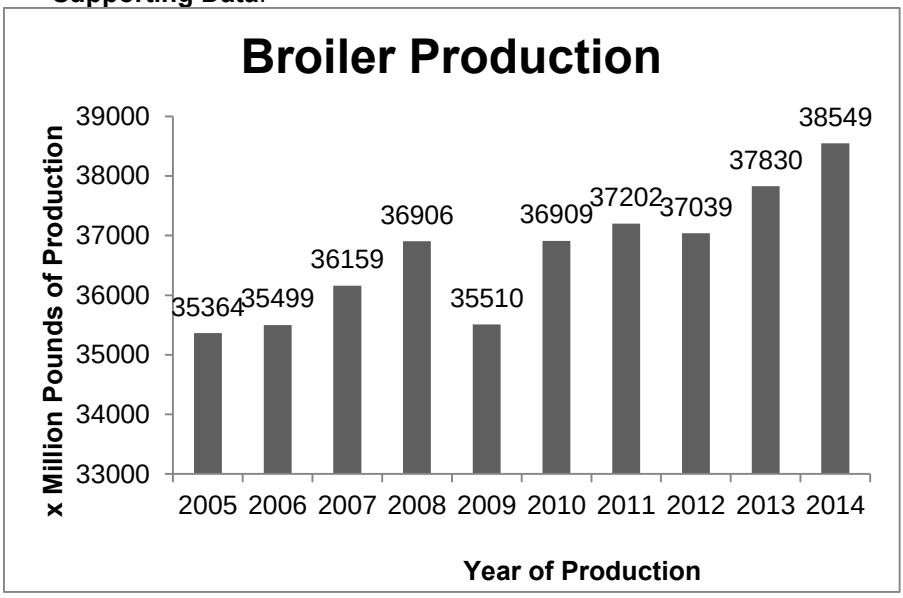
Infectious bronchitis ranked fourth on the poll. This disease continues to be a challenge, whether due to new strains or failure of vaccination programs to protect completely against existing strains.

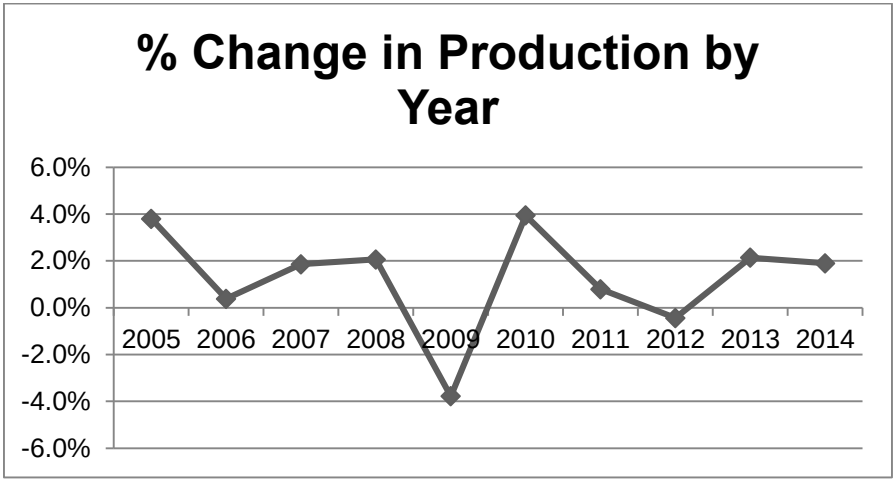
Further results for the 2015 AVBP disease poll are displayed later in this report.

Key Non-Disease Broiler Issues: The highest ranked non-disease issue was the biosecurity around HPAI prevention. Seventy-four percent of the broiler Veterinarians force ranked this issue first and the remainder of those surveyed ranked it second. Like last year, antibiotic free (ABF) issues ranked

high. This is due to increased production and demand for antibiotic-free (ABF) poultry by both customers and broiler production companies. Like last year, the loss or lack of effective drugs and increased regulation by the USDA and FDA ranked high. Poultry welfare issues ranked fifth in the poll. All results are displayed later in this report.

Supporting Data:





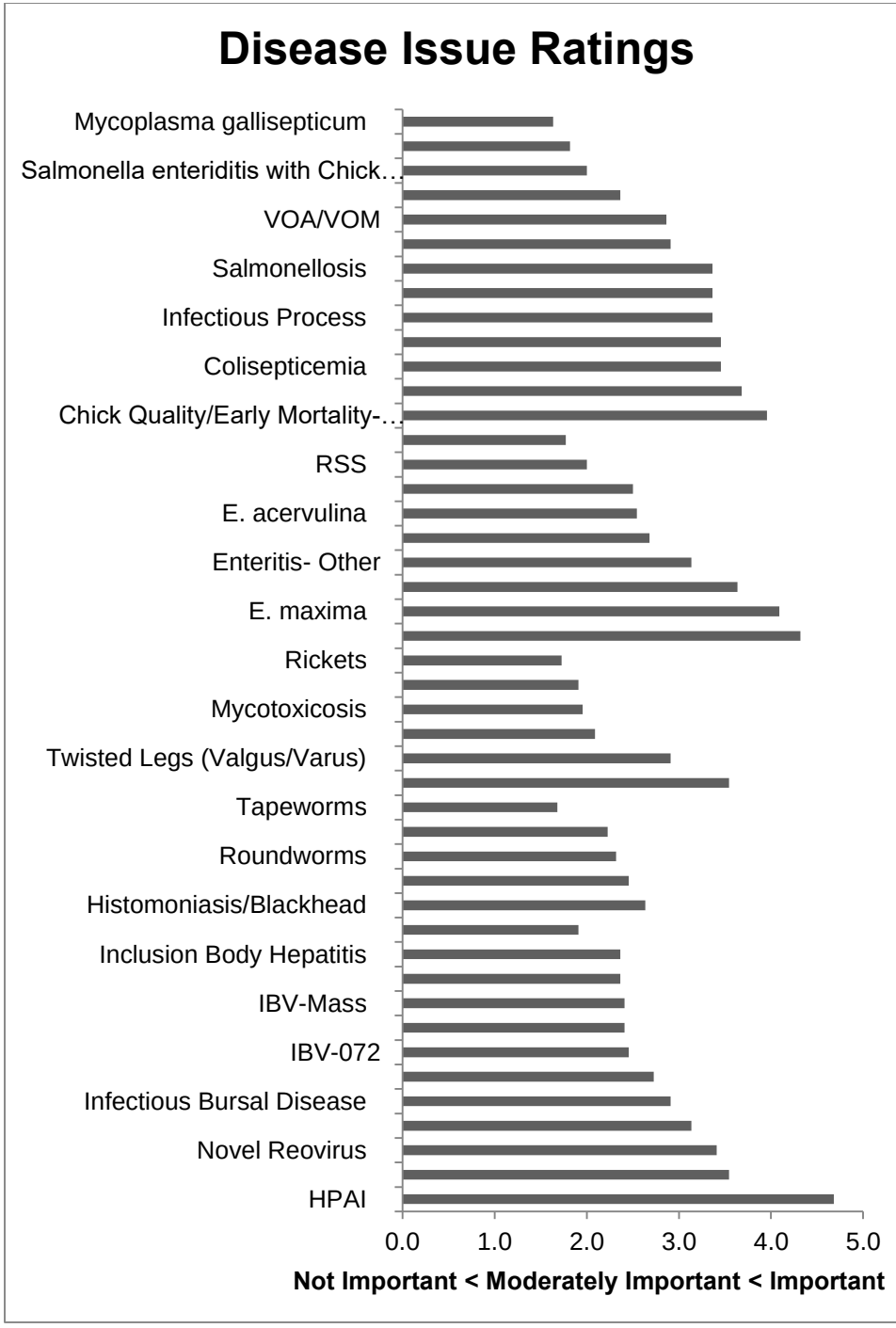
	2013	2014	2015
Average Age	**49.0**	**49.3**	**50.2**
Average Broiler Weight	**6.44**	**6.52**	**6.66**
Feed Ingredient Cost/Ton (All Broilers)	**348.44**	**289.50**	**255.25**
First Week Mortality	**1.15**	**1.26**	**1.48**
Total Mortality	**3.92**	**4.36**	**5.23**
Mortality (3.6-4.4 lbs)	**3.32**	**3.59**	**4.16**
Mortality (4.4-5.2 lbs)	**3.00**	**3.51**	**3.74**
Mortality (5.2-6.0 lbs)	**4.24**	**4.25**	**5.72**
Mortality (6.0-6.8 lbs)	**3.65**	**4.06**	**5.40**
Mortality (6.8-7.5 lbs)	**4.24**	**4.98**	**5.36**
Mortality (>7.5 lbs)	**4.58**	**5.04**	**5.86**
WB Farm + Parts Condemns	**.525**	**.592**	**.654**
Septox Condemns	**.129**	**.150**	**.171**
Airsac Condemns	**.099**	**.125**	**.127**
IP Condemns	**.031**	**.039**	**.047**
Leukosis Condemns	**.004**	**.001**	**.001**

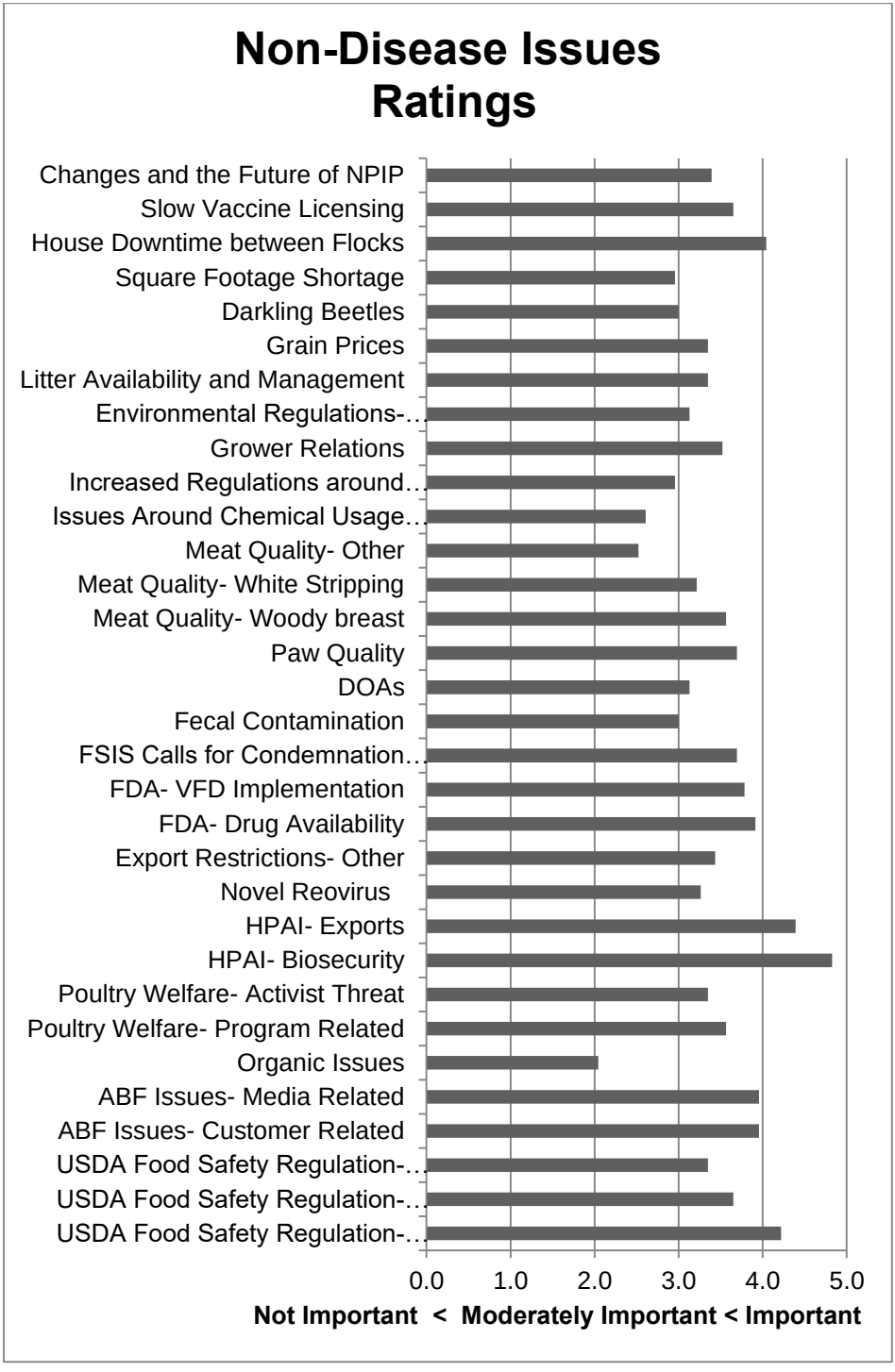
As in previous years, AVBP membership was polled concerning disease and non-disease issues. Topic issues were force ranked for both areas. All disease and non-disease issues were also rated in a second graph for each issue. AVBP is comprised exclusively of Veterinarians employed full-time by US broiler companies. The Veterinarians responding to the 2015 survey represented 62% of the membership and 84% of USA broiler production.

Ranking:

Top Disease Issues	Composite Forced Rank	Mean Rank
HPAI	1	1.45
Coccidiosis	2	2.74
Chick Quality and Early Mortality	3	4.91
Infectious Bronchitis- Respiratory	4	5.09
Necrotic Enteritis	5	5.65
Novel Reovirus	6	6.04
Grangrenous Dermatitis	7	7.17
Colibacillosis	8	7.3
Bacterial Osteomyelitis of the Legs	9	7.35
Infectious Bursal Disease	10	8.3
Infectious Laryngotracheitis	11	8.35
Vertebral Osteomyelitis	12	8.35
Infectious Bronchitis- Nephropathogenic	13	10.26
Mycoplasmosis	14	10.74
Marek's Disease	15	12.74

Top Non-Disease Issues	Composite Forced Rank	Mean Rank
Biosecurity- HPAI Threat	1	0.35
Antibiotic-Free Issues (Customer or Media)	2	2.48
Increased Food Safety Regulation by USDA	3	2.87
FDA-Drug Availability/VFD Implementation	4	3.3
Poultry Welfare (Internal Programs/Activist Threats)	5	3.61
Meat Quality (White Stripping, Woody Breast)	6	4.65
Exportation Issues (Drug, MRLs, Paws, AI, etc.)	7	4.83
Increased Environmental Regulations	8	5.91


Disease Issue Ratings
Mycoplasma gallisepticum
Salmonella enteriditis with Chick…
VOA/VOM
Salmonellosis
Infectious Process
Colisepticemia
Chick Quality/Early Mortality-…
RSS
E. acervulina
Enteritis- Other
E. maxima
Rickets
Mycotoxicosis
Twisted Legs (Valgus/Varus)
Tapeworms
Roundworms
Histomoniasis/Blackhead
Inclusion Body Hepatitis
IBV-Mass
IBV-072
Infectious Bursal Disease
Novel Reovirus
HPAI
0.0
1.0
2.0
3.0
4.0
5.0
Not Important < Moderately Important < Important


Non-Disease Issues Ratings
Changes and the Future of NPIP
Slow Vaccine Licensing
House Downtime between Flocks
Square Footage Shortage
Darkling Beetles
Grain Prices
Litter Availability and Management
Environmental Regulations-…
Grower Relations
Increased Regulations around…
Issues Around Chemical Usage…
Meat Quality- Other
Meat Quality- White Stripping
Meat Quality- Woody breast
Paw Quality
DOAs
Fecal Contamination
FSIS Calls for Condemnation…
FDA- VFD Implementation
FDA- Drug Availability
Export Restrictions- Other
Novel Reovirus
HPAI- Exports
HPAI- Biosecurity
Poultry Welfare- Activist Threat
Poultry Welfare- Program Related
Organic Issues
ABF Issues- Media Related
ABF Issues- Customer Related
USDA Food Safety Regulation-…
USDA Food Safety Regulation-…
USDA Food Safety Regulation-…
0.0
1.0
2.0
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5.0
Not Important < Moderately Important < Important

Table Egg Industry Report - October 2014 to October 2015

Eric Gingrich, Diamond V

The past year's most significant event was the devastating outbreak of highly pathogenic avian influenza (HPAI) in the central US. The outbreak began in commercial layers in Wisconsin in mid-April and ended in mid-June in Iowa. During this period of time, Iowa lost about 26 million layers, Minnesota 3.6 million, Nebraska 3.5 million, South Dakota 1.3 million, and Wisconsin 1.1 million for a total of 35.6 million. This is about 10% of the nation's egg layer population. Also, about 5 million pullets were lost to the disease or eradication effort.

A complicating issue was the inability to depopulate flocks on a timely basis leaving them to shed HPAI virus at a high rate and allowing increased spread. The lack of sufficient manpower, Modified Atmosphere Killing (MAK) carts, and/or CO2 supplies was responsible. From this issue, ventilation shutdown (VSD) is to be added as a possible depopulation method during the depopulation decision process according to USDA.

Many problems with biosecurity were found after close evaluation of the practices used by the farms that broke with the disease. A significant amount of investment in vehicle wash and baking stations, Danish entry type entryways for employees, visitors, and crews, hard surface pads outside of house entries, gates to control traffic, etc. Interviews of employees also took place to make sure they have no connections with other poultry operations in their households or off-work activities.

It is felt that with the improvements in biosecurity, greater awareness of the threat of HPAI, and more timely depopulation of flocks that are infected, that widespread HPAI losses as experienced this year will not occur again.

Other than HPAI, overall health of the national table egg layer flock continues to be very good. There are no other major clinical disease problems occurring at this time. This is due to the several resources and practices available to the industry:

- Continued availability of high quality vaccines
- Flock supervision from professional, well-trained flock service technicians
- Readily available veterinary technical assistance from primary breeder, vaccine company, diagnostic laboratory, feed additive suppliers, and consulting veterinarians
- High quality nutrition provided by professional nutritionists
- Housing of a majority of layers in environmentally controlled facilities in cages without exposure to litter
- Use of sound biosecurity practices.
- Continual surveillance for foreign animal diseases or potentially highly pathogenic agents such as Newcastle and avian influenza by our state and federal laboratory system

A poll of the Association of Veterinarians in Egg Production (AVEP) was conducted within the last month. The members were asked to rate a list of

common diseases of caged and cage-free pullets (23 and 24 conditions listed respectively) and caged and cage-free layers (32 and 34 conditions listed respectively) as to their prevalence and their importance in their area of service on a scale of 0 to 3 with 0 = not seen, 1 = seen but not common, 2 = commonly seen, and 3 = seen in a majority of flocks. For the importance question, they were asked to give a value of each disease to a company in their area of service on a scale of 0 to 3 with 0 = not important issue for flock health or economics to 3 = very important issue for flock health and economics. Twenty-two members of the total membership of 100 answered the survey.

To follow are the results of prevalence and importance of chick issues:

	Caged Pullets		Cage-Free Pullets	
	Prevalence	**Importance**	**Prevalence**	**Importance**
Yolk Infections	1.39 (1.19)*	1.35 (1.13)	1.50 (1.14)	1.44 (1.14)
Starveouts	1.61 (1.25)	1.24 (0.93)	1.31 (1.14)	1.38 (1.08)

* 2014 survey results are in parenthesis

Yolk infections and starveouts are associated with hatch egg quality, hatchery sanitation, and hatchery management of incubation, sanitation, chick processing, holding, and delivery. Compared to last year's survey, these problems appear to be on the rise again.

The survey revealed the following top five diseases of concern occurring in US for growing pullets excluding chick yolk infections and starveouts:

Top 5 Caged Pullet Diseases		Top 5 Cage-Free Pullet Diseases	
Prevalence	**Importance**	**Prevalence**	**Importance**
1 – Coccidiosis (0.98)	1 – Coccidiosis (1.65)	1 – Coccidiosis (1.50)	1 – Coccidiosis (2.00)
2 – tie Post SE Bacterin Hepatitis & Infectious Bursal Disease (IBD) (0.78)	2 – E. coli (1.59)	2 – Piling (1.25)	2 – Piling (1.94)
	3 – tie IBD & Marek's (1.47)	3 – E. coli (0.94)	3 – E. coli (1.63)
4 – tie Infectious Laryngotracheitis (ILT) & E. coli (0.56)		4 – Necrotic enteritis (NE) (0.94)	4 – ILT (1.56)
	5 – ILT (1.29)	5 – IBD (0.88)	5 – NE (1.56)

Note that none of the caged pullet diseases are prevalent above the one category so these conditions are not common. Coccidiosis and secondary necrotic enteritis remains the number one disease concern in pullets. It is a problem in caged pullets as well with vaccine usage as an intervention on the rise. Piling issues continue to plague the cage free pullet grower. *Salmonella*

enteritidis (SE) bacterin induced hepatitis syndrome can result in up to seven percent mortality starting two weeks after the administration of SE bacterin. It is a genetic susceptibility base as it has not been seen in one strain of birds. The cause of this problem continues to be unknown at this time. Infectious bursal disease (IBD) is its subclinical form may lead to immunosuppression after the maternal antibody has subsided. The use of the recombinant HVT-vectored IBD vaccine has greatly aided those sites with problems. Infectious laryngotracheitis is causing losses of pullet flocks in enzootic areas.

To follow are the top 5 diseases for caged and cage-free layers from the survey:

Top 5 Caged Layer Diseases		**Top 5 Cage-Free Layer Diseases**	
Prevalence	**Importance**	**Prevalence**	**Importance**
1 – E. coli (1.67)	1 – E. coli (2.28)	1 – Cannibalism (1.83)	1 – E. coli (2.22)
2 – Cannibalism (1.50)	2 – Cannibalism (1.89)	2 – E. coli (1.78)	2 – Cannibalism (2.06)
3 – Calcium Depletion (1.39)	3 – Mg (1.72)	3 – Ascarids (1.28)	3 – Mg (1.78)
4 – tie Gout & Mycoplasma gallisepticum (Mg) (1.28)	4 – Coccidiosis (1.61)	4 – Piling (1.17)	4 – Cocci (1.72)
	5 – Calcium Depletion (1.56)	5 – tie Mites & Coccidiosis (1.06)	5 – tie Fowl Cholera & Piling (1.44)

Colibacillosis continues as the #1 disease problem in caged and cagefree flocks and is a problem mainly of young flocks with mortality rates of 0.5 to 4% per week starting shortly after housing can occur. It is felt that this condition is most often secondary to upper respiratory challenges with Mg, *Mycoplasma synoviae* (Ms), ammonia, infectious bronchitis (IB), etc. in early lay. It also may be a primary problem if water lines are contaminated with *E. coli*. The overall prevalence and importance of colibacillosis was about the same as last year. A post-molt colibacillosis syndrome is also seen in some flocks due to declining immune system function, an ascending infection of the reproductive tract, upper respiratory infections, etc. The live E. coli vaccine, introduced in mid to late 2006, has been increasingly used successfully as both a preventative and as a treatment in the face of an outbreak in most areas. Some producers are now applying the live E. coli vaccine by eyedrop during the growing period to assure that each bird receives a dose.

Cannibalism was shown to be an important issue in both cage and cagefree layers. In cagefree production, the 10-day or younger rule for beak trimming results in longer beaks than desired compared to a beak trim at 4 to 8

weeks and may result in an increase in incidence and severity of cannibalism. The increasing use of large colony cages may also increase the level of cannibalism.

Calcium depletion continues to maintain high importance in caged flocks and is normally associated with either late onset of switching to lay feeds with high levels of calcium or low feed intake during early production with the lack of proper formulation to account for the low feed intake. This condition will be an ongoing issue with increasingly higher egg production rates accompanied with lower feed consumption through improvements in management and genetics.

Focal duodenal necrosis (FDN) dropped out of the top five conditions for caged layers this year. Apparently, preventative measures are working and the prevalence is low. Visceral gout came into the top five list this year in caged production for the first time. This condition is normally associated with kidney damage due to calcium toxicosis during a time when the bird cannot rid it from the kidneys (immature birds) such as feeding layer feed too early. Coccidiosis is an important issue for both caged and cagefree layers indicating problems with developing immunity during growing.

Mycoplasma gallisepticum (Mg) continues as an issue in multi-aged facilities and is successfully controlled in most cases through vaccination. Each complex must customize its vaccination program to control the strain on the farm. Ts-11 and 6/85 live vaccines are used for controlling mild strains of Mg while F-strain live vaccine is being used to control more pathogenic strains or where the Ts-11 or 6/85 vaccines are no longer effective. The live pox-vectored recombinant Mg vaccine is being used in a variety of situations and appears to be useful in low challenge situations. Vaccine failures with all vaccines are somewhat common and the unit must resort to medication programs using tylosin or tetracycline antibiotics before alterations in the immunity program are made. Most all operators are now applying the F-strain vaccine by eyedrop rather than spray in an effort to increase its efficacy.

An external parasite, the Northern Fowl Mite, has fallen in the list compared to last year's survey. The use of effective treatments has apparently had this effect. Spray treatment of caged layers is difficult due to the configuration of equipment but the feeding of elemental sulfur may have led to this decrease. Elemental sulfur in dust baths is being used very successfully in cage-free flocks. Insecticidal treatment of pullet moving trucks and equipment may also have had an effect.

The AVEP survey also asked about other issues and diseases of concern on a scale of 0 to 3 with 0 = no concern, 1 = some concern, 2 = moderately concerned, and 3 = very high concern. The opinions of the 20 respondents is as follows:

Issue	Average 2012	2013	2014	2015
Avian Influenza (AI)	1.55	2.00	2.19	3.00+
Lack of Effective Treatments	2.15	2.43	2.56	2.14
SE and FDA Egg Safety Rule	2.55	2.29	2.31	2.29
S. heidelberg and Egg Safety Rule	2.45	1.90	2.13	2.05
Welfare in General	2.33	2.15	2.31	2.21
Beak Trimming	1.70	1.50	1.88	1.91
Disposal of male chicks	1.40	1.25	2.00	1.64
On-Farm Euthanasia	1.95	1.80	1.88	1.73
Molting of Layers	1.60	1.35	1.31	1.27
Banning of Cages	2.60	2.35	2.69	2.27
Adoption of Enriched Cages	N/A	2.11	2.44	1.86
Supply of Useful Vaccines	1.20	1.05	1.56	1.45
Number of Responses	20	17	16	22

The concern for AI is self-evident. The lack of effective treatments for diseases such as colibacillosis, necrotic enteritis, ascarids, *Capillaria spp*., spirochetosis, fowl cholera, etc. is a very high concern and a welfare issue for the diseases that can cause much suffering due to illness. The list of antibiotics that can be used in egg layers is quite short – bacitracin, tylosin, and chlortetracycline. The lack of an anti-parasitic product for used in controlling ascarids during lay, or other nematodes, is especially troublesome as these conditions are becoming increasingly common in cage-free production. Amprolium continues to be available to prevent and treat coccidiosis. Hygromycin is also now approved for use in egg layers in production for roundworms, *Capillaria spp*., and cecal worms but there is nothing for treatment of organic layers. Also, there is an increase in usage of non-antibiotic, preventative feed and water additives containing probiotics, prebiotics, and fermentation metabolites.

Concern for SE and its consequences continues due to the ongoing possibility of human outbreaks as occurred with the egg recall of 2010 involving two Iowa operations in August 2010. The Egg Safety Rule was implemented on July 9, 2010 for flocks over 50,000 layers. Flocks of between 3,000 and 50,000 joined the program on July 9, 2012. Inspections by FDA are ongoing. The prevalence of SE is at an all-time low based on certain states monitoring results. A moderate degree of concern for adding other serotypes to the plan is apparent.

The FDA Egg Safety Program entails obtaining chicks from National Poultry Improvement Plan (NPIP) SE Clean breeders, rodent and fly monitoring and control programs, biosecurity, cleaning and disinfection of premises, training of persons involved, testing of manure samples at 14-16 weeks, 40 to 45 weeks, and 6 weeks after molt. If any of the manure tests are positive for SE, egg testing must take place. The producer funds all testing and compliance efforts. Laboratories have managed to gear up to handle the increased testing load this requires. Producers with a manure positive swab

test are holding eggs from the market until after the test results of eggs are obtained. The use of deoxyribonucleic acid (DNA) based tests are now being used that minimize the time of testing from the formerly required 10 days for culture to as low as 27 hours with the new tests. There is no provision in the program for compensating a producer who has an egg-positive flock and does not have a pasteurization or hard-cooking plant that will take their eggs. Producers are greatly ramping up measures to reduce risk of SE infection by increased use of vaccines, intestinal health feed additives, rodent and fly control measures, and biosecurity practices as was intended by the plan.

The possible addition of *Salmonella heidelberg* (SH) to the FDA Egg Safety Plan has the industry questioning why and how this will be initiated. SH in humans has not recently been attributed to eggs and the prevalence of SH in humans has dropped since the late 1990's to 2011 from 1 per 100,000 population to 0.35 per 100,000 in Centers for Disease Control and Prevention (CDC) figures from FoodNet. Also, there is no breeder program as there is for SE and it may take five to ten years before one can be fully assured of a clean product once a breeder program is started. Also, no specific SH vaccines are available as they are for SE. It is estimated that a much higher contamination rate of flocks with SH is present compared to SE.

Poultry welfare concerns continue to be of high to very high concern due to continued activities by activist groups. The increase in concern over day old male euthanasia has come about by some companies stating they are going to require egg products from flocks where day old male euthanasia is not used.

The transition to low density enrichable cage and cagefree egg production in California due to the regulations of Prop 2 has gone well with the California consumers paying a 60 cent premium for this decision. Several houses in the Southwest and Midwest were converted to comply with the CA regulations.

Vaccine use continues to be the mainstay of disease prevention in the egg layer industry second to biosecurity. The supply of useful vaccines continues to be adequate and appears to be keeping up with the layer industry needs. It will be interesting to see if this good supply of vaccines continues with the consolidations now occurring in the poultry vaccine business.

This is the third year that the AVEP members have been asked for their ideas as to research needs for the layer industry. A summary of the top 5 responses of the 21 responding members is as follows:

Research Need Area	Number of Respondents
1 – Enteric conditions (FDN, reovirus, spirochetes, cocci, non-specific enteritis, etc.)	12
2 – Avian influenza control/prevention – biosecurity, depop, disposal, vaccines, etc.)	7
3 – Mass depopulation methods	6
4 – Effective treatments, antibiotic or non-antibiotic	5
5 – Internal parasites control methods	3
5 – Improved recombinant vaccines with multiple antigens	3
5 – Post SE bacterin hepatitis in pullets	3

For the second year in a row, the egg industry, not affected by AI, has experienced unprecedented profits for the past 12 months. And again the reason is due to AI, last year due to AI in Mexico and this year for AI losses of egg layers in the US. For the first 9 months of 2015, the average egg producer according to the Egg Industry Center has made over $14 per bird. Normally, the average for a 10-year period is $1 per bird. Low feed prices for the period from October 2014 through September 2015 has aided greatly in assuring high profits.

Iowa (32.6 million) continues to be the lead state in egg layer numbers even though they had significant losses due to AI earlier in the year. Iowa is followed by #2 Ohio (30.8 million), #3 Indiana (26.0 million), #4 Pennsylvania (23.8 million), #5 Texas (15.6 million) and #6 California (12.9 million) according to the National Agricultural Statistics Service for August 2015. Total commercial egg layer numbers were 272 million in August 2015, down from 296 million in August of 2014.

Turkey Industry Annual Report–Current Health and Industry Issues Facing the US Turkey Industry

Steven Clark, Devenish Nutrition; Andrew Bailey, National Turkey Federation

In preparation for this report the subcommittee chairman, Dr. Clark, surveyed turkey industry professionals and veterinarians representing (n=25) US turkey production regarding the health status of turkeys produced in August 2014 through August 2015. The turkey industry reports several disease challenges for this 12 months varying by geographic regions within a state and across the United States. This report will list (Table 1) the challenges by disease and issues. Of particular interest in 2015 are issues with lack of efficacious drugs, *clostridial dermatitis*, avian influenza, *salmonella* and *colibacillosis*. Most notable, avian influenza moved from 28th rank (score 1.5) in 2014 to 4th (score 3.1) in 2015.

The “lack of approved efficacious drugs” continues to be the top health issue (Table 1). The withdrawal of the New Animal Drug Application (NADA) for enrofloxacin in 2005 for use in poultry leaves the industry with no adequate

therapeutic response to ***colibacillosis*** (ranked #3, unchanged since 2009), or fowl cholera (ranked #11 from #12). In July 2011, the sale of roxarsone was suspended; September 30, 2013, the FDA marketing authorization NADA was withdrawn. The sponsor of Penicillin-100 Type A medicated article (in feed administration) withdrew the approval (NADA) June 30, 2015. Issues over the use of antibiotics in animal agriculture remains a major concern for the turkey industry and for all of animal agriculture.

Clostridial Dermatitis (CD), also referred to as Dermatitis or Cellulitis, remains a major disease issue across all geographic regions; as the survey average decreased slightly to a score of 3.3 (from 3.5 in prior year) and ranked #2 (no change), from 3.6 (#2), 3.8 (#2), 3.9 (#2), 4.0 (#2), 3.8 (#2) and 3.3 (#3) in 2013, 2012, 2011, 2010, 2009 and 2008, respectively. Analysis indicates range of concern; 46% of respondents score CD a 4 and 5 (severe), 38% score it a 2 and 1 (mild); severe (4-5) versus mild (1-2) scores were 50%, 62%, 76% and 32%, 27%, 20%, respectively for the prior three years (2014, 2013, 2012). CD is most commonly seen in, but not limited to, commercial male turkeys nearing market age. Opinions vary as to risk factors and potential causes of the problem. Some of the key areas to control CD include: early recognition; removal of mortality 2-3 times per day; medicating affected flocks with appropriate antimicrobials; promptly managing all water spills and wet litter. There has been limited success with vaccinating at-risk flocks with autogenous bacterins and toxoids. For some, a novel litter amendment has shown limited success.

Poult enteritis of unknown etiologies has decreased in importance, to position #12 from #10, with a score of 2.3 (from 2.4). **Turkey Coronavirus** (TCV), as a defined cause of enteritis, was ranked #32 (Table 1), down from #27, with 119 reported cases (Table 2). Majority of TCV cases were limited to one geographic area.

Protozoal Enteritis, attributed to flagellated protozoa, *Cochlosoma*, *Tetratrichomonas* and *Hexamita*, ranked #22 (score 1.8), relatively unchanged over past years. Several types of protozoa are associated with enteric disease of turkeys. Protozoal enteritis can present with general signs, including dehydration, loss of appetite (off-feed), loose droppings (diarrhea) and watery intestinal contents. Flagellated protozoa include *Cochlosoma*, *Tetratrichomonas* and *Hexamita*. *Eimeria* and *Cryptosporidia* are non-flagellated protozoa. *Cochlosoma* and *Hexamita* are associated with enteritis, primarily in young turkeys, especially in the summer months. There are field reports of co-infections with *Cochlosoma* and *Tetratrichomonas*, or *Cochlosoma* and *Hexamita*, or flagellated protozoa and *Eimeria*.

Single age brooding has been implemented during the last several years to assist in managing diseases on turkey farms, especially enteric diseases. Historically, production systems included 2 - 3 different ages on a single farm site reared in separate barns, from day-old to market age. The trend is to isolate, specialized brooding facilities. All production is separate hen and tom rearing. The brooding phase for commercial turkeys is rearing about 0 – 5 weeks of age, then the flock is moved to specialty finisher or grow-out barns.

Single age brooding may be termed all-in/all-out or single-age or brooder hub. Single age brooding systems can operate in two ways. One option rears the turkeys to slaughter age at the same farm site, without other ages on the farm. Another system of single age brooding involves farm sites dedicated to brooding, then at five weeks of age birds are moved to a separate site for finishing. In 2015, 61% of brooding was single age, compared to 42% in 2008. Single age brooding is more common in the Southeastern US than the Midwest states. Conversion to single age brooding started in late 1990 following the emergence of Poult Enteritis Mortality Syndrome *(*PEMS) in North Carolina; advantages became obvious and it has expanded to other areas of the US tunnel ventilation of finisher (grow-out) barns is becoming more popular method to minimize heat stress; in 2015, 26% of the industry finisher production is tunnel ventilated, compared to 11% in 2008.

Late mortality ranked 6th (2.7) health issue and changed from #4 the prior year. Late mortality may be defined as mortality, in excess of 1.5% per week, in toms (males) 17-weeks and older; mortality is not diagnosed to a specific disease or cause. Late mortality may be associated with physiologic or biomechanical deficiencies following early rapid growth in heavy toms achieving genetic potential; aggressive behavior noted in mature toms; leg problems and/or hypertension.

Leg problems (#10, prior year was #6) are ranked among the top concerns of the turkey industry. Leg problems are a common complaint, such as, spiral fractures of the tibia or femur. Leg Problems may be defined as lameness, particularly in toms, several weeks prior to slaughter. Leg problems are attributed to various conditions (refer to Table 1), including, pododermatitis, fractured femurs, fractured tibia, osteomyelitis (OM), tibial dyschondroplasia (TDC), spondylolisthesis, “Shaky Leg”, chronic reovirus infection, etc.

Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR) was recognized as a newly emerging disease in 2011. Since then multiple unique reoviruses have been isolated and identified as the cause of tenosynovitis and digital flexor tendon rupture in commercial turkeys. Clinical signs in young flocks are reportedly mild to nonexistent, but can develop into lameness and/or abnormal gait in older flocks, starting at about 12 weeks of age. Affected flocks may also report an increased incidence of aortic ruptures and poor flock performance (weight gain, uniformity). Research continues into pathogenesis, virus characterization, diagnostics and epidemiology. Research indicates that the turkey arthritis reovirus is distinct from the recently identified novel reovirus causing arthritis in chickens, and more similar to the turkey enteric reovirus. TR-DFTR was added to the survey in 2011 and ranked #11 (Table 1) with 106 “confirmed” cases or flocks (Table 2). In 2015 TR-DFTR ranked #19 with 146 cases (150 in prior year). Multiple companies have implemented autogenous reovirus vaccination programs to induce the maximum production of antibodies and resulting transfer of maternal antibodies. Results show a significant reduction in associated clinical signs in those poults placed from vaccinated flocks. A commercial turkey lighting program of 4-8 hours of continuous dark in a 24-hour period has also been recommended. The combined efforts of

breeder vaccination, commercial farm biosecurity and flock management appear to be controlling this disease. Increased recognition of TR-DFTR in 2014 - 2015 confirmed that the reovirus has mutated into three distinct strains.

Blackhead, also known as histomoniasis, decreased to position #13 (#11 prior year). It is one disease with no efficacious drug approved for use in turkeys. There were 55 reported cases of blackhead (Table 2), a decrease from 61 the prior year, and a record 108 in 2010. Histomoniasis occurs regionally and seasonally in turkeys, and can result in significant mortality. Dimetridazole was extremely efficacious and previously approved for use in turkeys for the prevention and treatment of blackhead; it was banned in 1987. The lack of any legal treatment for histomoniasis is of concern, especially in the case of valuable turkey breeder candidate flocks. Losses to blackhead have been severe in several areas of Europe, and sporadic cases are occurring in North America. On April 1, 2015, the sponsor announced that it would discontinue marketing nitarsone, by fall 2015, and would request withdrawal of the approval for the drug by the end of 2015. Nitarsone is approved for the prevention of histomoniasis (blackhead disease) in turkeys and chickens, and is the only approved animal drug for this indication. Nitarsone will cease to be available in the 2016 growing season.

Heat stress ranked #18 following another hot summer, compared to #29 the prior year. PEMS ranked #30 versus #34 previously, *Ornithobacterium rhinotracheale* (**ORT**) ranked #7 versus #9 previously. Avian Metapneumovirus (aMPV) ranked #25 versus #35, with a few atypical cases limited to the Midwestern US *Bordetella avium* continued as a significant respiratory disease challenge in several geographic regions; bordetellosis ranked #8 (2.5 score) in 2015 compared to #5 (2.9) the prior year.

Mycoplasma synoviae (MS), infectious synovitis infections, ranked #27 (#25, prior year), are one cause of synovitis. It may be present in flocks 10-12 weeks of age with typically low mortality and low morbidity. There were 24 cases of MS reported (Table 2). The primary breeders have remained free of *M. gallisepticum* (MG), *M. meleagridis* (MM) and MS. Sporadic, but increasingly frequent infections with Mycoplasma, both MG and MS, often in association with backyard poultry and broiler breeder flocks is an ongoing concern, having the greatest impact when a breeder flock is infected and has to be destroyed. There were 31 cases of MG reported (Table 2).

In the Winter/Spring of 2015, an unprecedented outbreak of Highly Pathogenic Avian Influenza (HPAI) struck Western and much of the Midwestern United States. Turkey flocks in eight states were affected by H5N8 and H5N2 strains of HPAI, with H5N2 accounting for the vast majority. In total, 153 farms commercial turkey or turkey breeder flocks were infected, resulting in the loss of over 7.75 million turkeys, in addition to over 40 million chickens (layers and broiler breeders). USDA has classified this outbreak as the worst incident of animal disease in US history. The virulence of the H5N2 was like nothing seen before and its impact was unprecedented. As available studies and observations note, the route of introduction was not limited solely to infection from wild migratory birds. HPAI entered farms on personnel, vehicles

and blown dust. Onset of the 2015 H5N2 strain of HPAI was subtle with birds often asymptomatic until several days after infection, followed by the sudden, rapid onset of mortality. All infected flocks have been depopulated. Cleaning and disinfection followed by a required 21-day fallow period of turkey houses (barns) has substantially impacted turkey production in certain regions of the US.

In response, the turkey industry, along with APHIS, state governments, and other stakeholders have worked to review and improve disease monitoring and prevention with a primary focus on biosecurity enhancement, and response. Many lessons have been learned, and data is still being analyzed for any information that might help mitigate future introductions of the virus, which some expect could happen during the fall 2015 or spring 2016 migratory seasons. Vaccines have been developed for the prevention of H5N2 HPAI and APHIS has developed a plan of action for the deployment. Although the agency has not yet approved vaccine usage, APHIS has committed to stockpiling the vaccines in the event that the decision is made to use them in the future.

In light of the HPAI outbreaks in the West and Midwest, the industry accelerated work on developing the Secure Turkey Supply (STS) plan (www.secureturkeysupply.com). STS includes Federal and State Transport (FAST) Plan for Movement of Commercial Turkeys in a HPAI Control Area, and Turkey Risk Assessment. Draft versions of the Plan were utilized in regions affected by HPAI, and were instrumental in many instances where movement and shipping of turkeys and turkey products were at risk. The goal of the Plan is to facilitate business continuity and economic survival of participating non-infected turkey operations in a Control Area after a detection of HPAI, and to help assure the continuous availability of safe turkey meat to consumers.

Regarding disease surveillance, the industry has continued to voice strong support for the maintenance of the National Poultry Improvement Plan (NPIP) in the face of increased government spending cuts. NPIP is a vital state-federal-private partnership for the turkey industry, as well as the broiler and egg industries, and APHIS has continued to show strong support for the program, having hired additional staff for the program in 2014, and maintaining their offices in Conyers, Georgia, instead of moving it to the Washington, D.C. area. NPIP has been additionally helpful in addressing certain aspects of disease control and eradication in the HPAI outbreak. The industry is also supportive of federal efforts to update and modernize ARS' Southeast Poultry Research Laboratory in Athens, Georgia. To date, only $45-million (or approximately ⅓ of the ARS request) has been allocated, with an additional ~⅓ portion approved, but still pending Congressional budget passage.

Two of the industry's top priorities continue to be the health of turkeys and ability to utilize approved drugs, especially in light of recent avian influenza outbreaks and increased scrutiny from special interests regarding antibiotic resistance. The first related guidance, in regards to drug utilization, was published in 2003, Final Guidance #152, Evaluating the Safety of Antimicrobial

New Animal Drugs with Regard to their Microbiological Effects on Bacteria of Human Health Concern. Since then there has been a great deal of discussion around antibiotic resistance leading to numerous efforts by the Food and Drug Administration's Center for Veterinary Medicine (FDA/CVM): In 2012, the Guidance for Industry (GFI) #209 The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals was published. On December 11, 2013, the FDA finalized Guidance for Industry #213, New Animal Drugs and New Animal Drug Combination Products Administered in or on Medicated Feed or Drinking Water of Food Producing Animals: Recommendations for Drug Sponsors for Voluntarily Aligning Product Use Conditions with GFI #209. In 2015, FDA/CVM published the finalized Veterinary Feed Directive (VFD) regulation and mandates the rules and responsibilities of licensed veterinarians in prescribing and administering medically important antimicrobials in feed. Guidance #213 established procedures for phasing out the use of medically important antimicrobials for production purposes in alignment with Guidance for Industry #209 and proposed changes to VFD drug regulations. Final implementation is scheduled for December 2016, no drugs listed as “medically important” that are exclusively labeled for production purposes can be used. Drugs that are used, must prove, through data, that they are used for at least one of the following: prevention, control, or treatment and only be administered via a prescription from a veterinarian. All 26 animal drug manufacturers have agreed to comply. In conjunction with this guidance, the VFD increases the veterinary oversight of the administration of drugs. The rule incorporates many of National Turkey Federation’s (NTF) comments. Specifically, (1) Category I Type A medicated articles can continue to utilized by unlicensed feed mill; (2) the rule continues with the concept of veterinary oversight as opposed to continued supervision; (3) record keeping is required to be kept for two years rather than the one year that was proposed, and NTF supported; (4) veterinarians don’t have to be licensed in each state, but do need to be compliant with each state’s rules in which they practice; (5) though “standing VFDs” were not defined, they were discussed in the rule and approved as long as they are within the rule’s defined expiration date requirements; (6) though there are not uniform VFDs, the rule requires the application sponsor to provide all the information a veterinarian would need.

In addition to guidance from the FDA, antibiotic resistance has been a key focus throughout the Obama Administration. Last year, the CDC released a report on antibiotic resistance calling for immediate action to address the issue. Following this report, the President’s Council of Advisors on Science and Technology (PCAST) published a report on antibiotic use in human medicine and agriculture -- Combating Antibiotic Resistant Bacteria (CARB). The report included an Executive Order calling for a national response to antibiotic resistance through the establishment of a Presidential Advisory Council run by HHS in consultation with USDA and the Department of Defense. In March 2015, this group established a National Action Plan to ultimately (by the implementation date in the year 2020) achieve the five goals laid out by the Administration. USDA's Food Safety Inspection Service (FSIS), Agricultural

Research Service (ARS) and Animal and Plant Health Inspection Service (APHIS) are working with FDA/CVM to collect better data to inform these goals. The industry continues to discuss what data should be collected with these Agencies and how it will be done. Both the FDA and The Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria will hold public meetings at the end of September 2015 to further discuss the concepts for developing measurements and targets for data collection.

For the last 15 years, the US animal agriculture industry has been continually challenged with numerous attempts to ban the use of antibiotics in livestock and poultry. The current attempt at the federal level is with the 114th Congress' Preservation of Antibiotics for Medical Treatment Act (PAMTA) of 2015, introduced into both the House and Senate [H.R.1552; S.621]. The Senate version is titled S. 621 Preventing Antibiotics Resistance Act (PARA) and is "to amend the Federal Food, Drug, and Cosmetic Act to preserve the effectiveness of medically important antimicrobials used in the treatment of human and animal diseases." The legislation would disallow use of medically important antimicrobials for nontherapeutic uses. The turkey industry opposes PAMTA, a bill that would devastate the ability to protect animal health by unnecessarily and inappropriately removing several classes of important antibiotics from the market. The turkey industry welcomes honest discussion of science-based, pragmatic options which preserve animal welfare while providing consumers' assurance the use of these vital, safe and effective medications is professional, judicious and does not jeopardize their effectiveness in human medicine.

In August of 2014, FSIS published the final New Poultry Inspection System (NPIS) rule, which will modernize the inspection of turkeys and other poultry in the United States. In establishments that volunteer to transition to the new inspection system, FSIS inspectors will be allowed more flexibility to patrol the plant and provide scientific oversight to ensure the plant is meeting the required food safety performance standards. Federal inspectors will be stationed at the end of the production line to verify every poultry carcass meets the federal regulations, and plant employees will have an expanded role in inspecting carcasses for quality standards on the inspection line. The first turkey plants began their transition to the new system in the summer of 2015, and additional plants will continue to transition through 2015 and 2016.

In 2014, turkey production slightly decreased to 7,217,056,000 from 7,277,536,000 pounds (live weight). Overall domestic per capita consumption for turkey products decreased from 16.00 lbs in 2012 to 15.80 in 2013. The preliminary number for 2014 is 15.90 lbs turkey consumption per capita, which is the lowest level since 1988. Live production in 2014 decreased to 237,500 million head with an average live weight of 30.40 lbs. In 2013, 240.000 million head were produced with an average live weight of 30.34 lbs. (Reference: National Turkey Federation Sourcebook, October 2015).

Table 1. Turkey health survey (August 2014 - 2015) of professionals in US turkey production ranking current disease issues (1= no issue to 5 = severe problem). N=25

Issue	Score Average (1-5)	Score Mode (1-5)
Lack of approved, efficacious drugs	4.4	5
Clostridial Dermatitis (Cellulitis)	3.3	5
Colibacillosis	3.2	5
Avian Influenza	3.1	5
Salmonella	3.0	3
Late Mortality	2.7	3
Ornithobacterium rhinotracheale (ORT)	2.6	3
Bordetella avium	2.5	2
Cannibalism	2.4	3
Leg Problems	2.4	3
Cholera	2.3	2
Poult Enteritis of unknown etiologies	2.3	1
Blackhead (Histomoniasis)	2.3	1
Coccidiosis	2.2	2
Tibial Dyschondroplasia (TDC, Osteochondrosis)	2.1	2
Round Worms (*Ascaridia dissimilis*)	2.0	2
Breast Blisters and Breast Buttons	2.0	2
Heat stress	2.0	2
TR-DFTR (Turkey Reovirus Digital Flexor Tendon Rupture)	1.9	1
Newcastle Disease Virus (NDV)	1.8	1
Osteomyelitis (OM)	1.8	1
Protozoal Enteritis (Flagellated)	1.8	1
Bleeders (aortic, hepatic ruptures)	1.8	1
Fractures	1.6	1
Avian Metapneumovirus	1.5	1
Mycoplasma gallisepticum (MG)	1.5	1
Mycoplasma synoviae (MS)	1.5	1
Shaky Leg Syndrome	1.5	1
Erysipelas	1.4	1
PEMS (Poult Enteritis Mortality Syndrome)	1.4	1
Necrotic enteritis	1.3	1
Turkey Coronavirus	1.3	1
H3N2 (H1N1) Swine Influenza	1.2	1
Mycoplasma iowae (MI)	1.2	1
Spondylolisthesis (Kinky-Back)	1.1	1
Mycoplasma meleagridis (MM)	1.1	1

Table 2. Turkey health survey (August 2014 - 2015) of professionals in US turkey production.

Disease	Number of cases by year						
	2015	2014	2013	2012	2011	2010	2009
Blackhead (Histomoniasis)	55	61	52	80	89	108	67
Mycoplasma synoviae (MS)	24	41	75	49	39	56	38
Turkey Coronavirus (TCV)	11	43	42	22	70	91	3
Turkey Reovirus Digital Flexor Tendon Rupture	9	15	0	1	*	n/a	n/a
Mycoplasma gallispecticum (MG)	14	17	39	13	106	n/a	n/a
	6	0	45	1	n/a	n/a	n/a
	31	17	45	n/a	n/a	n/a	n/a

*One respondent noted that their operation processed over 300 flocks with varying degrees of severity, but not included in the reporting of 2011 confirmed cases; Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR).

Table 3. Turkey research priorities (August 2014 - 2015) of industry professionals in turkey production (1= low to 5 = high).

Issue	Score Average (1-5)	Score Mode (1-5)
Disease	4.0	5
Food Safety	3.9	5
Welfare	3.5	4
Poultry Management	3.2	3
Nutrition	3.1	3
Waste Disposal	2.4	2
Processing	2.4	2
Environmental	2.1	2

Table 4a. Percentage (%) of brooding (commercial; farm) production is all-in/all-out (single-age; brooder hub); average of respondents (n=25).

Year	Percentage (%)
2015	61.4
2008	42.1

Table 4b. Percentage (%) of finisher (grow-out; farm) production is tunnel ventilated; average of respondents (n=25).

Year	Percentage (%)
2015	25.7
2008	11.3

Table 5. Eighteen (18) in-feed FDA approved medications for turkeys listed by label indication.

Subtherapeutic (Production)	Therapeutic (Prevention, Control, Treatment)
Bacitracin Zinc	Amprolium
Bacitracin Methylene Disalicylate	Bacitracin Methylene Disalicylate
Bambermycin	Chlortetracycline **
Chlortetracycline **	Clopidol
Neomycin + Oxytetracycline **	Diclazuril
Oxytetracycline **	Fenbendazole
Ractopamine	Halofuginone ^
Virginiamycin **	Lasalocid
	Monensin
	Neomycin + Oxytetracycline **
	Nitarsone
	Sulfadimethoxine + Ormetoprim ^**
	Oxytetracycline **
	Zoalene (DOT)

^ Not currently marketed.
** Deemed “Medically Important” per FDA Guidance for Industry #209 and #152. Roxarsone and Penicillin approvals withdrawn September 30, 2013, and June 30, 2015, respectively.

Live Bird Marketing System, Avian Influenza Program Working Group Report

Fidelis N. Hegngi, USDA-APHIS-VS presented by Patricia Fox, USDA-APHIS-VS

Since 1986, States in the Northeast have been monitoring live bird markets for the presence of avian influenza (AI) viruses that may pose a threat to the commercial poultry industry. Beginning in 1994, low pathogenicity avian influenza (LPAI) H7N2 proved to be endemic in live bird markets in the northeastern United States. In 1999, the USDA established a Live Bird Marketing System (LBMS) working group to support States wanting to eliminate persistent LPAI H7N2 in the live bird markets. On October 20, 2004, the USDA, APHIS published uniform program standards to prevent and control H5 and H7 LPAI subtypes in US live bird markets. The standards cover licensing, AI testing, recordkeeping, sanitation, biosecurity, surveillance, inspection, tracebacks, premises registration, traceouts when positives occur, and response to positive facilities. The standards apply to live bird markets, auctions, and small sales, as well as to producers and distributors who supply the markets. The standards are currently being implemented.

States are responsible for enforcing the LBMS LPAI program standards. State participation is voluntary. Participating States enact regulations for compliance of their live bird markets, producers, and distributors. All markets,

producers, and distributors supplying the markets must be registered or licensed with the State and must allow Federal and State inspectors access to their facilities, birds, and records. These facilities must also have written biosecurity protocols in place. APHIS coordinates and administers the program and also provides personnel and resources to assist States in implementing and ensuring compliance with program requirements.

In February 2015, the LBMS working group held its annual business meeting in Sacramento, California to address LBMS AI prevention and control program concerns. More than 50 participants representing 23 States attended, including 16 APHIS Veterinary Services (VS) representatives; 2 university representatives; 25 State Department of Agriculture representatives; 9 LBMS/poultry industry stakeholders; and 4 representatives from animal health diagnostic laboratories. Participants discussed the program's progress, shared ideas for continued development, and agreed on further implementation.

In addition, the working group discussed:

(1) The Avian Health line item budget;

(2) An overview of Canada's HPAI H5N2 experience;

(3) The National Import and Export Services (NIES) information needs for international reporting;

(4) The VS guidance document on indemnity requirements and process issues/procedures for flock plans, compliance agreements, and indemnity claims in cases of H5/H7 LPAI infection in poultry;

(5) The Washington State experience on very vigilant infectious bursal disease (vvIBD), Infectious Laryngotracheitis (ILT), LPAI;

(6) An update on the National Veterinary Services Laboratories (NVSL) AI surveillance testing that included current nationwide findings and recommended AI diagnostic tests and reporting of results to include a network algorithm for AI, a timeline for testing schemes for samples, and discussion on weak positives at National Animal Health Laboratory Network (NAHLN) laboratories;

(7) Observations on global occurrences of HPAI H5N8 and other influenza A virus (IAV) of interest;

(8) Wild bird surveillance projected for 2015 and beyond;

(9) An update on the Zoetis Flu Detect AI rapid test;

(10) An update on the National Poultry Improvement Plan (NPIP) program and the announcement of the 2015 Official State Agency (OSA) and the General Conference Committee (GCC) meeting in Salt Lake City, Utah;

(11) A review of NPIP authorized laboratories for past, present, and future;

(12) The National Animal Health Monitoring System (NAHMS) Layer 2013 Study Results;

(13) The VS perspective on the California 2014 LPAI H5N8 incident;

(14) *Salmonella* in baby poultry sold at feed stores;

(15) The 2015 Biosecurity for Birds (BFB) website/webinar and other outreach/education successes;

(16) The 2015 Bird Health Awareness Week Webinar and Twitter entries;

(17) Social media/advertising/Purina and Tractor Supply Partnership/education /outreach needs and future of BFB educational materials;

Special presentations were given on State avian influenza incidents in late 2014 and early 2015, including challenges and lessons learned in California, Delaware, Maryland, New Jersey, Oregon, and Washington. In addition, personnel from the USDA, Agricultural Research Service (ARS), Southeast Poultry Research Laboratory (SEPRL), discussed research on HPAI H5N8 and H5N2.

In fiscal year (FY) 2015, USDA's BFB campaign continued its efforts to educate the backyard poultry community about ways they can help protect and maintain the health of their birds. The campaign consisted of a photo contest with hundreds of entries, the annual bilingual calendar, Bird Health Awareness Week in February, two webinars and concurrent Twitter chats, fair packages, and social media outreach. Social media continues to be a major outreach tool. The Healthy Harry Facebook page has more than 5,000 likes (an increase of 1,000 likes) and the Healthy Harry Twitter account has more than 1,500 followers (an increase of 400 followers). The campaign launched three new Healthy Harry videos on YouTube in FY2015: a biosecurity video, a live bird market video, and an NPIP video, each with at least several hundred views.

In FY2014, approximately 140,987 tests were conducted for AI surveillance in the LBMS. Surveillance in the LBMS remains a high priority in FY2105. Approximately 38,878 tests have been conducted for AI surveillance in the LBMS for the first full quarter and partial second quarter. Tests included agar gel immunodiffusion, real-time reverse-transcriptase polymerase chain reaction (rRT-PCR), antigen capture immunoassay, and virus isolation. For virus isolation and rRT-PCR, each sample may represent 5 to 11 individual swabs pooled for a composite single sample/test.

Since USDA initiated the H5/H7 LPAI LBMS prevention and control program in 2004, we have seen a marked decline in the incidence of LPAI viruses in the US LBMS. The number of LBMS H5 and H7 AI positive premises has decreased steadily. In FY2015, USDA detected only one LPAI H5N1 virus in a New Jersey live bird market. The virus was characterized as H5N1 North American lineage LPAI based on partial hemagglutinin/ neuraminidase (HA/NA) sequence and cleavage site analysis and is different from the Eurasian/AM H5N1 virus recently detected in a wild bird in Washington.

HPAI in the Live Bird Marketing System –General Guidance

USDA will handle findings of HPAI in any component of the LBMS the same way it handled detection in a commercial poultry facility. This includes the finding of HPAI in LBMS environmental samples or when birds are no longer on a LBMS premises. Specifically, premises with presumptive positive HPAI results must be quarantined and inventoried. An epidemiological investigation should be conducted that includes all components of the LBMS. Rapid and diligent traceback and traceforward investigations of movements from infected hauler, dealer, and wholesaler premises must be implemented.

This tracing will aid in the control of the spread of HPAI virus and limit the impact of the outbreak.

Infected premises will be depopulated and cleaned and disinfected in accordance with the guidelines available in the HPAI Response Plan: The Red Book (www.aphis.usda.gov/fadprep). The results of the epidemiological investigation will determine if additional components of the LBMS, such as haulers' trucks and dealer and wholesaler facilities require depopulation, disposal, and cleaning and disinfection. Control areas will be drawn around infected premises, according to the HPAI Response Plan: The Red Book.

Avian Disease and Oncology Laboratory (ADOL) Research Update

John Dunn, USDA-ARS Avian Disease and Oncology Laboratory (ADOL)

Employing Genomics, Epigenetics, and Immunogenetics to Control Diseases Induced by Avian Tumor Viruses: *Improved chicken genome assembly to aid genetic and biological studies.* The chicken genome provides the blueprint for the underlying biology of all traits including those that are agronomically important such as growth, reproduction, health, and well-being. In collaboration with investigators at Washington University School of Medicine in St. Louis, Missouri, we used advanced sequencing technologies to increase the coverage and length of sequence contigs of the chicken genome assembly. This tool will allow scientists and commercial companies to conduct more complete and accurate studies to identify specific genes and pathways that will result in precision breeding and rearing of chickens with superior agronomic performance. As chicken is the primary meat consumed, this will benefit consumers and society by reducing the amount of feed and waste produced, and increasing health and well-being of reared birds.

Host genetics/epigenetics play a critical role in control of vaccinal response to Marek's disease (MD), an avian tumor virus-induced disease. Since the introduction of MD vaccines in the 1970s, the influence of host genetics on vaccine protective efficacy has been grossly overlooked by the vaccine and poultry industries. We have provided strong experimental evidence that host genetics contributes up to 83% of MD vaccine protective efficacy. This finding lays the foundation to search for the genetic and epigenetic mechanisms underlying the biological pathways that modulate vaccine protective efficiency. Further studies are likely to provide the knowledge needed to develop new and improved vaccines for not only more effective control against MD but also against other pathogens that will be highly protective in chickens of varying genetic backgrounds. This finding will directly benefit the poultry industry by significantly reducing economic losses due to disease control, improve animal welfare, and provide consumers with safe poultry products.

Genetic and Biological Determinants of Avian Tumor Virus Pathogenicity, Transmission, and Evolution

Characterization of Marek's disease virus (MDV) field strains. It has been nearly 20 years since a comprehensive set of MDV field strains have been solicited from poultry companies for pathotyping. Although MD condemnation rates in broilers have been dropping, there has also been increasing use of the

most protective vaccine (CVI988/Rispens) in both broiler and layer operations, which may be masking an increase in virulence of circulating MDV field strains. We analyzed samples to determine whether the virulence of field strains has plateaued in recent years or if increasing virulence is causing industry to become more reliant on Rispens vaccination. We were unable to isolate any viruses significantly more virulent that field strains collected 20 years ago, which suggests that current management and vaccine practices have slowed the evolution of MDV.

Global gene expression in skin tissue of chickens infected with MDV. The feather follicle epithelium (FFE) is the only anatomical site where fully infectious enveloped cell-free MD virus particles are produced and released into the environment. The molecular mechanism of virus replication, assembly and dissemination is not known. Using state-of-the-art ribonucleic acid (RNA) sequencing technology, global gene expression profiling was conducted between the skin tissues of control and MDV-infected susceptible chickens. Data analysis revealed substantial changes in the expression patterns of both host and virus genes in the infected skin tissues when compared to the control uninfected samples. To our knowledge this is the first study to provide direct insight into the pathogenesis of MDV in the epithelial cells of the skin leading to the production of fully infectious virus particles. This study will be the base for the development of specific recombinant vaccines to block the production and dissemination of such virus particles into the environment.

Role of natural killer cells in MDV-induced protection. To shed light on the possible role of natural killer (NK) cells in vaccine-induced protection, we collected tissue samples from control and vaccinated chickens and conducted NK cell-specific gene expression analysis. Data obtained revealed activation of NK cells and up regulation of NK cell-specific genes in the vaccinated birds. Additionally, immunohistochemistry analysis showed that the number of activated NK cells was increased in the tissues of vaccinated birds in comparison to the control chickens. Higher expression levels of a NK cell activation marker (CD107a, a cell surface protein) suggested that NK cells, an essential component of the innate immune system, play a critical role in the vaccine-induced immunity against MDV infection. Understanding the mechanism of vaccine-induced protection will help to design effective recombinant vaccines against newly evolved and highly pathogenic strains of MDV.

Effect of MDV infection on structural changes and gene expression pattern within comb tissue of affected chickens. The chicken line 6_3 (MD-resistant) exhibits an unusual necrotic dermatitis of combs, wattles, and toes under natural condition that is exacerbated by MDV-infection. We investigated the effect of MDV-induced immune suppression on structural changes and gene expression pattern within comb tissues of lines 6_3 and 7_2 (MD-susceptible) at 21 days post infection. Gene expression analysis revealed that many immune-related genes were all up-regulated in the necrotic combs of MDV-infected line 6_3. The expression levels of these selected genes were much lower in the combs of the susceptible line that displayed no visible necrotic damage.

Staining for MDV antigens did not detect any viral proteins in the combs of either line but a massive infiltration of macrophages and sub-populations of T cells into the necrotic tissues. Further analysis also revealed thinning and erosion of epidermis within the connective tissues of the necrotic combs. Gram stain of the sectioned frozen comb samples exposed the presence of Staphylococcus bacteria species. This is the first study to shed light on the unintentional consequence of line selection that could negatively affect the immunological competence of the birds against immunosuppressive agents.

Pathotyping of bacterial artificial chromosome (BAC) clones of recombinant MDV. The cloning of MDV genome as an infectious BAC clone has led to major advances through our ability to study individual gene function by making precise insertions and deletions in the viral genome. MDV BAC clones are likely to replace wild type MDV field strains used in all aspects of MDV research due to advantages that include 1) precise manipulation of the viral genome, 2) viral genomes that are stable and can be maintained independently of propagation in eukaryotic cells, and 3) shipping BAC-cloned viruses is significantly easier and cheaper than shipping cell-associated viruses. We acquired virulent MDV BAC clones that have been generated by researchers around the world and produced a standardized virulence rank. Clones were pathotyped to compare virulence rank to prototype field strains using the standard pathotyping assay and the results indicated viruses derived from BAC clones encompassed all three virulent pathotypes (vMDV, vvMDV and vv+MDV). Although these clones were found to not be able to replace the current MDV strains used in traditional pathotyping, their full characterization, side-by-side comparison, and broad range of virulence makes them excellent candidates as standardized reagents in most other future and ongoing MDV studies.

Protective efficacy of a BAC clone of a recombinant strain of MDV containing reticuloendotheliosis virus (REV) long terminal repeat (LTR). Vaccination is used worldwide to control MD, but increasingly virulent field strains can overcome this protection, driving a need to create new vaccines. The use of recombinant DNA technology has greatly increased the ability to generate new vaccine candidates. We recently developed a recombinant vaccine candidate by inserting the LTR region of a REV into a very virulent MDV strain. This recombinant did not cause disease in susceptible chickens. We then analyzed the ability of the recombinant vaccine candidate to protect against challenge with a very virulent plus MDV strain (vv+MDV) following vaccination *in ovo* at 18 days of embryonation. The passage 70 recombinant vaccine candidate protected the chickens against lymphoid tissue atrophy but did not demonstrate the same level of protection against MD lesions as the most effective commercially available MD vaccine. The recombinant vaccine candidate may be a useful candidate to include in a multivalent vaccine program since it allows for easy manipulation to include genes encoding antigens of other avian pathogens.

Interference among turkey herpesvirus (HVT) vectored vaccines. HVT has been widely used as a vaccine for MD since the 1970s. Because HVT is a

safe vaccine that is poorly sensitive to interference from maternally derived antibodies, it has also been developed as a vector vaccine for infectious bursal disease (IBD), Newcastle disease, infectious laryngotracheitis (ILT), and avian influenza (AI). Unfortunately, vaccine companies and producers have found that these HVT vector vaccines interfere with each other when mixed together, reducing the protection against one or more of the vectored diseases. We vaccinated chickens with each of the commercial HVT vector vaccines and found differences in the replication rates among the vaccines. When two of the vector vaccines were administered simultaneously, it was rare to find both vaccines replicating within the birds, instead only one of the two vectors was typically detected. These findings provide a preliminary explanation as to why mixing HVT vector vaccines leads to reduced protection against the vectored diseases.

National Poultry Improvement Plan 2015 Annual Report

Denise L. Brinson, USDA-APHIS, Veterinary Services (VS), Surveillance, Preparedness and Response (SPRS) presented by Patricia Fox, USDA-APHISVS

The National Poultry Improvement Plan (NPIP) is a Federal-State-Industry cooperative program. There are 49 Official State Agencies, one US Territory Official Agency and 98 Authorized Laboratories. Official NPIP disease monitoring classifications include: US Pullorum Typhoid Clean, US Mycoplasma Gallisepticum Clean and Monitored, US Mycoplasma Synoviae Clean and Monitored, US Mycoplasma Meleagridis Clean, US *Salmonella* Enteritidis Clean and Monitored, US Sanitation Monitored, US *Salmonella* Monitored, US Avian Influenza Clean, US H5/H7 Avian Influenza Clean for poultry breeding flocks, and US H5/H7 Avian Influenza Monitored for commercial (production) poultry flocks.

Pullorum-Typhoid Status: There were no isolations of *Salmonella* pullorum in commercial poultry in FY2011, FY2012, FY2013, FY2014 or FY2015. There were no isolations of *Salmonella* pullorum in backyard birds in FY2013, FY2014 or FY2015. There have been no isolations of *Salmonella* gallinarum since 1987 in any type of poultry in the US. US Pullorum-Typhoid Clean participating hatcheries include: 237 egg and meat-type chicken hatcheries, 45 turkey hatcheries, and 734 waterfowl, exhibition poultry and game bird hatcheries.

NPIP US Pullorum-Typhoid Clean Participating Breeding Flocks and Number of Birds are listed below:

Egg-Type Chickens

261 Flocks with 5,617,813 birds

Meat-Type Chickens

6108 Flocks with 129,022,446 birds

Turkeys

562 Flocks with 23,510,786 birds

Waterfowl, Exhibition Poultry, and Game Birds

6,397 Flocks with 2,191,933 birds

Meat-Type Waterfowl
90 Flocks with 161,824 birds

Avian Influenza Status: In FY2015 (July 1, 2014-June 30, 2015), there was one isolation of Low Pathogenicity Avian Influenza (LPAI) in commercial poultry in the US:
H7N3 isolated in a California commercial turkey flock

Table 1: 2015 NPIP US Avian Influenza Clean and US H5/H7 Clean Participating Breeding Flocks; and US H5/H7 Avian Influenza Monitored Participating Commercial Flocks:

Subpart	Flocks	Birds	Tests
Egg-Type Chicken Breeders	280	5,785,681	22,794
Table-Egg Layers-Commercial	6,223	1,035,237,331	144,587
Chicken Breeders	9,082	140,170,728	477,681
Chickens-Commercial	111,282	8,823,120,888	1,403,096
Turkey Breeders	1,107	28,359,997	58,001
Turkeys-Commercial	21,798	259,805,524	214,361
Waterfowl, Upland Game birds, Ex. Poultry	6,487	2,353,757	412,284
Upland Game birds, Waterfowl, Raised for Release Upland Game birds, Raised for Release Waterfowl-Commercial	3,064	45,526,914	40,960
Total	159,323	10,340,360,820	2,773,764

Mycoplasma gallisepticum, Mycoplasma synoviae, and Mycoplasma meleagridis positive breeding flocks - National Poultry Improvement Plan FY2015

	WEGBY	Egg-Type	Meat-Type	Turkeys
M. gallisepticum	51	0	13	1
M. synoviae	32	0	43	2
M. meleagridis	0	0	0	0

Authorized Laboratories Activities: The National Veterinary Services Laboratories (NVSL) issued a group D *Salmonella* check test, *Salmonella*

serotype proficiency check test Mycoplasma serology, and an Avian Influenza check test for the Agar Gel Immunodiffusion test annually for Authorized Laboratories of the NPIP. Laboratory training provided to the authorized laboratories included a *Salmonella* Isolation and Identification Workshops, a Mycoplasma Diagnostic Workshop, and an Avian Influenza Diagnostic Workshop during FY2015.

NVSL Avian Influenza and NDV Diagnostic Report

Mia Kim Torchetti, NVSL-USDA

The National Veterinary Services Laboratories (NVSL) in Ames, IA, in coordination with the National Animal Health Laboratory Network (NAHLN), received avian samples for testing of avian influenza (AI) and avian paramyxovirus serotype-1 (APMV-1) in fiscal year (FY) 2015 (10/1/14 to 9/30/15) arising from National Poultry Improvement Plan (NPIP) and Live Bird Market (LBM-BYD) surveillance programs, foreign animal disease (FAD) investigations, import and export activities, wild bird surveillance, and other diagnostics. The majority of the samples are received for confirmation testing, but it is currently not possible to separate confirmations from other testing due to limitations of the laboratory information management system and inconsistent information received on submission forms.

In December 2014, detection of highly pathogenic (HPAI) Eurasian lineage H5 2.3.4.4 influenza viruses associated with a wild bird mortality event and raptor mortality in Whatcom County, Washington marked the beginning of the largest animal health emergency in the US. The NAHLN and NVSL played a crucial role in the response effort; NVSL received 1625 outbreak samples for confirmatory and first line testing between 12/08/2014 and 6/17/15 (Table 1a: poultry=1065, wild bird=560). Information regarding the response, epidemiology, and virus information can be found at **this link**.

Assay Updates. Molecular diagnostics for influenza A virus (IAV) used across the National Animal Health Laboratory Network (NAHLN) in the US were confirmed to work well to detect these Eurasian H5Nx viruses. As primary surveillance tools, the NAHLN H5 and H7 assays (both 2008 and 2014 protocols) are designed to capture broad virus diversity and do not distinguish geographic lineage or pathotype. Virus subtype and pathotype can be expedited using other molecular methods such as Sanger sequencing to generate partial HA/NA sequence directly from the sample where sufficient viral RNA is present.

Import and Export Testing. Pet bird and psittacines made up the majority of import testing, while export testing was conducted in petbirds, psittacines, columbiformes, and poultry (~400 tests per year). All import and export samples tested for FY2015 (n= 1721) were negative for AI and ND (**Table 1b**).

Live Bird Marketing System (LBMS), Backyard Birds and Exhibition Birds. As part of the ongoing LBMS surveillance for presence of AI and APMV-1, the NVSL tested 1579 specimens in 398 submissions from 32 states (AL AR AZ CA CT DE FL ID KS LA MA MD ME MN MT NC NE NH NJ NY OH OK OR PA RI TN TX UT VA WA WY) by virus isolation in embryonated

chicken eggs and, when appropriate, by real-time RT-PCR (rRT-PCR). All remaining LBMS surveillance specimens were tested at the State level. In FY2015, AIV (n=41) and APMV-1 (n=90) was isolated from specimens tested. For low pathogenic avian influenza a single North American lineage H5N1 LPAI virus from chickens was detected in a NJ live bird market. Other non-H5/H7 AIV are listed by H-type in **Table 2**. Ninety APMV-1 viruses were isolated from 11 states (CT DE FL MA MD NE NJ NY PA RI SC). Pathogenicity of representative APMV-1 isolates obtained from birds was determined by the intracerebral pathogenicity index (ICPI) test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site. All were characterized as low virulent (lentogenic pathotype) strains.

Commercial Poultry. Surveillance for AI in commercial poultry is conducted under provisions of the National H5 and H7 Low Pathogenicity Avian Influenza Control Program implemented in September, 2006. The majority of this testing is performed at the state level; the NVSL provides reagents for the agar gel immunodiffusion (AGID) test and controls for the rRT-PCR test in addition to confirmation and characterization of positive specimens. For commercial poultry during FY2015, one detection of North American lineage H7N3 LPAI of wild bird origin (CA: turkey) was reported to the World Organisation for Animal Health (OIE). Other AIV isolated are listed by H-type in **Table 2**.

AI Antibody Subtyping. The NVSL received 299 submissions (1973 sera) for AI antibody confirmation and subtyping in FY2015 from 28 states predominantly from chickens and turkeys. Antibodies to influenza H1 and/or H3, with N1 and/or N2 antibodies were detected predominantly in turkey samples (97%) where vaccination is common; over two thirds of samples were from OH with sporadic detections from 10 other states (AZ CA GA IA MN MO NC PA OR SD). Antibody was also detected as follows: H4 (MN and KS: turkey – serologic only), H5N2 (MI: turkey); H7N9 (KS: turkey serologic only), H10N2 (TN: chickens, serologic only).

Surveillance in Wild Waterfowl. The Eurasian H5 clade 2.3.4.4 events of late 2014 prompted enhanced active surveillance from late December 2014 through June 2015 in the Pacific flyway; results for this effort are listed **here**. An updated strategy and new Wild Bird Surveillance program was initiated on 1 July 2015 (refer to this **link** for the surveillance plan, and this **link** for detections from July 2015); with the 2014 updates to the H5/H7 molecular assays, NAHLN laboratories participating in the wild bird surveillance testing forward only H5/H7 suspects to NVSL and other influenza A positive samples are forwarded to the NAHLN laboratory at Colorado State University for the Wildlife Services repository. Other wild bird efforts such as routine mortality event testing, and characterization of H5/H7 viruses submitted by university and independent researchers was conducted. In FY2015, 977 wild bird specimens were received at NVSL from all efforts. The Eurasian H5 clade 2.3.4.4 findings are listed at links above; non-HPAI subtypes (n=260) are listed in **Table 3**.

Avian paramyxovirus serotype-1 (APMV-1). In FY2015 a total of 179 APMV-1 viruses were isolated from 23 states (AK AL CA CO CT DE FL IA ID MA MD MI MN NC NE NJ NY OR PA RI SC UT WA; includes the 90 LBM isolates mentioned above). Pathogenicity of representative APMV-1 isolates obtained from birds was determined by the intracerebral pathogenicity index (ICPI) test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site. There were no virulent viruses (vNDV) isolated in FY2015. Of the 179 isolates, 152 were characterized as low virulent NDV (loNDV) and 27 were identified as pigeon paramyxovirus type-1 (PPMV-1) from falcons, dove, racing and other pigeons in 9 states (AZ CA ID MN NY OR PA UT WY). PPMV-1 isolates were identified by the HI test with monoclonal antibodies specific for PPMV-1 and sequence analysis of fusion protein cleavage site.

Proficiency Test Panels. For AGID, 112 laboratories were invited to participate in the voluntary proficiency test (PT); 92 panels were shipped (including Chile (1) and El Salvador (2), Canada (2) and Japan (1)). A total of 68 laboratories from 39 states passed with a score of 90% or better. The NAHLN laboratories conducting surveillance testing for AI and/or ND are required to have one or more diagnosticians pass an annual PT to perform official rRT-PCR testing. In FY 2015, AI (matrix/H5/H7) PTs were distributed for 285 diagnosticians in 58 laboratories and for 250 diagnosticians in 56 laboratories for APMV-1 (Newcastle disease) rRT-PCR. Results for the 2014 international OFFLU AI Ring Trial, (coordinated, prepared, and shipped by the NVSL with assistance from the Frederich Loeffler Institute) were reported to the participating laboratories, OIE, FAO, and OFFLU organizations. The panels included 15 samples and participants conducted influenza A, H5 and H7 subtyping rRT-PCR, as well as sequence analysis for molecular pathotyping. Participants represented 20 labs from different countries, including 9 OIE/FAO Reference Centers and 11 Regional Laboratories. While the majority of labs accurately detected influenza A, subtyping by PCR continues to be challenging and demonstrates the difficulty capturing the diversity present in the H5 and H7 subtypes. Accurate detection of viruses from opposite hemispheres using a single assay presents the greatest challenge.

AI Diagnostic Reagents Supplied by the NVSL. The following reagents were distributed for rRT-PCR testing and support of NPIP and LBM surveillance during FY 2015:

AGID Diagnostic Reagents:

- 12,124 units of AGID reagents (antigen and enhancement serum) were shipped to 67 state, university, and private laboratories in 36 states sufficient for approximately 1,454,880 AGID tests
- An additional 1005 units (120,600 tests) were shipped to 16 international laboratories (13 countries)

AIV Diagnostic Reagents:

AIV rRT-PCR Controls

- 101 vials of positive amplification control (M, H5 & H7) 20 states; 10 internationally to 1 country

- 508 vials of positive extraction control 39 states; 2 internationally to 1 country
- 572 vials of negative extraction control 39 states; 8 internationally (3 countries)

APMV-1 Diagnostic Reagents:

LaSota Antigen (inactivated)

- 80 vials (2 ml) to 9 national and 28 vials to 4 international labs

APMV-1 Antiserum

- 14 vials (2 ml) to 5 national and 94 vials to 7 international labs

APMV-1 rRT-PCR Controls

- 13 vials of positive amplification control to 9 states; 10 vials internationally (3 countries)
- 94 vials of positive extraction control to 20 states; 8 vials internationally (4 countries)

Table 1a. Samples NVSL received for outbreak testing during the 2014-2015 Eurasian H5 events by purpose.

Month	BACKYARD	COMMERCIAL	WILD BIRD	Grand Total
December-14	10	0	42	**52**
January-15	139	2	335	**476**
February-15	7	1	37	**45**
March-15	9	24	49	**82**
April-15	14	367	52	**433**
May-15	84	355	27	**466**
June-15	28	25	18	**71**
Grand Total	**291** (56% H5+)	**774** (65% H5+)	**560** (30% H5+)	**1625** (51% H5+)

Table 1b. Samples received for avian influenza and Newcastle disease testing during FY2013-15 by purpose.

	FY2013	FY2014	FY2015
IMPORT	4944	1562	1309
EXPORT	378	519	412
LBM-BYD	649	658	1288
COMMERCIAL	266	283	3489

Table 2. FY2015 AIV isolates from LBM, backyard, and commercial submissions by state and H-type.

Purpose	Subtype	Source	State
LBM/ backyard	H1N1	Duck, swan	NJ NC
	H2N2	Guinea, turkey, duck, chicken, quail	CT NC NY PA RI
	H3N9	Duck, goose	PA
	H11N9	Duck, goose	PA
	H5N1 LPAI	Chicken	NJ
Other Commercial	H1N2	Turkey	IA
	H3N2	Quail	CA
	H7N3 LPAI	Turkey	CA

Table 3. Influenza A isolates from wild birds by district (specific states where samples collected are listed) and by H and N-type with predominant N-type underscored (n=260; collection dates range from 2012-15). Samples are not representative of all Districts.

USDA DISTRICT	**H1** (N1,N3,N9)	**H3** (N1,N6, NR)	**H4** (N1,N2,N4,	**H5 LPAI** (N2, N9)	**H6** (N1, N8)	**H7 LPAI** (N1,N2,	**H9**N2	**H10** (N3, N7, NR)	**H11** (N2,N3,N9)	**H16**N3	**mixed**	**Total**
1 (CT,MA,NH,NJ,NY, PA)						8	8					07
2 (GA)												
3 (IL,MI,MN,OH)							1					3
4 (LA,OK,TX)						9	2					4
5 (ID, KS, MT)							6					0
6 (AK,CA,CO, NM,NV,OR,UT,WA)			4			3	2	3				5
TOTAL	7	3	6			47*	1	8	3			60

* 63% HA gene molecular confirmation only

Poultry *Salmonella*, *Mycoplasma*, and *Pasteurella* Diagnostics at NVSL
Brenda Morningstar-Shaw, Diagnostic Bacteriology Laboratory, NVSL-USDA
***Salmonella* serotyping**

The Diagnostic Bacteriology Laboratory within the National Veterinary Services Laboratories (NVSL) routinely serotypes *Salmonella* isolates submitted by private, state, and federal laboratories as well as veterinarians, researchers and other animal health officials. This report summarizes *Salmonella* serotyping submissions to NVSL from January 1 through December 31, 2014 originating from poultry. *Salmonella* isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (herd and flock monitoring programs, environmental sources, food). Serotyping data from isolates submitted for research purposes are not included in the summary.

Salmonella serotyping at the NVSL is an ISO 17025 accredited test. Salmonellae are typed using polyvalent and single factor antisera to determine

the O and H antigens. Approximately 60% of the sera used at the NVSL are produced in house as previously described. (Ewing) The remaining antisera are purchased from commercial vendors. All sera are subject to extensive quality control testing prior to use. *Salmonella* antigenic formulae are determined as previously described (Ewing) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I.

From January 1 to December 31, 2014 there were 4,688 isolates from chicken sources and 1,188 isolates from turkey sources submitted to the NVSL for *Salmonella* serotyping. The most common isolates from chickens and turkeys are listed in Tables 1 and 2 respectively.

The NVSL provided a *Salmonella* Group D proficiency test to assess the ability of laboratories to isolate *Salmonella* from environmental samples and determine the serogroup (specifically group D) of any *Salmonella* isolated. The test consisted of ten lyophilized cultures containing various combinations of *Salmonella* and common contaminants that simulated an environmental swab. The 2014 test included *Salmonella* serotypes Enteritidis, Javiana, Anatum, Oranienburg, Heidelberg, and an *sdf* negative Enteritidis. Contaminant bacteria included *Enterobacter cloacae, Citrobacter sedlakii*, *Citrobacter amalonaticus, Citrobacter freundii., Pseudomonas aeruginosa., and Providencia rettgeri.*. Laboratories were instructed to test the samples according to the procedures used in their laboratories. The NVSL randomly retained 11% of the test kits and tested them blindly for QA purposes. The results of the proficiency test are shown in Table 3.

Additionally, the NVSL offered a *Salmonella* serotyping proficiency test to allow laboratories to assess their ability to serogroup or serotype *Salmonella*. The panel consisted of ten pure *Salmonella* isolates, including *Salmonella* serotypes Berta, Saintpaul, Montevideo, Pensacola, Idikan, Essen, Liverpool, Fresno, Lille, and Enteritidis. Participants were given the option to perform serogrouping, partial serotyping, or full serotyping of the isolates and were graded based on appropriate identification to the level of typing they performed. The NVSL randomly retained 15% of the test kits and tested them blindly for quality assurance (QA) purposes. The results of the proficiency test are shown in Table 4.

Table 1: Most common serotypes in 2014: Chicken

Clinical		**Non-Clinical**	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Enteritidis	86	Senftenberg	1106
Kentucky	30	Mbandaka	473
Infantis	13	Kentucky	450
Typhimurium	11	Enteritidis	291
Senftenberg	9	Typhimurium	93
All others	71	All others	2055
Total	**220**	**Total**	**4468**

Table 2: Most common serotypes in 2014: Turkeys

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Senftenberg	87	Senftenberg	271
Heidelberg	37	Anatum	96
Albany	29	Hadar	93
Ouakam	22	Muenster	74
Montevideo	16	Agona	52
All others	114	All others	247
Total	**305**	**Total**	**833**

Table 3: Summary of NVSL *Salmonella* Group D proficiency test

	2010	**2011**	**2012**	**2013**	**2014**
Participants	55	70	73	61	80
Mean Score	92%	97%	92%	94%	98%
Score Range	100-44%	100-85%	100%-29%	100-68%	100-80%
Below Passing	3	0	N/A*	N/A**	0

Because of the change in grading method, a pass/fail designation was not assigned.
*2012 Seven individuals scored less than 80%
**2013 Four laboratories scored less than 80%

Table 4: Summary of NVSL *Salmonella* Serotyping proficiency test

	Serogrouping 2012	**Serotyping 2012**	**Serogrouping 2013**	**Serotyping 2013**	**Serogrouping 2014**	**Serotyping 2014**
Participants	22	13	18	14	34	23
Mean Score	98%	92%	98%	98.50%	99%	95%
Score Range	100-90%	100-70%	100-90%	100-90%	100-80%	100-80%

***Salmonella* Enteritidis**

The number of *Salmonella* Enteritidis (SE) isolates submitted from chickens in 2014 is shown in Table 5. The most common SE phage types are shown in Table 6.

Table 5: Number of chickens *Salmonella* Enteritidis isolates per calendar year at the NVSL

	2010	2011	2012	2013	2014
No. chicken isolates	4987	3940	3502	3912	4688
No. chicken SE isolates	1500	776	507	400	377
SE percent of all isolates	30.1%	19.7%	14.5%	10.2%	8.4%

Table 6: Most common *Salmonella* Enteritidis phage types from chicken sources per calendar year

Rank	2010	2011	2012	2013	2014
1	8	8	8	8	8
2	13	13a	13	13	RDNC
3	13a	13	RDNC	13a	2
4	RDNC	RDNC	13a	RDNC	13a
5	23	23	23	23	13

RDNC = reacts, does not conform

***Salmonella* Pullorum and Gallinarum**

The NVSL provided 2,570 ml of *S.* Pullorum tube antigen, 158 ml of *S.* Pullorum stained microtiter antigen, and 478 ml of antisera to testing laboratories between January 1 and December 31, 2014. The NVSL conducted 437 *S.* Pullorum microtiter tests in 2014. The NVSL did not identify any *Salmonella* Pullorum isolates in 2014.

Pasteurella* and *Mycoplasma

The NVSL received 128 isolates for somatic typing in 2014. The NVSL also supplied 106 ml of *P. multocida* typing sera.

The amount of *Mycoplasma* reagents provided are shown in Tables 7 and 8.

Table 6: *Pasteurella multocida* somatic typing. Table shows number of isolates per fiscal year for each type.

	2010	2011	2012	2013	2014
Type 3	38	25	38	28	18
Type 3,4	27	12	33	17	36
Type 1	25	17	10	10	10
All other	70	52	100	90	62
TOTAL	**160**	**106**	**181**	**145**	**126**

Table 7: *Mycoplasma* antisera (ml) provided by NVSL per fiscal year

Antisera	2010	2011	2012	2013	2014
M. gallisepticum	256	306	274	532	246
M. meleagridis	32	54	40	108	34
M. synoviae	256	326	342	672	212
Negative	222	150	175	344	156
Total	766	836	831	1656	648

Table 8: *Mycoplasma* antigen (ml) provided by NVSL per fiscal year

Antigen	2010	2011	2012	2013	2014
M. gallisepticum	150	195	175	245	170
M. meleagridis	75	95	80	40	85
M. synoviae	215	220	245	290	230
Total	440	510	500	555	485

References

Ewing, WH. 1986. Edward and Ewing's Identification of Enterobacteriaceae. 4th edition. Elsevier Science Publishing Co., Inc., New York, US.

Grimont, PAD, Weill, FX. 2007. Antigenic Formulae of the *Salmonella* Serovars. 9th edition. WHO Collaborating Centre for Reference and Research on *Salmonella*. Paris, France.

Committee on *Salmonella* Report

Doug Waltman, Georgia Poultry Laboratory

The Committee on *Salmonella* met on Tuesday, October 27, 2015 and heard updates and research findings from a series of speakers. Dr. Megin Nichols, the Enteric Zoonoses Activity Lead for the Outbreak Response and Prevention Branch of the Division of Foodborne, Waterborne and Environmental Diseases at CDC, spoke on "2015 Enteric Zoonoses Outbreaks: Public Health Impacts and Challenges. She overviewed several outbreaks that have occurred in 2015, and then focused on the pork outbreak in Washington. Dr. Karen Becker, the Director of the Applied Epidemiology Staff within FSIS's Office of Public Health Science, spoke on "An FSIS Update on Policy and Action to Prevent and Control Foodborne Disease Associated with Salmonella. She first added additional processing plant information to the Pork outbreak that was introduced by Dr. Nichols. She then shared an update on FSIS activities on controlling Salmonella including their standards, including upcoming directions. Brenda Morningstar-Shaw, over *Salmonella* serotyping at the Diagnostic Bacteriology Laboratory at NVSL, gave the Annual NVSL *Salmonella* Report. Dr. June deGraft Hanson, a member of the Office of Food Safety, Division of Dairy, Egg, and Meat Products of FDA, spoke on "the Egg Safety Rule : Progress and Update". She overviewed the Egg Rule and then provided the results of the program activities and testing. Dr. Jean Guard of the US National Poultry Research Center presented An Approach to Serotyping Salmonella enterica that Facilitates Independent Analysis of Farm Ecology by Producers. She shared her work on and research with intergenic

sequence ribotyping (ISR) for serotyping *Salmonella*. And finally Dr. Doug Waltman gave a presentation titled Just when you think you have Salmonella figured out …. His presentation reviewed a retrospective study of the *Salmonella* isolated from individual houses from flocks on farms from one breeding company.

Dr. Doug Waltman and Dr. Richard Sellers, chair and vice-chair, respectfully, are rolling off of the Committee on *Salmonella*. Dr. Donna Kelley of the University of Pennsylvania has volunteered and has been recommended to the Executive Committee to take the Committee Chair position.

REPORT OF THE COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE

Chair: Harry Snelson, NC
Vice Chair: Lisa Becton, IA

Bobby Acord, NC; Gary Anderson, KS; Paul Anderson, MN; Marianne Ash, IN; Karen Beck, NC; Robert Blomme, IA; Philip Bradshaw, IL; Becky Brewer-Walker, AR; Nancy Brown, KS; Tom Burkgren, IA; Robert Cobb, GA; Jim Collins, MN; Joseph Corn, GA; Thomas DeLiberto, CO; Dee Ellis, TX; Mark Engle, MO; Tony Forshey, OH; Nancy Frank, MI; Donna Gatewood, IA; Cyril Gay, MD; Michael Gilsdorf, MD; Timothy Goldsmith, MN; Larry Granger, CO; Patrick Halbur, IA; Rod Hall, OK; Steven Halstead, MI; William Hartmann, MN; Greg Hawkins, TX; Michael Herrin, OK; Richard Hesse, KS; Sam Hines, MI; Russell Iselt, TX; Regina Jensen, DE; Jeffrey Kaisand, IA; Ellen Kasari, CO; Marcus Kehrli, Jr., IA; Jennifer Koeman, IA; Charlotte Krugler, SC; Elizabeth Lautner, IA; James Leafstedt, SD; Donald Lein, NY; Tsang Long Lin, IN; Bret Marsh, IN; David Marshall, NC; Chuck Massengill, MO; Paul McGraw, WI; Gay Miller, IL; Richard Mock, NC; Jerome Nietfeld, KS; Sandra Norman, IN; Dustin Oedekoven, SD; Kris Petrini, MN; Barbara Porter-Spalding, NC; David Pyburn, IA; Susan Rollo, TX; James Roth, IA; Mo Salman, CO; Joni Scheftel, MN; David Schmitt, IA; Richard Sibbel, IA; Brad Thacker, MD; Lee Ann Thomas, MD; Beth Thompson, MN; Sarah Tomlinson, CO; Susan Trock, GA; Paul Ugstad, NC; Liz Wagstrom, DC; Patrick Webb, IA; Margaret Wild, CO; Ellen Mary Wilson, NM; Nora Wineland, MO.

The Committee met on October 26, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 1:00 – 6:00 p.m. There were 23 members and 39 guests present. Chairman Snelson provided an introduction to the full Committee and covered housekeeping items for the Committee prior to the start of presentations.

Presentations and Reports

Feral Swine PRV/ BR Sub-Committee Report

Joe Corn, USDA, Wildlife Services (WS)

Dr. Corn provided an update on current activities with the Sub-Committee. He reviewed his work on the feral swine map and associated efforts. In 2008 the National Feral Swine Mapping system was developed that can collect data from a wide range of states and other agencies to track feral swine populations. Maps are updated on a monthly basis. The data is password protected but Dr. Corn can be contacted for the information if approved. Dr. Troy Bigelow provided an update on USDA feral swine activities. Activities at other locations include disease surveillance in US and other locations for multiple diseases the program continues to collaborate with other researchers and scientists for disease surveillance. Animal and Plant Health Inspection Service (APHIS) serves as the lead agency for dealing with feral swine. Strategy is to provide resources and strategy at a federal level to support local

and state efforts. APHIS has just released the next strategy for dealing with feral swine. Through Veterinary Services (VS) recommendations the surveillance will be reduced to classical swine fever (CSF), swine brucellosis (SB) and pseudorabies virus (PRV). Additional training and classes will be provided for personnel dealing with feral swine. Additional work will be done assessing other damage impacts from feral swine in all environments where feral swine are active.

Washington State *Salmonella* Outbreak - Background and Industry Perspective

Jennifer Koeman, National Pork Board (NPB)

Dr. Koeman provided an update on the producer perspective and status of the salmonella outbreak in Washington. The outbreak occurred in the summer of 2015. This outbreak was looking at pork products and specific to roaster pigs initiated at several private events. Washington Department of Health was the primary agency for the epidemiological investigation. USDA, Food Safety and Inspection Service (FSIS) also took part in the investigation. The epi graph of the outbreak is available at the CDC website. As of August 27, 152 people were affected. No deaths reported with this outbreak. The outbreak was associated with a specific strain of *Salmonella* 1,4,[5],12:i. Trace back findings looked at one processing location as the potential source of the outbreak. The plant was sourced from multiple locations and pigs. This is the first time the isolate was identified in Washington state. FSIS did intensive sampling of the plant and pork products and found *Salmonella*. A subsequent recall of potential contaminated product occurred. On-farm sampling was requested from public health. There was close collaboration with pork producers, state and national associations to communication on the outbreak and needs for action. On-farm sampling raised a lot of questions for producers on concerns of such sampling. Science has shown that on-farm sampling with not have a significant public health outcome. Those concerns were relayed to the public health authorities as well as with state and federal animal health authorities. Other concerns focused around response, payment of sampling, communication of results, and potential bias for farms that may or may not be found positive for *Salmonella* and subsequent marketing options. Next steps, meet with Center for Disease Control and Prevention (CDC) to review the outbreak response, identify research gaps and needs and identify communications gaps and needs. A request for proposal (RFP) is posted for this strain of *Salmonella* to gain more understanding on this pathogen. That can be found at www.pork.org.

State Animal Health Official (SAHO), Food Safety and Inspection Service (FSIS) Perspective:

Marty Zaluski, Montana Department of Livestock; Joe Baker, Washington State Department of Agriculture; Karen Becker, USDA-FSIS

Dr. Zaluski covered the State's response to the *Salmonella* outbreak. Numerous meetings were held with many different groups to address this

issue. This outbreak has been resolved but there were other issues identified in dealing with such a situation. There is need for more animal health veterinarians within the public health field. Five of the six farms that supplied the plant were in Montana. There were several questions back to public health (PH) on what is the benefit to PH from sampling? What is the action/outcome of those diagnostic results from on-farm sampling? Were there deficiencies in the plant? Why is illness not seen from other plants that also received those pigs? What is the prevalence of this *Salmonella* strain in other production units? The risks and benefits were assessed for on-farm sampling. The investigation of a foodborne outbreak for meat/meat products is different from outbreaks associated with produce. Washington public health to request samples from Montana. The sampling was voluntary and producers elected not to participate. Still need to have more veterinarians within public health to help facilitate the issues associated with these type outbreaks.

Dr. Becker provided insight for the outbreak from an FSIS perspective from the Office of Public Health Science. The Colorado district office helped to assist in this outbreak investigation. The staff also assisted CDC in the outbreak investigation so this helped in collaborative efforts. The office was alerted through other surveillance channels and then did further investigation of the outbreak in Washington. FSIS is doing more exploratory surveillance of pork and pork products for Salmonella investigations. Outbreaks were seen during more warm weather months, so this may be pursued for potential risks for future outbreaks. Cross-contamination was common within an outbreak. FSIS has gone back and traced some Salmonella back to a source from past 2014 outbreaks. FSIS sampled the establishment and found positive samples for the identified strain. Salmonella was also found in the pre-environmental samples (after cleaning) so this was of concern. Other sanitation issues identified at the locations where the pork products were supplied to. FSIS used a traceback visualization tool to see what was occurring with the outbreak and where potential sources were located at. A recall was done at Establishment A due to the outbreak and subsequent issues with sanitation and positive sampling results. FSIS could not determine one source on-farm for the contamination from the sampling that was done at the pigs coming to the plant. The plant is still closed and working with FSIS to reopen. FSIS is doing raw pork product exploratory sampling since May of 2015. Testing for *Salmonella*, *Campylobacter*, Shiga toxin-producing *Escherichia coli* (STECS), Toxoplasma gondii, Methicillin-resistant *Staphylococcus aureus* (MRSA*), Yersinia enterocolitica* and indicator organisms. There is FSIS guidance for controlling Salmonella in market swine from pre-harvest through slaughter. A multi-level approach is needed to reduce the incidence of Salmonella in pork and help to prevent illness.

Dr. Baker provided an update of the outbreak. He did not know about the outbreak until mid-July when he was contacted by the National Pork Board, Dr. Koeman. The first case was actually identified in April of 2015. There still is a disconnect between both public and animal health and needs to be realized that the two are very closely interwoven. Having the FSIS data earlier and on

a real-time basis would have helped to move the outbreak response along. There were other requests to have a schema for on-farm sampling from industry done, but it was not. The sampling could have been completed, but it was not done until later in the outbreak and the producers did not volunteer to do this. The data seemed to be suggesting that there were some significant concerns with the plant sanitation issues and not necessarily a farm problem as shown by the epi-curve.

Panel Discussion

A panel of all speakers was convened to discuss the outbreak and how the response and activities occurred. There were no indications of clinical signs of illness in any of the pigs that were supplying the plant. There could be benefits to on-farm sampling if it was from some type of illness and intervention. There could be value to show the assessment of interventions. The issue of potential contamination of the transport vehicle could also be a part of the transmission and risk of the spread of the *Salmonella* isolate. Sampling at the plant can be dependent upon the length of time in lairage or in transit for when pigs can become infected by other pigs. There is merit in studying this organism aside from the outbreak to better understand transmission and risk factors for survivability and transmission potential. The problem of sampling was that there was the request to sample on-farm without a clear indication of what to do with those results. Another area of concern was the reuse of water and potential contamination. Are there unique characteristics of the strain that make it more resistant to temperatures used for sanitation and disinfection? This should be assessed. Dr. Robert Tauxe did state that there were actually two different isolates that cycled through the outbreak and did change from the time within the outbreak. This could also point to the potential breakdown of the sanitation process at the plant to allow the isolate to get through those processes.

Having a One-Health approach to this issue instead of having something threatened to happen would have made this process go a lot smoother to get on-farm sampling completed. A joint approach is needed with all folks at the table to address each issue.

USDA Swine Health Programs Update

Troy Bigelow, USDA-APHIS, Veterinary Services (VS)

Dr. Bigelow provided an update for swine activities. A review of the African swine fever (ASF) and foot-and-mouth disease virus (FMDV) surveillance pilot project was given. This encompassed communications, awareness of signs, what diagnostic samples to submit etc. The pilot was a 12-month pilot. ASF was for whole blood and FMDV was oral swabs. FADDL was looking at additional samples (from universities) to assess validity of alternative sample types. Data is being analyzed for the pilot project and initial indication shows that the pilot did identify some issues like data management, field submissions and test validation. USDA is continuing to work on a CIS concept to continue to assess sampling and data management concepts for surveillance. The

diseases include classical swine fever (CSF), pseudorabies virus (PRV), swine brucellosis, etc. Other parts of surveillance include the Enhance Passive Surveillance (EPS) that assesses syndromic issues within production, slaughter data and wildlife diseases issues. FSIS slaughter data is also being assessed for potential signals, this is helpful information to look at alternative data for early disease identification. Swine enteric coronavirus disease (SECD) programs are also part of integrated surveillance system (CIS). The plan is being reassessed for maximum efficiency and output. Information is being updated since the backlog of data since the highly pathogenic avian influenza (HPAI) outbreak. Feral swine are still a concern for Veterinary Services (VS) and Wildlife Services (WS) due to pseudorabies and swine brucellosis. PRV and swine brucellosis (SB) still show up on sampling but not in the commercial component of production, but are in feral swine. National Veterinary Services Laboratories (NVSL) is working on diagnostic capabilities for China PRV. Data is being assessed on this strain to help US industry better prepare.

Seneca Valley Virus (SVV) is a new, emerging disease that is active in the industry. Dr. Bigelow covered the needs for veterinarians to respond in the event of seeing vesicles and lesions consistent with SVV. A new guidance document has been released to help provide information for vets and producers to best respond to the disease.

USDA Influenza Surveillance Program Update

Barbara Porter-Spaulding, USDA-APHIS, Veterinary Services (VS)

Dr. Spaulding provided an update on the influenza A virus surveillance program in swine. The data set has some limitations when assessing swine health data due to the submission of samples, anonymity and state-level sharing only. The collaboration with industry, veterinarians, state and federal partners help to assess and utilize the surveillance data to address health challenges with influenza. Reports to be shared with different sectors of the industry and with veterinarians. The reports will be regionalized to help areas assist in managing influenza in their area. There will be internal and external reviews of the value of the program. When both reviews are complete, the intent is to sit down with industry and other collaborators for the future of the surveillance program. The current project is a run off of no-year funding so funds will be used up and then the project is done. Steps are being taken to make the program more efficient and have better use of remaining funds and make them stretch out longer. The efficiencies for propagation of virus was implemented by National Veterinary Services Laboratories (NVSL) that represent what is currently active within the industry. These will be held available for later use if needed. Analysis of data and review of diagnostic standards is ongoing between USDA and National Animal Health Laboratory Network (NAHLN) laboratories to hone in on cycle threshold (CT) values and create better efficiencies within the testing matrix. Dr. Spaulding provided the results of the different regions to date. Need to have surveillance to monitor the changes that occur in the influenza strains circulating in swine. H3N1 is out there and may (or may not) become more of an issue.

Swine Health Information Center Update

Paul Sundberg, Swine Health Information Center (SHIC)

Dr. Sundberg reviewed the status of the newly formed Swine Health Information Center (SHIC) and activities with Seneca Valley Virus. July 1st, 2015 was the start of the SHIC funded by National Pork Board but it is a stand-alone entity. The focus and scope is on emerging diseases and how to assess data that can support continuity of business during such outbreaks. A big focus is on assessing foreign & transboundary production disease risk for on-going prioritization of the swine disease matrix. The Disease Matrix is a project that identifies potential disease threats and helps to define research needs and gaps in order to be better prepared for them.

Dr. Sundberg gave a brief update on the status of the Seneca Valley Virus (SVV) incidence. There are ongoing cases with SVV and need to make sure to hold those pigs from marketing if they are showing acute lesions of SVV. Here are different clinical presentations for the different strains of SVV that are seen: one strain is more vesicular and relatively mild; the other is more aggressive with accompanying lameness and including piglet mortality in young pigs. Sequencing is ongoing of the virus to identify potential origin. Some information that is gathered is from the University of Minnesota Swine Health Monitoring project that evaluates disease status in sow herds. SVV seems to be in low prevalence since 1980's. However, this year has shown an increase in incidence and the need to assess it as a newly emerging disease and the other issues surrounding virus identification in plants. The virus has wide distribution within the US. Research for the virus is ongoing to assess the basic of disease such as transmission, duration of shed, screening for prevalence, epi surveying for the disease and risk factors, disinfectant efficacy and focusing on diagnostic capability such as sequencing (whole virus) and serologic assessment (ELISA).

The SHIC is helping to coordinate efforts for the response to SVV and what to do in the face of disease. Working collaboratively with all stakeholders has been essential to getting information out to veterinarians, packers and producers as rapidly as possible. Coordination is ongoing with USDA, Food Safety and Inspection Service (FSIS) for response to SVV at the plant.

Other areas of focus for SHIC include the China PRV strains. Working with USDA on assessing the strain and preparedness to detect and deal with this virus in the event it might get to the US. Clinically this strain is causing major swine health issues in China. So need to assess the virus here in the states and assess current US vaccines and ability to potentially protect against that virus is critically important. Current diagnostics will detect the China PRV strains both by serology and also by polymerase chain reaction (PCR). This work is currently ongoing. Kubovirus in China is also an issue so may be one to watch within the US. All info on SHIC can be found at www.swinehealth.org .

Enhanced Passive Surveillance System: Swine Pilot Update
Lindsey Holmstrom and Matt Cochran, Institute of Infectious Animal Diseases

Dr. Cochran provided and update on the AgConnect suite of tools at Texas A&M. The Enhanced Passive Surveillance (EPS) is real-time data collection and analysis of syndromic information that could potentially serve as an alert for an emerging disease or a significant shift is domestic diseases. It is applied out in the field with veterinarians reporting on a day to day basis. The value of the project is the integration of data into one system that can be reviewed and analyzed for animal health decisions. The following laboratories are currently messaging laboratory data into EPS: Iowa State University, University of Minnesota and South Dakota State University. Reporting for the project include healthy as well as clinical animals. There are many elements that can be incorporated into the reporting. Currently the swine application deals with the key data points and will start with minimal fields and add more as the project progresses. AgConnect is the computer operating system that can access different areas for production to incorporate all forms of data such as phylogenetics, movements, production data, laboratory data and syndromic information. The system can incorporate all sorts of customized data and then provide data back in a rapid format. But the data fields are also what practitioners are already using out in the field so the program is complementary for major health systems efforts. The operating system is based off of HL7 messaging so it is compatible with other National Animal Health Laboratory Network (NAHLN) messaging platforms. The program is progressing according to the stated 3-year timeline of the projects. Dr. Holmstrom provided a real-time demonstration of the EPS program.

2012 NAHMS Update/CARB Update
David Dargatz, USDA-APHIS, Veterinary Services (VS)

Dr. Dargatz gave a brief overview of the activities for Combating Antibiotic Resistant Bacteria (CARB) plan. This is also in conjunction with evaluation of antimicrobial resistance activities. There are resources on the Center for Epidemiology and Animal Health (CEAH) website for surveillance and antimicrobial resistance (AMR) issues. There are a number of activities underway. The stakeholders are involved in this process. Discussions of feasibility are ongoing for surveillance stream data gathering. USDA is working with groups to identify priority of streams. There are no new resources however applied to this project, so have to deal with the use of current resources. We are looking at how to utilize data that has already been collected from other data streams (i.e. National Animal Health Monitoring System (NAHMS)) and determine how it might be used to look at existing trends if at all possible. Another part of this project, is to assess analysis of the most recent swine survey from 2012; this includes the antimicrobial data. Future activities will also look at this area of antimicrobial use and resistance. There is intent to look at key animal health pathogens. The assessment of animal health pathogens is in its initial phase. Another area of collaboration is working with industry and academia on gathering animal health data. Target is looking at what data to

collect, how it will be reported and analyzed. International engagement is also a component of the CARB plan. USDA is actively engaged in stakeholder discussions to help in this arena. Dr. Larry Granger also provided a brief update on activities for AMR and CARB. There will be a release of the 180 day update on the action plan. There has been little movement on this action plan due to financial constraints. Working with CDC on the infographic depicting the potential mechanism of resistant bacteria to humans resulting in illness to make it less controversial.

PEDV Biosecurity Project

Julie Smith, University of Vermont

Dr. Smith gave a review of the current activities for understanding implementation of biosecurity for diseases of importance. This project is a focus on people and understanding what that interaction between human movements and transmission of disease. This is a multi-disciplinary, multi-university team to address this project. There are four major goals to assess the issues at hand. The focus is on porcine epidemic diarrhea virus (PEDV) in the swine industry. Goal is to have tools available to producers at the end of the project. Will look at all factors that drive the implementation of a practice, behavior or policy that can impact animal health. Year 1 will focus on PEDV. A review was given on the modeling that will be using for this project. The model is an Agent-based modeling for livestock biosecurity research.

Committee Business

No new resolutions were presented for 2015.

Chairman Snelson provided an overview of the 2014 resolution for African swine fever (ASF). USDA did have a response to the resolution. See response from the USAHA Resolutions from 2014 for actual language. There were no further comments on this resolution.

No other business was presented at this time. A motion was made by Dr. Webb to adjourn and Dr. Burkgren seconded. The meeting was adjourned.

REPORT OF THE COMMITTEE ON TUBERCULOSIS

Chair: Dustin Oedekoven, SD
Vice Chair: Beth Thompson, MN

Sara Ahola, CO; Bruce Akey, NY; James Averill, MI; Kay Backues, OK; Bill Barton, ID; Peter Belinsky, RI; Warren Bluntzer, TX; Steven Bolin, MI; Joyce Bowling-Heyward, MD; Rhonda Brakke, IA; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Charlie Broaddus, VA; Charles Brown II, WI; William Brown, KS; Jess Burner, TX; John Clifford, DC; Robert Cobb; Michael Coe, UT; Jim Collins, GA; Kathleen Connell, WA; Walter Cook, WY; Susan Culp, TX; Donald Davis, TX; Thomas DeLiberto, CO; Jere Dick, MD; Leah Dorman, OH; Brandon Doss, AR; Anita Edmondson, CA; Dee Ellis, TX; Donald Evans, KS; John Fischer, GA; W. Kent Fowler, CA; Nancy Frank, MI; Mallory Gaines, DC; Tam Garland, TX; Robert Gerlach, AK; Collin Gillin; Michael Gilsdorf, MD; Linda Glaser, MN; Chelsea Good, MO; Michael Greenlee; Paul Grosdidier, KS; Stephane Guillossou, MO; Rod Hall, OK; Steven Halstead, MI; Noel Harrington, ON; William Hartmann, MN; Greg Hawkins, TX; Carl Heckendorf, CO; Terry Hensley, TX; Linda Hickam, MO; Rick Hill, IA; Bob Hillman, ID; Christine Hoang, IL; Donald Hoenig, ME; Thomas Holt, FL; Dennis Hughes, NE; John Huntley, WA; Russell Iselt; Jamie Jonker, VA; Susan Keller, ND; Bruce King, UT; Diane Kitchen, FL; Patrice Klein, MD; Todd Landt; TR Lansford, TX; John Lawrence, ME; Tsang Long Lin, IN; Rick Linscott, ME; Travis Lowe, MN; Bret Marsh, IN; Chuck Massengill, MO; Paul McGraw, WI; Robert Meyer, WY; Eric Mohlman, NE; Ernie Morales, TX; Julie Napier, NE; Sherrie Nash, MT; Cheryl Nelson, KY; Jeffrey Nelson, IA; Louis Neuder, MI; Kenneth Olson, IL; Mitchell Palmer, IA; Elizabeth Parker, ITA; Boyd Parr, SC; Elisabeth Patton, WI; Janet Payeur, IA; Kris Petrini, MN; Alex Raeber, CH; John Ragsdale, NM; Jeanne Rankin, MT; M. Gatz Riddell, Jr., AL; Suelee Robbe-Austerman, IA; Keith Roehr, CO; Susan Rollo, TX; Mo Salman, CO; Shawn Schafer, ND; Joni Scheftel, MN; David Schmitt, IA; Dennis Schmitt, MO; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Craig Shultz, PA; Kathryn Simmons, DC; Daryl Simon, MN; Nick Striegel, CO; Tyler Thacker, IA; Lee Ann Thomas, MD; Tracy Tomascik; Darren Turley, TX; Paul Ugstad, NC; Curt Waldvogel, OH; Mark Walter, PA; Ray Waters, IA; Ellen Wiedner, FL; Richard Willer, HI; Brad Williams, TX; Ellen Mary Wilson, NM; Kyle Wilson, TN; Ross Wilson, TX; Nora Wineland, MO; David Winters, TX; Ching Ching Wu, IN; Marty Zaluski, MT; Glen Zebarth, MN.

The Committee met on October 27, 2015 from 1:00 to 6:00 p.m. at the Rhode Island Convention Center in Providence, Rhode Island. There were 69 members and 23 guests present. Dr. Dustin Oedekoven introduced himself, welcomed members and guests, and introduced the vice chair, Dr. Beth Thompson.

Dr. Oedekoven presented the Report of the Scientific Advisory Subcommittee (SAS) on behalf of Dr. Mitch Palmer. A motion to accept the report of the SAS was made by Dr. Michael Gilsdorf and seconded by Dr. Dee

Ellis. The motion was passed. The full text of the report is included at the end of this report.

Dr. Chuck Massengill presented the report of the Bi-National Committee (BNC). Dr. Massengill, US Coordinator for the USA./Mexico Bi-National Committee for the Eradication of Bovine Tuberculosis and Brucellosis (BNC) began his report with an explanation of the purpose of the BNC. In 2015, the BNC discussed specific issues for cattle trade between Mexico and the US, including "M" brands, Sonora *Brucella* status, USDA capture of electronic data, documentation requirements, consistency at all ports, approved feedlots in Sonora and the long term plan for the port at Eagle Pass. Dr. Massengill also explained the importance of avoiding unintended consequences during regionalization in Mexico. The full text of the report is included in this report.

Dr. Mark Schoenbaum, USDA-APHIS-VS, presented the National Tuberculosis (TB) Program Update. Dr. Schoenbaum reported on the prevalence of TB in the US, for both cattle and cervids, and slaughter surveillance in cattle. There were ten confirmed cattle cases in FY2015. Herd plans for FY2015 include both depopulation for some herds, and test and remove for other herds. Dr. Schoenbaum explained how the use of whole genome sequencing is providing a better understanding of the transmission of *M. bovis* in the US. Dr. Schoenbaum reported on other activities, including live animal testing, Bovine Interferon Gamma tests, caudal fold response rates and cervid testing. Lastly, Dr. Shoenbaum spoke to an issue of low sensitivity with the Bovigam® test. The full text of the update is included in this report.

Dr. Alejandro Perera, USDA-APHIS, International Services (IS), presented the Mexico National Tuberculosis report on behalf of Dr. Castillo, SAGARPA/SENASICA. The report included an update on Mexico's campaign against bovine TB, testing, staffing and regulations. Dr. Perera also spoke about the differing TB status zones and approved laboratories within the country. Some states within Mexico have begun mandatory official identification of cattle, which is part of a national traceability system. The full text of the report is included in this report.

Dr. Kevin Stokes, USDA-APHIS, National Veterinary Services Laboratories (NVSL) presented a Time Specific Paper, Real time PCR used in US Slaughter Surveillance. The paper, in its entirety, is included in this report.

Dr. Scott Wells, Veterinary Population Medicine, University of Minnesota, presented on Modeling Transmission of Bovine Tuberculosis in Uruguay using Dynamic Cattle Movement Networks-A Potential Model for the US. Dr. Wells explained that the basis of the model is the network of cattle movements, with an application of scoring methods for risk. In Uruguay, there is a complete electronic based traceability for cattle which can then be used for risk base

analysis. The applicability in the US would be similar, using the movements of cattle to identify risk.

Dr. Alex. J. Räber, Thermo Fisher Scientific, discussed the World Organisation for Animal Health (OIE) approved diagnostic claims of BOVIGAM™ – *Mycobacterium bovis* gamma interferon test kit for cattle. Dr. Räber explained the validation process stages for the test kit. There are a number of OIE approved diagnostic claims, including historical freedom and re-establishment of freedom after outbreak.

State presentation and/or written reports were received from the following:

California - Dr. Annette Jones

- 11 affected dairy herds in 11 years
- Eligible for “free” status in 2016
- Rely heavily on slaughter surveillance due to high dairy population
- Of 58 counties in CA, 52 had cases of M. bovis in humans

Texas – Dr. Andy Schwartz
The state report is included later in this report.

Michigan - Dr. James Averill

- 2 infected herds identified this past year, in Modified Accredited (MA) zone
  - 600 head dairy
  - Small hobby farm
- The state animal health officials (SAHO) continue to be involved in various research projects
- State will propose a Modified Accredited Advanced Zone (MAAZ) buffer zone, through new Memorandum of Understanding

Dr. Kay Backues from the Tulsa Zoo presented information on Elephant Tuberculosis (TB) Testing Recommendations, current in 2015. Dr. Backues reports stakeholders support the 2015 modifications over 2010 guidelines. The recommendations use current and use science based information. Additionally, Dr. Backues included a discussion and recommendations for State Animal Health Officials (SAHO) on elephant TB testing.

As an addition to the agenda, Ken Olson presented an update of the Mycobacterial Diseases of Animals (MDA).

Committee Business:

At the conclusion of formal presentations, Dr. Oedekoven determined there was a quorum. The status of the 2014 resolution was reported. Two resolutions were considered by the committee.

The first resolution is titled Tuberculosis testing protocol for farmed cervidae. A motion was made to adopt, and was seconded. After discussion, a call for the question was made. The chair called for a show of hands; the resolution passed.

The second resolution is titled Global Health Security Alliance – A New Initiative to Limit the Spread of Infectious Diseases Globally. A motion was made to adopt, and was seconded. After discussion, a call for the question was made. The resolution passed unanimously.

Each resolution was approved and forwarded to the Committee on Nominations and Resolutions.

One recommendation was considered by the committee:

BACKGROUND: Movement of animals is a known risk factor of disease transmission from farm to farm. Currently, interstate cattle movement data is not available in searchable format and intrastate movement information is not available from most states. This information is available in Michigan. In addition, Mexican cattle movements are not traced after they enter the country allowing for the possibility of exposure of native animals to tuberculosis. There is a growing movement in other countries in the world to capture complete electronically-available data on animal movements. If available, this movement information could be evaluated using social network analysis to improve strategies to target surveillance towards herds of highest risk.

RECOMMENDATION: USAHA encourages USDA-APHIS, Veterinary Services (VS) support in capturing certificate of veterinary inspection (CVI) and intrastate movement data from Michigan cattle and cervid herds, through collaboration of university and other partners, to evaluate the risks of disease related to movement data and to inform disease surveillance. Once in place, this system can be expanded to include Mexican cattle movements and other higher risk movements.

A motion to accept the recommendation was made and seconded. The recommendation passes by voice vote.

A motion to adjourn was made, and seconded. The meeting adjourned at 5:30 p.m.

REPORT OF THE TUBERCULOSISSCIENTIFIC ADVISORY SUBCOMMITTEE

Mitchell Palmer, Chair

Four presentations were made at the 2015 Tuberculosis (TB) Scientific Advisory Subcommittee (SAS) meeting.

Investigation of the Cause of Geographic Disparities in IDEXX ELISA Sensitivity in Serum Samples from *Mycobacterium Bovis*-Infected Cattle

Brett Trost, University of Saskatchewan, Canada

The ability to accurately identify *Mycobacterium bovis*-infected cattle is a critical component of bovine tuberculosis prevention and control programs. One method for detecting infected cattle is an enzyme-linked immunosorbent assay (ELISA) developed by IDEXX laboratories, which detects antibodies in bovine serum or milk samples to two proteins produced by *M. bovis*, MPB70 and MPB83. The assay's sensitivity varies substantially by geographic region, with sensitivities of 77%, 45%, and 9% in serum samples collected from infected cattle in the United Kingdom, the United States, and Mexico, respectively. We hypothesized that geographically biased sequence variation in the genes encoding the above antigens (*mpb70* and *mpb83*), or in the genes encoding proteins that regulate the expression of *mpb70* and *mpb83* (*sigK* and *rskA*), may explain these differing sensitivities. This hypothesis was tested by comparing the sequences of the above genes in the genomes of 455 *M. bovis* strains isolated from cattle in the United Kingdom, the United States, and Mexico. For each of the four genes, a single, common sequence was found in most of the *M. bovis* genomes in all three countries. Additionally, 12 of the 455 strains were isolated from cattle on which the IDEXX ELISA was performed (seven ELISA-positive and five ELISA-negative). Five of the seven ELISA-positive genomes and three of the five ELISA-negative genomes contained the most common sequence of all four genes. Thus, it appears that sequence variation in *mpb70*, *mpb83*, *sigK*, and *rskA* does not explain the geographic disparities in IDEXX ELISA sensitivity.

Phage, a New Tool for the Investigation of Bovine TB; Rapid Identification of Bacteremia in the Blood of SCCIT-Positive Cattle

Catherine Rees, School of Biosciences, University of Nottingham, UK

Bacteriophages are viruses that specifically infect bacteria. Like all viruses, they have a specific host range and require viable host cells for replication. For many years now bacteriophage-based methods have been developed for the rapid identification of viable bacteria in a variety of settings – from the food industry to human clinical samples. At Nottingham, we have recently focused on the development of tests that can be used to detect mycobacterial infections in livestock. First we showed that a bacteriophage-based method combined with polymerase chain reaction (PCR) (phage-PCR) could be used to detect and identify viable pathogenic mycobacteria in the

peripheral blood mononuclear cells (PBMCs) of animals suffering from Johne's disease. We have now adapted this method and shown that it can also be used to detect and identify viable *Mycobacterium bovis* in the blood of SCCIT-positive animals with a detection limit of approximately 10 cells per ml of blood, and with results gained within 24h. Interestingly a higher number of *M. bovis* cells were detected in cattle with visible lesions than those with non-visible lesions, suggesting that the bacterial load in blood increases as the disease progresses. These initial results indicate that this simple and rapid method can be used as a new tool to investigate the progress of bovine TB in naturally infected animals. In our studies of Johne's disease, we have found that *Mycobacterium avium* subsp. *paratuberculosis* can be detected in the blood before a positive enzyme-linked immunosorbent assay (ELISA) result is achieved; if this holds true for bovine TB there is a potential that this method may allow earlier identification of infected cattle. More recently the methodology has been improved, shortening the time to detection to within one working day and increasing the sensitivity of the method.

Laboratory Evaluation of Factors Influencing Unexpected Gamma Interferon Results in TB Affected Herds

Jeffery T. Nelson, USDA-APHIS-VS- NVSL

The National Veterinary Services Laboratories (NVSL), along with the USDA, Veterinary Services (VS) Cattle Health Center, worked collaboratively with state animal health laboratories to identify factors that increased false negative results of the gamma interferon assay from samples collected from known bovine TB affected cattle herds. Shipping temperatures and several different lots of gamma interferon assays were analyzed. Through the combination of several rounds of inter-laboratory testing, side by side comparisons of different PPD lots using samples from sensitized cattle at NVSL, and reviewing laboratory control data it was found that the most likely factor affecting the results was decreased activity of the most recent bovine PPD lot used in the stimulation phase of the gamma interferon assay. Laboratories that are approved to perform the gamma interferon assay are no longer using this lot of PPD. After the completion of a verification panel, the approved laboratories are now using an imported version of the gamma interferon assay used throughout the world. NVSL is continuing to work with the manufacturer to identify ways to improve comparison testing of different PPD lots so that consistent results are provided to their stakeholders.

Results of PolyBatics Assign bTB Skin Test and On Site Bovigam Stimulation

Suelee Robbe-Austerman, USDA-APHIS, Veterinary Services (VS), National Veterinary Services Laboratories (NVSL)

NVSL reported on studies evaluating synthetic peptides in the purified protein derivative (PPD) and the gamma interferon. With the assistance of Michigan Department of Agriculture and Rural Development and the Texas Animal Health Commission, two herds were tested with the Assign bTB, a

bead based delivery system for synthetic peptides. Results were highly variable between the two herds, with good specificity in the Michigan herd, but poor specificity in the Texas herd. When the Assign bTB was used in the gamma interferon assay, the results were very comparable to the commercially available synthetic peptides from Prionics. Because the bovine PPD was defective in the kit, further comparisons could not be made.

If further evaluations of the Assign bTB is warranted for skin testing, USDA will have to evaluate the use of multidose syringes due to the syringeability of the bead based product. Finally, it appears that clotting is occurring in the updated plastic heparin Vacutainer tubes. Adjustments may be needed in tube design or the heparin additive to improve the usability of blood tubes in the field.

DEVELOPMENT AND VALIDATION OF A DIRECT REAL-TIME PCR ASSAY FOR MYCOBACTERIUM BOVIS AND IMPLEMENTATION INTO THE UNITED STATES NATIONAL SURVEILLANCE PROGRAM

Philip Dykema[1], Kevin Stokes[1], Nadine Beckwith[1], James Mungin[1], Lizhe Xu[1], Deborah Vickers[1], Monica M. Reising[2], Doris Bravo[1], Bruce Thomsen[1], Suelee Robbe-Austerman[1]*

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Abstract

Abattoir surveillance for bovine tuberculosis, which consists of identifying and submitting granulomas for histology and mycobacterial culture was the primary means for detecting new cases in the Unites States. Mycobacterial culture is expensive, labor intensive and identifies cases weeks after slaughter, hampering trace back efforts. To address this inefficiency, the United States Department of Agriculture replaced culture with real-time PCR for screening granulomas. The objectives of this paper were to describe the development and validation of this PCR as well as the performance of the assay during the first year of implementation. Using archived culture and histologically positive tissue, the sensitivity was 0.96 (95% CI: 0.89, 0.99) for the Mycobacterium tuberculosis complex (MTBC) primer-probe set and 0.89 (95% CI: 0.80, 0.95) for the M. bovis specific primer-probe set. Specificity, estimated during by side by side testing was 0.998 (95% CI: 0.994, 1.000). After implementation, 6124 samples over 54 weeks were tested and all 36 histopathology positive samples were detected including 2 additional cases initially misclassified by histopathology. It appeared that specificity may have declined during post validation testing with 47/6086 signaling positive but not confirmed by either histopathology or culture. While PCR implementation has significantly improved the efficiency of the US slaughter surveillance program, careful attention must be paid to prevent and address cross contamination in the laboratory.

Introduction

Bovine tuberculosis (bTB), caused by Mycobacterium bovis, is an important zoonotic disease that impacts international trade. Many countries spend significant resources eradicating, controlling or conducting surveillance for bTB in livestock and wildlife species. In the United States, the primary method to detect new bTB cases is abattoir surveillance. Submitted granulomas identified during inspection were historically tested with histology and a subset of approximately 40% were also parallel tested using mycobacterial culture. Mycobacterial culture was used to obtain isolates for genotyping and improve sensitivity by identifying cases not found on histology.

Over the last 10 years, 12 additional bTB cases were identified by culture, but they were detected weeks after the carcass was sampled making tracing the animal more challenging.

Direct PCR on fresh or borate preserved tissue has the potential to offer a parallel test to histology, and greatly reduce the labor, expense, and turnaround time required for mycobacterial culture. Published literature contains numerous PCR methods for the Mycobacterium tuberculosis complex (MTBC), including M. bovis, starting in 1990 with the exploitation of IS6110 and then IS1081 in 1991. [1,2] After 15 years of use in laboratories, two published meta-analyses reviewed in-house PCR methods analyzing sputum samples for human TB diagnosis, and these meta-analyses highlight variability in methods and in sensitivity and specificity for a relatively homogeneous specimen.[3,4] Variation from laboratory to laboratory significantly impacts the usefulness and reliability of an assay, especially for a disease that requires regulatory guidelines. The development of real-time PCR technology, which provides a quantification of the nucleic acid target, was an important advancement in PCR.[5] Several researches published primer-probe combinations for the IS6110 and IS1081 insertion elements.[6-9] In 2009, the “Minimum Information for Publication of Quantitative Real-Time PCR Experiments” (MIQE) guidelines outlining documentation of real time PCR protocols were published.[10].

Veterinary researchers and diagnosticians have recognized the advantages of using PCR to detect Mycobacterium bovis in tissues, but the variation in tissue matrices adds complexity not generally seen with a sputum sample. Extraction methods must be able to deal with the diverse tissues matrices, at a reasonable cost, and be scalable to the daily influx of specimens. Previous studies investigated several methods including sequence capture, immunomagnetic methods, bead disruption, proteinase K digestion and others with moderate to successful results, some amenable to higher throughput testing.[8,11-13]. Commercialized PCR reagents have been developed and marketed such as: LSI VetMAX targets all MTBC organisms (Thermo Fisher Scientific Waltham, MA, USA), and BoviMAN (Sliverline Bio, Valdivia, Chile), which targets M. bovis, was adopted as an official test by Servicio Agricola y Ganadero (SAG) the Animal Health Agency of Chile. However, a complete system, including extraction and control reagents, is not currently available. Furthermore, to the authors’ knowledge, no country has yet published complete methods, workflow and performance of an in-house direct real-time PCR while being used in a national slaughter surveillance program.

The objectives of this paper were to describe the development and validation of an optimized extraction method, various probe/primer combinations and the manufacturing of controls used to monitor the performance of the assay. Finally, we report on the overall performance of the assay in the first year of national program use.

Materials and Methods

Development of primer-probe sets

To develop primer-probe sets, IS1081 and IS6110 transposase sequences representing Mycobacterium africanum, M. bovis, Mycobacterium canetti, and

Mycobacterium tuberculosis species were obtained from NCBI database and aligned using Geneious v. 6.0.3 (Biomatters, Auckland, New Zealand) to identify conserved regions. To identify the most optimal primer-probe combinations, regions were selected throughout the transposases (Supplemental Figure 1). The design feature available in Geneious was used to construct primers and probe, adjusting the Tm range to 64-68°C (66°C optimum) for the primers and 70-74°C (72°C optimum) for the probe. The best combinations were selected, based on no dimer formation, no self-complementarity, and to hold amplicon size below 150bp. This study also included a previously published primer-probe set, extRD9, which targets a single copy region of the MTBC [14].

To develop primer-probe sets specific for M. bovis, differences between other Mycobacterium tuberculosis complex (MTBC) and M. bovis genomes were analysed using WebACT, the web-based version of Artemis Comparison Tool (www.webact.org). Large rearrangements were identified and several real-time PCR primer-probe sets were designed following parameters described above using MacVector (MacVector, Inc., Cary, North Carolina, USA) based on the sequence of M. bovis (NCBI reference sequence NC_002945). Each of these primer sets were evaluated against publically available sequences of MTBC isolates. Two sites, Locus 2 (L2) and Locus 3 (L3), were identified to be specific for M. bovis. This study also included a previously published primer-probe set, targeting the lpqT locus, specific to M. bovis.[15]

All primer-probe sets were manufactured at Integrated DNA Technologies (Coralville, Iowa, USA). All probe oligonucleotides incorporate a 5' FAM reporter, with the exception of extRD9 which signals with a 5' CY5 reporter. All probe oligonucleotides incorporated an internal fluorescent quencher (zen) and a 3' non-fluorescent quencher, both recommended by the manufacturer (Supplemental Table 1). All PCR reactions reported in this study were performed in 20 μl reaction volumes using 10 μl Taqman Fast-Advanced PCR Master Mix (Thermo Fisher Scientific, Waltham, Massachusetts, USA), 1 μl 20x primer-probe mix (final concentration: primer, 500 nM; probe, 250nM), 4 μl Milli-Q pure water, and 5 μl of the purified DNA template. The reaction mixture was initially incubated at 50°C for 2 minutes, then 95°C for 10 minutes. Amplification occurred in 40 cycles: denaturation at 95oC for 15 seconds, and annealing/extension at 60°C for 60 seconds. The PCR reaction was performed on either a ViiA7 or 7500 Fast real-time PCR system (Thermo Fisher Scientific).

Initial evaluation of primer-probe sets

Genomic DNA from selected Mycobacterium species (Table 1) was quantified using a Qubit® (Thermo Fisher Scientific). Ten-fold serial dilutions of DNA were made using 1x TE pH8.0 to reach the following concentration range: 1 ng/5μl to 0.1 fg/5 μl and were used to evaluate the efficiency of the 10 primer-probe sets. These DNA dilutions were also used to test a cross-reactivity to Mycobacterium fortuitum with the primer-probe sets targeting

IS1081 and IS6110. Results were analysed by calculating % efficiency from the slope of the standard curve for each primer-probe set.

Tissue Extraction

The extraction process was separated into 2 parts, DNA isolation and then DNA purification. M. bovis culture-positive, granulomatous tissue was obtained from 5 animals, dissected into 27, 300 mg portions, and stored at -20°C. Using a generalized randomized complete block design, 3 isolation methods and 3 purification methods were evaluated using 3 aliquots from each of the 5 animals. DNA purifications for a given DNA isolation method were performed on the same day, and analyzed on the same PCR plate. (Note: the fourth DNA isolation method was adopted after some inhibition issues were identified.).

DNA isolation methods:

1) NaOH: tissues were incubated in 50 mM sodium hydroxide (NaOH) at 95°C for 30 minutes, bead-disrupted using an equal mixture of 0.1 mm and 1.0 mm silicon beads (Bio Spec Products, Inc., United Kingdom) for 2 minutes, and then centrifuged 10 minutes at 13K x g at 20°C.
2) Phenol/chloroform (PC): tissues were added to vials containing equal volumes TE and phenol/chloroform (approximately 400 μl each), bead-disrupted and centrifuged as above.
3) TE: tissues were incubated with 400 μl 1x TE at 95°C for 30 minutes, bead-disrupted and centrifuged as above.
4) TE/ PC: tissues were incubated with 400 μl 1x TE at 95°C for 30 minutes and bead-disrupted; tubes were centrifuged as above; approximately 400 μl of the aqueous liquid was removed and purified with phase separation using an equal volume of phenol/chloroform and centrifuged as above.

Aqueous eluants from 1-3 were used to test three purification methods:

1) Method A: a commercial kit and protocol was followed (MagMAX Total Nucleic Acid Isolation Kit, 96 well plate format, Thermo Fisher Scientific).
2) Method B: a customized technology for high-throughput preparations; briefly, 400 μl of the aqueous portion of the phase-separation extraction was removed and mixed with 1.2 ml DNA Binding Buffer; this solution was loaded onto the appropriate well either spin columns or 96-well spin plates, depending on the number of samples; rinsed with pre-wash and wash buffers, and eluted with 100 μl buffer. (ZR Fecal DNA Miniprep, Spin columns or Zymo-Spin™ I-96 Plate (Deep-well) formats, Zymo Research, Irvine, California, USA).
3) Method C: a traditional nucleic acid precipitation (400 μl of aqueous liquid was combined with 1/10th volume 3M sodium acetate and 2 times volume ice-cold ethanol).

To evaluate the performance of the initial three DNA isolation and the three purification methods, a linear model was fit using data from 4 of the 5 animals. One animal was eliminated from the analysis because not all methods produced a $C\tau$ value. Methods were compared to each other using mean

differences in Cτ values and 95% confidence intervals were calculated using the Clopper Pearson method.[16] A result was considered statistically significant if the 95% CI did not span zero. DNA isolation method 4 (TE/PC), developed later, was not included in these analyses.

Extraction and PCR Controls

To monitor the extraction and PCR efficiency, 2.5 μl of a commercially available control was added to each disruption tube (E. coli hosting a plasmid containing a unique sequence, DNA Extraction Control 670 (DEC670), Bioline, London, United Kingdom). One microliter of DEC670 primer-probe mix (to achieve a Cτ value of 32-34) as added to the PCR mix and the amount of water was adjusted to maintain a 20 μl reaction volume. To establish an inhibition cutoff value, standard deviations were calculated for 15 PCR runs and the acceptable range for DEC670 was set at 3 standard deviations from the mean.

In addition to the commercially available control, three tissue controls were developed; a negative control, and two tissue positive controls containing either H37Ra or BCG. The negative control was produced by homogenizing approximately 300 g of bovine liver in 200 ml PBS. To produce the positive controls, cultures of M. bovis BCG (ATCC35734) and M. tuberculosis H37Ra (ATCC25177) were grown in 7H9 broth containing 0.8% Tween-80 at 37°C with 10% CO2 for 3 - 4 weeks. Using a spectrophotometer, the optical density was measured at 600nm. Cells per ml was calculated using a modified extinction coefficient: 1 O.D. ~ 3 x 106 cfu/ ml.[17] Two ml of a type culture was added to 200 ml of the homogenized liver, (final concentrations of bacteria per ml homogenate: H37Ra = 0.5 x 102 to 1.0 x 102 cfu/ml, BCG = 0.5 x 103 to 1.0 x 103 cfu/ml). One ml aliquots were stored at -20°C, thawed once and kept refrigerated for up to 5 days before discarding. Approximately 100 μl of the controls were added directly to the prepared disruption tubes. The negative control and the H37Ra tissue control were added between every 5th test sample for the first 20 samples and after that, every 10th sample. The BCG tissue control was used one time at the end of the run. Performance of the positive tissue controls was evaluated by measuring the mean and standard deviation of the Cτ values between replicate controls on the same plate and then comparing those against previous runs.

Sensitivity evaluation using archived tissues:

Initially, 26 tissues archived at -20°C, (24 M. bovis culture positive, 2 M. tuberculosis positive and 2 culture negative tissues) were blinded and tested with DNA isolation method 2 (PC), DNA purification method B and MTBC primer-probe IS1081-3. Once method 2 was shown to be problematic, those same tissues, along with 54 additional archived tissues were used to estimate the sensitivities of both IS1081-3 and L3 primer-probe sets using DNA isolation method 4-TE+PC, DNA purification method B. Inhibited samples were excluded from the analysis. Sensitivity was calculated and 95% confidence intervals were obtained using the Clopper Pearson method.

Specificity evaluation during side by side testing with slaughter surveillance:

To characterize specificity, and develop a standardized laboratory workflow, the PCR was implemented while continuing standard histopathology and culture testing during 4 months of routine slaughter surveillance testing. Routine slaughter surveillance was defined as granulomas identified during regular slaughter from animals with no known previous bTB exposure or antemortem bTB test results. Briefly, granulomas identified during carcass inspection were split with ½ the lesion placed in 10% buffered formalin for histology and ½ the lesion was placed in sodium borate for culture.

Histopathology was conducted the day after the samples arrived, and tissue submitted in formalin for histopathology were routinely processed, sectioned and stained with hematoxylin and eosin stains. If inflammatory lesions were identified microscopically, additional histochemical stains were performed on the formalin fixed paraffin embedded tissue and mycobacterial cultures were started on the tissue submitted in sodium borate to help identify the underlying etiology of the inflammatory lesions. Samples were diagnosed as 'mycobacteriosis compatible" based on histopathology when there were granulomatous lesions that contained acid-fast bacilli, and both the lesion characteristics and the bacteria morphology were consistent with an M. bovis infection.[18]. If the diagnosis was mycobacteriosis compatible, the Pathology section would also perform conventional PCRs targeting IS6110 for MTBC, 16S for M. avium, and IS900 for M. paratuberculosis on sections from the paraffin block.[18,19]

Mycobacterial culture was performed by homogenizing the tissue, decontaminating with NaOH and inoculating on to in-house modified 7H11 Middlebrooks solid media and BACTEC™ MGIT™ 960 liquid media.[20] Acid fast stains were conducted on all signal positive media and suspicious colonies. If acid fast positive, DNA hybridization probes specific to the MTBC were performed (AccuProbe Mycobacterium tuberculosis complex culture identification test, Hologic, Sunnyvale, CA). If results were negative, cultures were reported out as Mycobacterium species – not Mycobacterium tuberculosis complex. If results were positive, whole genome sequencing was conducted to determine the species and genotype the isolate.

Direct PCR was performed on all sodium borate submitted samples following this workflow: processing technicians sampled and inactivated the tissue, molecular technicians conducted the bead disruption, extraction and PCR, and microbiologists analyzed the PCR run the next morning. A run was considered valid if all the controls performed as expected and fewer than 1 in 10 samples were inhibited. Validated PCR results were provided to the pathologists after histopathology was completed but prior to the report being released. Discrepant test results were reviewed and the pathologists determined the final diagnosis. Once at least 1000 samples were tested successfully, officials at the United States Department of Agriculture Animal Plant Health Inspection Service (USDA-APHIS) evaluated the direct PCR assay workflow and results, and approved its use in the National slaughter surveillance program.

To analyze these data, a true M. bovis case was defined as an animal that had both a mycobacteriosis compatible histology result and a positive M. bovis culture. All other samples were considered truly negative. Procedures allowed for specimens to be sampled multiple times during the same PCR run at the discretion of the technician, and a sample was considered PCR positive if any one subsample was positive. All direct PCR results with a determined $C\tau$ value were considered test positive.

Post validation performance:

Once test implementation was approved by USDA-APHIS, the workflow outlined in figure 1 was implemented. All borate samples were tested with the direct PCR independently and in parallel with histopathology. If the results were PCR negative and the histopathology diagnosis was anything other than mycobacteriosis compatible, no further testing was done. PCR signal positive, mycobacteriosis compatible samples, and any discrepant results were cultured. Histopathology results from discrepant cases were reviewed by the pathologists to re-access and confirm their diagnosis. If the $C\tau$ value was less than 35, an M. bovis specific PCR was conducted. To assist with trouble shooting the direct PCR assay, if the PCR results had a $C\tau$ value greater than 35, a M. bovis specific PCR was generally not done, and the assay for that sample was repeated. Data was collected from 2014-04-21 to 2015-05-06. The proportion of histology positive and negative samples that tested positive and negative by PCR, respectively, was estimated.

In addition to routine slaughter surveillance, animal health officials requested direct PCR testing on cattle from known infected herds with gross lesions identified at necropsy or slaughter. A total of 341 cattle from 3 affected premises were tested with the direct PCR in parallel with either histology, culture, or both histology and culture as described above. For this dataset, true positive cases were defined as either having a histopathologic diagnosis of mycobacteriosis compatible or M. bovis culture positive results. Unlike the post validation slaughter surveillance where direct PCR testing influenced culture results, these samples were cultured independently of direct PCR results; consequently, sensitivity and specificity could be calculated.

Results and discussion

Development of primer-probe sets:

The ten primer-probe sets ranged from 82-103% efficiency during the initial evaluation (Supplemental Table 2). All sets detected M. bovis DNA, and those designed to detect only M. bovis DNA did not cross-react with other MTBC DNA (Table 1A). Primer-probes designed against IS1081 and IS6110 did, however, cross-react with high concentrations of M. fortuitum DNA although at significantly higher $C\tau$ values than comparable amounts of MTBC DNA. (Table 1B). At 100 pg, these primer-probe sets did not detect M. fortuitum DNA, but still detected M. bovis DNA with $C\tau$ values ranging from 19.52 to 21.89. While this cross-reactivity was interesting, M. fortuitum DNA would not be expected to be found in diagnostic specimens at those levels, so the cross-reactivity was not likely to be clinically relevant.

Because laboratory contamination with amplicons or even DNA is a well-known reoccurring problem in clinical laboratories, it was prudent to identify and maintain multiple primer-probe sets.[21] Primer-probe sets targeting the multi-copy insertion sequences consistently generated lower Cτ values than those targeting single copy locus (Supplemental Table 2). While no cross reactions occurred using the extRD9 primer-probe set (Table 2), the analytical sensitivity improvements gained by using a MTBC primer-probe sets to IS1081 or IS6110 was compelling. Therefore, these were selected for the initial screening of borate submitted samples. Positive results were followed with a M. bovis specific probe-primer set if M. bovis was suspected or with extRD9 if another MTBC organism was expected. Consequently, the primer-probe sets 1081-3, 6110-2, extRD9, L2, L3, and lpqT were evaluated against tissue extracts reported below (Figure 2B).

Tissue extraction:

DNA isolation method 1 (NaOH) clearly underperformed when combined with purification method A, failing to consistently identify 4 of the 5 culture positive animals (Supplemental Table 3). Sample 07315 failed to produce Cτ values for all three subsamples in a majority of the testing, and was excluded from comparative analysis of the methods. No significant differences were identified between method 2 (phenol-chloroform), or method 3 (TE) (Supplemental Table 4 A, B). DNA purification method B was the only method to produce statistically significant lower mean Cτ values (Supplemental Table 4 C, D). Demonstrating statistical significance with small sample sizes is difficult, however, these small studies can provide rapid guidance when testing diverse methods. Other criteria also influence choices of methodology, for example DNA isolation method 3 required a 30 minute incubation step not required in method 2. All samples purified by method C, ethanol precipitation, showed negative test results. This may be due to high quantities of DNA purified, which likely overwhelmed the PCR reactions. The spin filter (method B) and magnetic beads (method A) inherently normalize DNA amounts in the final eluent. Because method C would probably require an additional DNA quantification step to normalize the amount of DNA added to the PCR reaction, this method was not investigated further. Because < 24-hour turnaround time was desired, the more rapid, DNA isolation method 2 was initially chosen and combined with purification method B.

Sensitivity:

During the first week of slaughter surveillance side by side testing, all 5 PCR runs contained inhibited samples (no Cτ value detected for both the DEC670 and MTBC primer-probe sets) with an overall rate of 22%, a problem not seen during development. A decision was made to combine methods 2 and 3 into method 4, which solved the inhibition problem. The sensitivity evaluation was repeated with 80 archived tissues (the original 26 in addition to another 54). (Supplemental files 1, 2,) It did not appear that the sensitivity was negatively impacted by combining methods 2 and 3. The sensitivity for the

1081-3 primer/probe set was 0.96 (95% CI: 0.89, 0.99) and for the L3 primer/probe set was 0.89 (95% CI: 0.80, 0.95). (Table 2A and 2B)

Specificity:

During side-by-side testing, 1742 tissues were tested using the 1081-3 primer-probe set (Supplemental File 3). Of those, 1736 tested negative by both PCR and histology. PCR correctly identified all three positive samples and misidentified three samples as positive for a specificity of 0.998 (95% CI: 0.994, 1.000). (Table 2C) This supported initial thoughts that the cross reactivity with M. fortuitum was not clinically relevant.

Post validation performance:

A total of 273 PCR runs were performed during 54 weeks, 251 of which were deemed as valid, and 15 as invalid. The most common reason for determining a failed run was an excessive number of inhibited controls or samples, often complicated with false positive signals in samples and negative controls. Of the 6162 samples tested during this time period, 38 were PCR MTBC positive and confirmed by both histology and culture, and 47 were PCR positive but were not confirmed by either histology or culture (Supplemental file 4, Table 2D). While it appears that the PCR identified all the true positive samples during this time period, there were slightly more false positive samples than expected. Nearly all of the samples with false positive signals were retested the next day while they were prepared for culture and in all but 2 cases, the false positive signals were not repeated. Despite this problem, the PCR did identify 2 cases that were initially missed by the histopathology, and corrected on the review. Of importance, one of those cases had an initial diagnosis of coccidiomycosis which, under the old system, would not have been cultured. These results reinforced the importance of performing two independent tests during routine diagnostic testing.

Because the PCR influenced how histology and culture were conducted, a true sensitivity and specificity cannot be calculated from this sample set; however, estimations should be calculated to evaluate post validation performance. The proportion of probable negative samples that tested PCR negative was 0.992 (95% CI: 0.990, 0.994) and the proportion of probable positive samples that tested PCR positive was 1.00 (95% CI: 0.91, 1.00).

All three controls used were designed to have $C\tau$ values between 32 - 35, a value that is about as high as possible and yet still consistently test positive during a normal run. The BCG control was developed to consistently be 2-3 $C\tau$ values lower than the H37Ra control because it needed to be reliably positive when testing samples with the less sensitive M. bovis specific primer probe sets. Since most PCR runs had greater than 5 negative and H37Ra controls, within plate and day to day precision can be monitored over time. While that data is not shown, Table 3 shows the mean $C\tau$ values and their standard deviations during post validation performance for all control samples. Interestingly, the variability between the controls was fairly consistent, but rather high (1.3 – 1.8). Several unsuccessful attempts were made to improve this variability, such as increasing or decreasing tissue concentrations and volumes. Figure 3 shows a box-and-whisker plot of the confirmed positive

(both 1081-3 and L3), the false positive samples and the spiked controls. Nearly all of the false positive samples had higher $C\tau$ values than the controls, and the controls generally had higher $C\tau$ values than positive samples. This assisted in predicting the false positive samples.

The apparent reduction in specificity from the side by side testing (3/1739) to the post validation testing (49/6124), suggests laboratory cross contamination, especially since the vast majority were not confirmed when re-tested.[22] This is not unexpected with an open DNA isolation and purification system containing a large number of positive controls that challenge the system. Potential improvements to reduce this risk would depend on the cause of the contamination. If contamination is due to within plate cross contamination, centrifugation of spin plates could be replaced with a vacuum apparatus, and manual pipetting could be replaced by a liquid handling system. If contamination is due to amplicons or carryover from previous runs, strict work flow guidelines and environmental controls must be evaluated and potentially altered.[23,24] Parallel testing with histopathology has prevented this false positive rate from negatively impacting the program, however, it is critical to keep cross contamination at a minimum.

Performance of Assay with Samples from Positive Herds:

While the goal of the PCR was to replace mycobacterial culture screening for routine slaughter surveillance, State and Federal animal health officials also request its use during the surveillance of bTB affected herds to assist with ante mortem test evaluation (Supplemental file 5). This was an opportunity to conduct a more robust analysis of sensitivity. Of the 341 samples tested in parallel, one was eliminated due to inhibition, 307 were confirmed positive and 33 negative by histology or culture. PCR detected 297 of the 307 using the 1081-3 primer-probe set for a sensitivity of 0.97 (95% CI: 0.94, 0.99) (Table 2E). During follow-up testing for M. bovis, the L3 primer-probe set correctly identified 289 of the 303 positive samples tested for a sensitivity of 0.95 (95% CI: 0.92, 0.97) (Table 2F). The 97% sensitivity of the assay in cattle from known infected herds was similar to the initial sensitivity estimate of 0.96 (95% CI: 0.89, 0.99) using archived samples.

Interestingly, testing tissue samples from affected herds (both archived and diagnostic cases) had a higher rate of false negatives than routine slaughter-surveillance, of which there were no apparent misses. This most likely was caused by sampling. For routine slaughter surveillance, granulomas must be developed well enough to be identified during the inspection process. In contrast, animals from infected herds go through an enhanced inspection process and often the slightest abnormality is submitted for testing. During culture, up to 50 g of tissue was processed and concentrated verses a 300 mg portion used in the direct PCR. This puts tissues in the early stages of granuloma formation with very few bacteria more susceptible for false negative results.

Conclusion:

This paper describes the validation and implementation of direct PCR in the USDA bTB slaughter surveillance program. This assay has allowed the

USDA to efficiently test all samples submitted in parallel with histopathology, improving accuracy by reducing laboratory error. Limitations of the PCR assay include the need for highly trained staff, strict workflow procedures, environmental controls to prevent cross contamination, and the small sample volume requiring careful dissections of visible lesions. Despite these limitations, the assay appears to be highly sensitive and specific. During the year of post validation slaughter surveillance testing, no histologic positive samples were missed by the PCR, and 2 additional cases were detected preventing erroneous results from being released.

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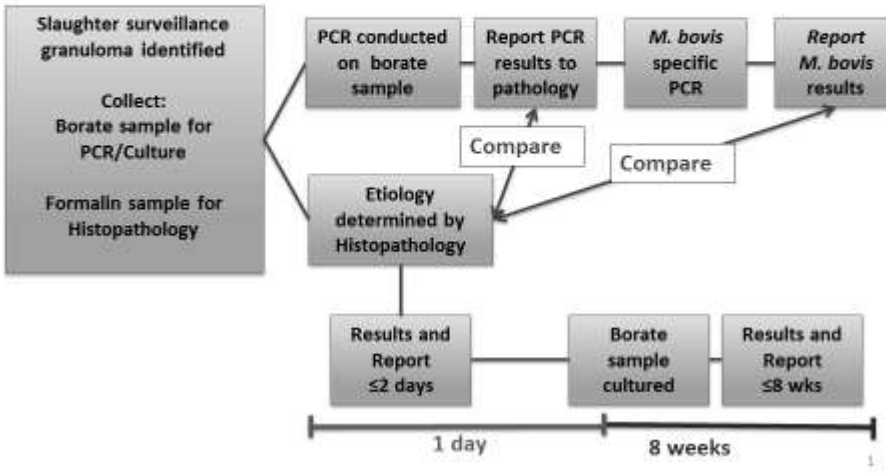

Figure 1. Work flow after implementation of a direct PCR used in parallel with histopathology. Direct PCR is initially performed using 1081-3 a primer-probe set specific to the MTBC. If positive, an M. bovis specific PCR is conducted.

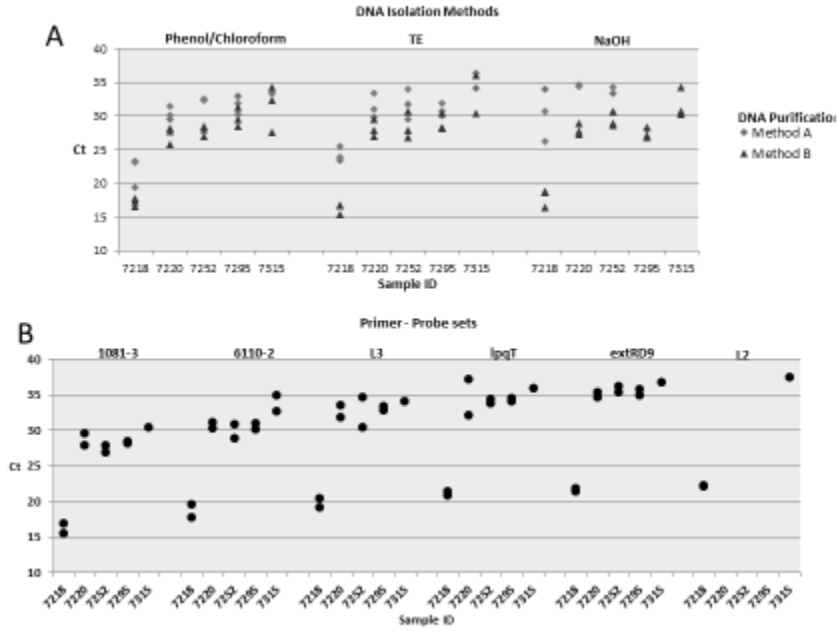

Figure 2: Graphical Displays of Ct values comparing extraction methods and primer-probe sets. A: Comparison of purification methods based on DNA isolation technique. Five samples were subsampled three times and extracted by phenol/chloroform, TE, or NaOH; aqueous extracts were further purified by either Method A or Method B; eluants were analyzed by PCR using the 1081-3 primer-probe set. B: Evaluation of the performance of selected primer-probe sets based on DNA isolation method 3 and purification method B (negative results not displayed).

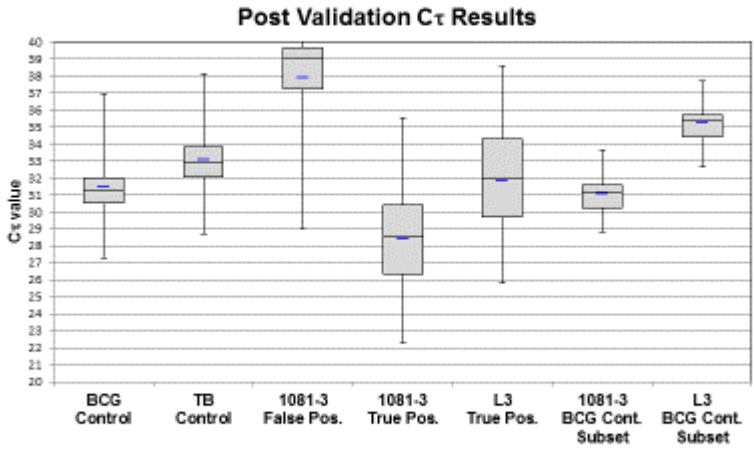

Figure 3: Box whisker plot of Ct results during 1 year post validation. The first two plots shows all BCG and the H37Ra (TB) control results using 1081-3. The next two plots show the false positive and histology and culture confirmed bTB cases using 1081-3. The last three plots contain the subset of confirmed bTB samples using L-3 and the corresponding controls.

Table 1: Testing primer-probe sets against Mycobacteria species DNA. A: Cycle threshold results from each primer-probe set against DNA extractions from selected Mycobacterium species. B: Cycle threshold results from selected primer-probe sets targeting IS1081 and IS6110 elements against serial dilutions of M. fortuitum genomic DNA as compared to 100 pg BCG genomic DNA.

A

Isolate	ATCC ID	1081_1	1081_2	1081_3	6110_1	6110_2	lpqT	L2	L3	extRD3
BCG	35734	23.59	23.25	22.24	26.33	23.97	27.4	28.6	2.3	25.58
H37Ra	25177	14.62	14.3	14.4	12.87	11.97	U	U	U	17.65
M. microti	11152	15.63	14.81	15.26	13.87	12.97	U	U	U	18.39
M. africanum	25420	14.996	14.29	14.65	14.75	13.83	U	U	U	17.98
M. kansasii	12478	U	U	U	U	U	U	U	U	U
M. avium subsp. *avium*	25291	U	U	U	U	U	U	U	U	U
M. avium subsp. *paratuberculosis*	19698	U	U	U	U	U	U	U	U	U
M. fortuitum	6841	33.68	35.005	33.35	33.16	31.41	U	U	U	U
M. terrae	15755	U	U	U	U	U	U	U	U	U

B

Isolate	1081-1	1081-3	6110-1	6110-2
100pg BCG	19.75	19.52	21.89	21.13
100ng *M. fortuitum*	37.6	34.87	33.6	32.78
10ng *M. fortuitum*	36.39	36.98	34.56	33.95
1ng *M. fortuitum*	36.84	U	U	U
100pg *M. fortuitum*	U	U	U	U

Table 2: Summary of PCR results using histology and/or culture as the gold standard. A: Eighty known bTB positive archived tissues were tested with the 1081-3 primer-probe set, and B: were tested with the L3 primer-probe set of which 5 were inhibited and removed. C: Routine slaughter-surveillance samples were tested side by side with the PCR assay to primarly evaluate specificity. D: Apparent post validation performance using PCR and histology. E: PCR testing was performed on samples from herds known to be infected with *M. bovis* using the 1081-3 primer-probe set and F: the L3 primer-probe set. Five samples were not tested with the L3 primer-probe set.

PCR Primer-probe	Sample	Mean ($C\tau$)	Standard deviation
DEC670	Negative Control	34.2	1.8
	H37Ra Control	34.1	1.6
	BCG Control	34.3	1.7
1081-3	H37Ra Control	32.5	1.3
1081-3	BCG Control	31.3	1.6

A Archived Tissues Tested With 1081-3

PCR	bTB Positive	bTB Negative	
Positive	74	0	74
Negative	3	3	6
	77	3	80

B Archived Tissues Tested With L3

PCR	bTB Positive	bTB Negative	
Positive	65	0	65
Negative	8	2	10
	73	2	75

C Side-by-side testing

PCR	bTB Positive	bTB Negative	
Positive	3	3	6
Negative	0	1736	1736
	3	1739	1742

D Performance of PCR Assay During Routine Surveillance

PCR	bTB Positive	bTB Negative	
Positive	38	47	85
Negative	0	6077	6077
	38	6124	6162

E

Performance of 1081-3, Known Infected Herds

PCR	bTB Positive	bTB Negative	
Positive	297	1	298
Negative	9	32	41
	306	33	339

F

Performance of L3, Known Infected Herds

PCR	bTB Positive	bTB Negative	
Positive	289	0	289
Negative	14	31	45
	303	31	334

Table 3: Means and standard deviations of controls during the 54 weeks of post validation slaughter surveillance.

DEC670	Negative Control	34.2	1.8
	H37Ra Control	34.1	1.6
	BCG Control	34.3	1.7
1081-3	H37Ra Control	32.5	1.3
1081-3	BCG Control	31.3	1.6

REPORTS AND PRESENTATIONS

Report from the US-Mexico Bi-National Committee for the Eradication of Bovine Tuberculosis and Brucellosis

Chuck Massengill, **US-Mexico Bi-National Committee** Coordinator

The US-Mexico Bi-National Committee (BNC) for the Eradication of Bovine Tuberculosis and Brucellosis was formed in 1993 based on a recommendation by USAHA. The BNC has responsibility to provide oversight on the eradication programs in each country and to provide recommendations for the minimum requirements for the exportation of cattle from Mexico to the United States. Each nation is equally represented with voting members. The BNC meets during the National Cattlemen's Beef Association (NCBA) and National Confederation of Livestock Unions (CNOG) annual meetings. Topics include: surveillance programs, disease traceability, eradication program progress, research programs, region reviews, inter-state and inter-region movement control, legal and regulatory adequacy, and ongoing training. The voting members bring consensus items to the two federal agencies for discussion and clarification. This group has been very successful in promoting cooperation and information exchange between the respective border states, the industry and the federal agencies involved. There has been a remarkable reduction in the number of bovine tuberculosis cases discovered at slaughter in the US since the BNC came into existence. The next meeting will be in conjunction to the NCBA annual meeting in San Diego, California in January 2016. Participation by State Animal Health Officials (SAHO) is welcomed and encouraged by the BNC.

Annual Update for the State and Federal Cooperative Bovine Tuberculosis (TB) Eradication Program FISCAL YEAR (FY) 2015

Mark Schoenbaum, USDA-APHIS-VS

Development of Proposed Brucellosis/TB Regulations

APHIS completed new regulations and supporting standards for the brucellosis and TB programs in FY2012. Under the proposed approach, The Code of Federal Regulations (CFR) will provide the regulatory authority for the programs while the details of the programs will be described in a program standards document. These new regulations and supporting standards were under departmental review during FY2014-15. APHIS is hopeful that Proposed Rule and Program Standards will be published in 2015. Upon publication, APHIS plans to provide an extended comment period of 90 days.

Bovine State Status

As of September 30, 2015, 48 States, two Territories (Puerto Rico and the US Virgin Islands), and one zone (Michigan) were tuberculosis (TB) accredited-free. California has modified accredited advanced (MAA) status. The MAA zone of Michigan was advanced to accredited-free status on September 10, 2014. With this advancement, Michigan has an accredited-free and a modified accredited (MA) zone.

Captive Cervid State Status

All States and territories have MA status.

TB Program Reviews

The Michigan TB program was reviewed in FY2015.

TB-Affected Herds Identified in FY2015

Five TB-affected cattle herds, including three Texas dairies, and a dairy and a small cattle herd in the MA zone of Michigan were identified during FY2015. One Texas dairy and both Michigan herds will be depopulated with Federal indemnity. Two Texas dairies are under a test-and-remove management plan. Two captive cervid herds in the Michigan MA zone remain under quarantine.

National TB Surveillance

Granuloma Submissions:

For FY2015, 6,177 granulomas from 163 federally inspected establishments were identified during postmortem slaughter inspection and submitted for diagnostic testing. In addition, 155 granulomas were submitted from 19 state inspected establishments for a total of 6,340 granuloma submissions. Overall, 2.2 granulomas were submitted per 2,000 adult cattle (culled dairy and beef cows and bulls) slaughtered, a decrease for the second consecutive year. The granuloma submission rate was 2.6 in FY2014. TB slaughter surveillance during FY 2014 and 2015 have experienced the lowest submission rates since 2006. During FY 2006-13, the submission rate ranged from 2.9-3.5 per 2,000 culled adult cattle slaughtered. The minimum standard for slaughter surveillance is one granuloma submitted per 2,000 adult cattle slaughtered annually. Only 31 of the 40 highest volume adult cattle slaughter establishments met or exceeded the submission standard in FY2015, compared to 37 in FY2014. These 40 highest volume establishments slaughter approximately 95 percent of adult cattle processed with federal inspection in the United States.

Slaughter Cases:

During FY2015, a total of 12 granuloma submissions had histology compatible with mycobacteriosis, out of 6,340 granuloma submissions (0.2 percent). Of these, TB was confirmed in ten (83.3 percent) cases. TB is confirmed by polymerase chain reaction (PCR) testing of formalin-fixed and direct PCR and culture of fresh tissue. Of the remaining two cases, other *Mycobacterium* species were identified for one case and one case could not be cultured because only formalin fixed tissue was submitted.

One of the ten confirmed cases occurred in an adult dairy cow over two years of age, and nine cases occurred in feeder cattle. The adult case led to the identification of two infected dairies in Texas. Of the ten fed cattle cases, three occurred in Mexican-origin cattle and six were in domestic origin Holstein steers. Traceback of the Holstein steers led to the identification of the third

Texas affected dairy, which is a complex of two dairies and a heifer raiser/feedlot. This is the first time in many years that infected feeder cattle, rather than culled adult cattle, led to the identification of an infected herd. All ten cases were detected at Texas slaughter establishments.

The source of infection for the three Texas dairies is under investigation; however, the source of infection is often not identified for TB. Whole genome sequencing results indicate that the most closely related isolates for the first two dairies are a 2004 Texas and 2007 New Mexico affected dairies, while a 1997 *M. bovis* isolate from Mexico is the most closely related isolate to the isolate from the third Texas dairy.

Mexican-Origin Slaughter Cases:

A total of three TB-infected animals identified through slaughter surveillance were determined to be of Mexican-origin. The official Mexican ear tags collected at slaughter indicated origin from the State of Nuevo Leon (one case). Two cases were from Mexico, though the state of origin could not be determined.

Animal Identification (ID) Collection for Slaughter Cases:

As a result of USAHA Resolution 29 (2013), the National Veterinary Services Laboratories (NVSL) developed a process to record information regarding the presence or absence of official animal ID on animals sampled for TB slaughter surveillance beginning in April 2014. During April 1, 2015 thru September 30, 2015, 3,985 of 7,578 (52.6 percent) submissions had official animal identification collected at the time of slaughter, 1,874 submissions (24.7 percent) had unofficial identification and 1,719 (22.7 percent) had no identification collected.

Live Animal Testing, Cattle:

Tuberculin skin testing in live animals is another component of national TB surveillance in cattle and bison. During October 1, 2014 through August 31, 2015, a total of 557,395 caudal fold tuberculin (CFT) skin tests of cattle and bison were reported, with 7,868 responders (1.4 percent, 46 states and one Territory reporting, data not available for four states). During FY2014, 659,080 CFT tests of cattle and bison were reported, with 8,660 responders (1.3 percent, 50 States and 1 Territory reporting).

The gamma interferon test has been approved for use in cattle only as an official supplemental test in the TB program since 2003. Laboratories in seven States (California, Colorado, Michigan, Nevada, Pennsylvania, Texas, and Washington) and the NVSL in Iowa are approved to conduct gamma interferon testing. These laboratories completed approximately 8,000 tests for cattle residing in 20 states during FY2015 (data incomplete for some laboratories).

Live Animal Testing, Cervids:

Information for tuberculin skin testing in captive cervids for FY2014-15 is not available at the time of this report.

The CervidTB Stat-Pak® and Dual Path Platform® (DPP) tests were approved for program use in elk, red deer, white-tailed deer, fallow deer, and reindeer. Official program testing began on February 2013. During FY2015, a total of 15,486 cervid serological TB tests were completed. These samples

were submitted from 12,735 white-tailed deer (82.2 percent), 2,275 elk (14.7 percent), 294 fallow deer (1.9 percent), 63 red deer (0.4 percent), and 119 reindeer (0.8 percent). Thirty-four animals with positive DPP test results were necropsied in FY2015. Of these, laboratory tests and culture for *M. bovis* have been negative for 30 animals and are pending for four animals.

Statistical analysis was performed on DPP test performance for tests administered during FY2013-15. The specificity of the first DPP test is 99.6 percent. The specificity after the second DPP test is 99.86 percent. Raising the DPP test cutoff would decrease sensitivity, while having very little effect on improving specificity; therefore, the DPP cutoff values will not be changed in FY2016.

Collaborations with Mexico:

In FY2015, APHIS teams conducted reviews in Chihuahua, Coahuila, Durango, Sinaloa, and the Yucatan region consisting of Campeche, Quintana Roo, and Yucatan. APHIS and International Services staff assisted Secretary of Agriculture, Ranching, Rural Development, Fisheries and Food Supply (SAGARPA) in conducting pre-certification reviews in Baja California and Baja California Sur.

TB Serum Bank:

APHIS continues to obtain well-characterized serum samples for both uninfected and infected animals. The serum bank contains 5,340 serum samples from cattle, of which 524 are from TB-infected animals, and 3,737 samples from cervids, of which 92 are from confirmed TB-infected animals. Serum bank samples continue to be available to researchers and diagnostic companies for serologic test development. States are encouraged to submit blood and tissue samples from potentially infected cattle and captive cervids, as well as blood samples from presumably uninfected cattle and cervid species from accredited-free States during FY 2015.

IDEXX ® *M. bovis* Antibody Test Kit:

The IDEXX ® *M. bovis* Antibody Test Kit was approved for official TB program use in TB-affected cattle herds in FY2013. Guidance for the use of the test can be found in VS Guidance 6702.1 - The IDEXX Antibody (Ab) Test Serological Test for Diagnosing Bovine Tuberculosis (TB) in TB-Affected Cattle Herds. The serology test continues to be evaluated in affected herds, to determine if its use in conjunction with skin testing will reduce the risk of not detecting truly infected animals that are skin test negative. The test was used in TB affected herds in FY2015, as part of the test and remove herd management plan.

Selected State Updates

Michigan:

Two new affected herds were identified in FY2015, including a dairy herd and a small beef herd located in the MA zone. Both herds were detected through annual herd testing. Three of nine total cattle in the beef herd had gross lesions and were confirmed infected with *M. bovis*. In addition, tissues from a goat in the same herd were compatible for mycobacteriosis and culture

was positive for *M. bovis*. This is the first detection of *M. bovis* in a domestic goat since 1991. The affected dairy in the MA zone has an estimated within herd prevalence of nearly 10 percent. This herd will be depopulated, but completing the depopulating was delayed due to funding limitations and will be completed in early FY 2016. Two affected captive cervid herds that were detected in FY2009 remain under quarantine in the MA zone.

Texas:

Three infected dairies were identified in FY2015. The first dairy was quarantined in October 2014 and was detected through slaughter surveillance. The estimated prevalence of TB based on gross lesions found was 5.9%, based on necropsy results of reactors from the second whole herd test. This dairy will be depopulated in early FY2016. The second dairy was also quarantined in October 2014 and is under the same ownership as the first dairy, but is located on a geographically separate premises and had only three confirmed *M. bovis* infected cattle. This second dairy was managed by testing and will receive its quarantine release test in December 2015.

The third dairy identified as affected in Texas was quarantined in April 2015. This operation consists of three premises including two dairies and a heifer raiser/feedlot that were tested after TB was confirmed in six TB infected Holstein steers that traced back to the feedlot. The infected steers were detected by slaughter surveillance during December 2014 and January, April, and May 2015. Test and remove herd management is being used for these premises.

Gamma Interferon Testing Issue

In the course of tuberculosis testing the first Texas dairy quarantined in FY2015, relatively lower sensitivity of the US gamma interferon assay (34% and 28%) for lesions of tuberculosis was noted on the first two herd tests. As a result of extensive investigation and study over several months with collaboration of the Cattle Health Center, National Veterinary Services Laboratories (NVSL) , and gamma interferon testing laboratories in Texas, Michigan, and California, a problem with lower activity of one of the lots of stimulating tuberculin in the gamma interferon assay was discovered. A notice from Veterinary Services (VS) revoked the official status of tests conducted with this particular lot after July 31, 2015. The notice described procedures to replace this testing with either the comparative cervical test or a gamma interferon assay that included a Rest of world (ROW) (Lelystad) tuberculin for stimulation. All laboratories were verified as conducting gamma interferon assays with the ROW tuberculin by August 9, 2015.

Presentation of the National Campaign Against Bovine Tuberculosis in Mexico

The Federal budget to operate the National Campaign against bovine tuberculosis in Mexico, in 2002 was $44, or 664,469.76 Mexican pesos, in 2015 Federal resources are $234, or 313,564.00 Mexican pesos, and this

represents over these years an increase of 500%, with a positive impact in the operation of the Campaign.

The precedents of the Campaign in Mexico began 1910, when the Directorate General of Agriculture created the animal health program against bovine tuberculosis. Then, the National program against bovine tuberculosis was created in 1972. The next important date was when the first Law on Animal and Plant Health was published (1974), and by the year 1992, the skin diagnostics tests began in the states of Sonora and Chihuahua, and it was initiated the TB free herds Program in the northern border states; in 1993 was created the Mexico-United States Binational Committee for the eradication of bovine tuberculosis, and in 1996 was published in the Official Gazette, the NOM-031-ZOO-1995, National Campaign against Bovine Tuberculosis (*Mycobacterium bovis*). By 2000 there were already ten states in Phase II and nine States in Phase I, and initiate the process of recognition of zones by waiver; in 2007 the Memorandum 552.41 Guide for Tuberculosis (TB) reviews for in Mexico is published; in 2008 an agreement was reached to have a Strategic Plan against bovine tuberculosis, by 2012 83% of the national territory under eradication is achieved, and in 2013 a second US-Mexico Strategic Plan for 2013-2018 was developed; in 2015 the regional review process began with the Yucatan Peninsula, which it consolidates successfully to be recognized by APHIS on Modified Accredited status. In May of this year, the Official Gazette NOM-001-SAG / GAN-2015 National System of Animal Identification for cattle and beehives was published, which is expected to consolidate the identification and traceability systems. In addition, in June the protocol for approved feedlots was modified, improving the criteria for monitoring and authorization.

Besides National regulation there are International Agreements between Mexico and United States (SENASICA – APHIS) as Memoranda, Protocols, and the Strategic Plan.

There are two methods of supervision: documentary (tests, charts, epidemiological investigations, reports) and on site (cattle association, slaughterhouses, feedlots).

The performance indicators of the campaign are measured on a quarterly basis, June 2015 are as follows: National prevalence is 0.09%, to 253.959 herds with 1,385 infected herds (definitive quarantines) and 3,282 preventive quarantine; in the first half of 2015, 3,968 samples have been sent to different laboratories at the national level with an average of three days for the sample arrival the laboratory and six days for the issuance of histopathology results and 36 days for bacteriology, it is 95.7% inspection on the slaughter plants, with a rate of 2.37 submission rate of samples for every 2,000 animals inspected. There are 3,996 TB free herds, 234 certified free herds and 62 approved feedlots. From January to June 7,050,827 animals have been tested and from this, 62,456 were responders to the tuberculin skin test with a response percentage of 0.89% of the animals.

Because of its economic importance to the country, exports of calves are a relevant factor for the livestock sector in the north, from 1993 to 2015 have

been exported around 22.3 million head, in the last cycle 2014 to 2015, 955,896 heads were exported by the different border ports located in Sonora, Chihuahua, Coahuila, Nuevo Leon and Tamaulipas, there were only one case reported by APHIS, which represents a rate of 0.11 cases per 100,000 animals exported.

The National System for Individual Identification of Livestock (SINIIGA) allows to set the basis for improving, strengthening and linking other information systems related to cattle, through the allocation of a single, permanent and unique numbering throughout the animal's life to form a central data bank: Establish permanent individual identification of cattle in Mexico and form a dynamic database, to guide comprehensive actions that lead to raising the standards of traceability and competitiveness of Mexican livestock.

At this date it has 96% advance in the identification of cattle in the country, and it has an electronic system that allows the use of the database of identification to establish a reliable traceability by issuing mobilization guidelines with data of origin and the destination, watching the entire production chain (farm, gathering, feedlot, slaughterhouse); the system is known as Electronic Registration Mobilization (REEMO) and is currently operating in ten states and is projected to increase coverage in ten more in the rest of this year.

Due to the change in the regulation of the United States of America, the recognition of areas of low prevalence of bovine tuberculosis includes a new regionalization. During March 2015 the first regional review (Yucatan, Campeche and Quintana Roo) was performed. At this date, exists the proposal of 12 regions, one in Level I, seven in Level II and four in Level III.

It has agreed protocols with APHIS: approved feedlots which allow the mobilization of cattle from non-accredited regions to accredited regions for fattening accredited under control measures; Free Herd Certificates in which the requirements for the mobilization of cattle from non-accredited regions to accredited regions in order to improve livestock. Now 234 Herds reach this certification.

Some important challenges and issues of the Campaign are:

- Complete the National Animal Identification System (NAIS) to form a national traceability system that gives certainty in determining the origin of livestock for animal disease eradication program and security exports.
- Reduce underreported cases of TB in respect of bad field trials conducted by private veterinarians.
- Increase the percentage of successful tracing and epidemiological investigation of cases and suspicions.
- Advance in "not accredited" zones and in control.
- Increase surveillance of TB in municipal slaughterhouses and implementation of epidemiological surveillance of TB in wildlife.

- Finish research projects for the use of vaccines against TB in dairy herds and genetic characterization and distribution in Mexico strains of *Mycobacterium bovis*.

On the other hand there are prospects:

- Strategic Plan 2012-2018, in which all regions of beef cattle dual purpose cattle have a prevalence lower of 0.5% and dairy cattle less than 5%, based on a national system for identification and traceability.
- Updating the regulations, implementation of new technologies in research and diagnostics, maintenance of our exports and reduce risks to public health.
- Operating a TB control program in specialized dairy cattle through the use of the vaccine against bovine TB in herds of high and low prevalence, under the scheme of infected herd (2018).
- Complete the genetic characterization of *Mycobacterium bovis* endemic strains.
- Increase surveillance of TB in municipal slaughterhouses and implement epidemiological surveillance in wildlife.
- Increase the percentage of successful tracing and epidemiological investigations.

Texas Bovine Tuberculosis Report

Andy Schwartz
Texas Animal Health Commission

In fiscal year 2015, slaughter inspection in Texas disclosed two cases of TB in separate lots of feeder animals imported from Mexico, and seven cases of TB in dairy animals that initiated two separate dairy complex investigations.

2014 Dairy Complex:

Investigation of a lesioned cow at slaughter in October 2014 led to the quarantine of two large dairies and an associated feed/grower yard under the same owner.

Dairy #1 consisted of approximately 10,300 head, including associated heifers in the feed yard. All caudal fold tuberculin (CFT) responders were removed on a series of herd tests. TB has been confirmed in 300+ animals on this dairy and in the grower yard. Stochastic modeling by USDA indicated 19 or more removal tests would be needed to release this herd. Federal indemnity funds were requested early this year and made available in recent weeks. The appraisal process is currently underway. Once the numbers are agreed upon, the herd will be depopulated.

Dairy #2 consisted of approximately 12,000 head. Only one TB affected animal has been found on this dairy (November 2014), a heifer that had fairly recently moved from Dairy #1. Stochastic modeling by USDA indicated four removal tests would be needed for release of this herd. The fourth test was conducted in June 2015. An assurance test is scheduled for December 2015.

All replacement animals sold from these two dairies have been traced, including those going out of state. Tracing efforts continue on culled animals sold 3-5 years prior to the disclosure of TB. Culls in the past two years went directly to slaughter.

One additional feed yard under outside ownership remains under hold order until all exposed steers are fed out.

The genetic sequence of isolates from this herd do not match other outbreaks in the US, and the source of infection in the complex has not been identified.

2015 Dairy Complex:

Over a several month period earlier this year, six Holstein steers with lesions at slaughter were confirmed with TB. Subsequent investigation and testing led to the disclosure of two affected dairies (Dairy #3 and Dairy #4) and an associated feed/grower yard, all under the same owner (but different from the 2014 Dairy Complex). The first positive steer was from the same outside feed yard mentioned in the 2014 investigation. It was in a consignment with steers from ten dairies, including animals from dairy #1 discussed above. Some of the subsequent positive steers had ID's that traced to Dairy #3. On initial whole herd tests, TB was not found in dairy #3 but was confirmed in one cow in dairy #4. Due to delays in the indemnity process and negotiations over indemnity amounts, TB was not confirmed in this cow until after the herd was tested a second time. Subsequent testing in Dairy #3 and Dairy #4 identified

two histo-compatible cows and one histo-compatible cow, respectively. Cultures are pending. Tuberculosis was confirmed in 16 heifers in the feed yard on the initial test.

Genetic sequencing to date indicates all isolates in this operation are closely related to each other, but are not related to isolates from the 2014 Dairy Complex investigation. Again, there is no match with other outbreaks in the US. This same sequencing information indicates TB may have been introduced into the grower yard through purchased additions, then spread to the dairies. Trace-in investigation is being conducted.

Replacement heifers sold from the affected grower yard have gone to Texas dairies and to five other states. These states have been notified. Sales records of culls through traders and livestock markets in Texas and New Mexico are being compiled, which will lead to the identification of additional trace animals.

REPORT OF THE COMMITTEE ON WILDLIFE DISEASES

Chair: Colin Gillin, OR
Vice Chair: Peregrine Wolff, NV

Gary Anderson, KS; Paul Anderson, MN; Karen Beck, NC; Scott Bender, AZ; Warren Bluntzer, TX; Tom Bragg, NE; Rhonda Brakke, IA; Dwight Bruno, NY; Beth Carlson, ND; Matt Cochran, TX; Walter Cook, TX; Joseph Corn, GA; Susan Culp, TX; Thomas DeLiberto, CO; Barbara Determan, IA; Mark Drew, ID; James Evermann, WA; Anna Claire Fagre, CO; John Fischer, GA; Richard French, NH; Francis Galey, WY; Tam Garland, TX; Donna Gatewood, IA; Robert Gerlach, AK; Paul Gibbs, FL; Linda Glaser, MN; Paul Grosdidier, KS; Greg Hawkins, TX; Kristi Henderson, IL; Terry Hensley, TX; Linda Hickam, MO; Robert Hilsenroth, FL; Donald Hoenig, ME; Dennis Hughes, NE; David Hunter, MT; Susan Keller, ND; Diane Kitchen, FL; Patrice Klein, MD; Todd Landt, IA; T.R. Lansford, TX; Charles Lewis, IA; Tsang Long Lin, IN; Jim Logan, WY; Linda Logan, TX; Travis Lowe, MN; Mark Luedtke, MN; Margie Lyness, GA; David Marshall, NC; Chuck Massengill, MO; Daniel Mead, GA; Robert Meyer, CO; Myrna Miller, WY; Eric Mohlman, NE; Yvonne Nadler, IL; Julie Napier, NE; Cheryl Nelson, KY; Mitchell Palmer, IA; William Parker, GA; William Pittenger, MO; Jewell Plumley, WV; Kate Purple, TN; Jennifer Ramsey, MT; Jack Rhyan, CO; Justin Roach, OK; Jonathan Roberts, LA; Shawn Schafer, OH; David Schmitt, IA; Dennis Schmitt, MO; Brant Schumaker, WY; Marc Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Daryl Simon, MN; Jonathan Sleeman, WI; Robert Temple, OH; Lee Ann Thomas, MD; Brad Thurston, IN; Curt Waldvogel, OH; Michele Walsh, ME; Skip West, OK; Ellen Wiedner, FL; Margaret Wild, CO; Richard Willer, HI; Michelle Willette, MN; Ellen Mary Wilson, NM; William Wilson, KS; David Winters, TX; Richard Winters, Jr., TX; Cindy Wolf, MN; Mary Wood, WY; Marty Zaluski, MT; Glen Zebarth, MN.

The Committee met on October 25, 2015 at the Rhode Island Convention Center in Providence, Rhode Island from 12:30 to 5:00p.m. There were 43 members and 59 guests present. The Chair welcomed everyone and reviewed house-keeping items. He also discussed the process of submitting recommendations and resolutions and asked for any new business, of which, there was none forwarded. There were no resolutions from this committee from 2014, but one proposed resolution submitted by a committee member for 2015. This resolution was emailed to the listed membership ten days prior to the committee meeting for review.

Presentations and Reports

There were 12 presentations focused on the interface between wildlife and livestock health. These talks were given by state, federal, and university presenters from management and research disciplines. Topics included case descriptions of emerging diseases, disease spillover between livestock and wildlife, cutting edge technologies, presentations of federal regulatory

programs, and discussions of epidemiological trace-outs of complex disease cases and outbreaks.

The first presentation given was by the USAHA Student Travel Scholarship award winner, Ms. Allison Keggan, a veterinary student attending Cornell University School of Veterinary Medicine. This travel scholarship is given to students of allied organizations through a competitive selection. The American Association of Wildlife Veterinarians (AAWV) was asked to canvas their membership for students interested in the attending USAHA and the current issues of wildlife disease related to the livestock and agriculture. Ms. Keggan discussed her background and research titled **Investigation of Trypanosome Vectors in the Home Range of Javan Rhinos in Ujung Kulon National Park, Indonesia**.

Highly Pathogenic Avian Influenza: Biosecurity and Surveillance - A Management Perspective

Colin Gillin, Brandon Reishus, Julia Burco, Oregon Department of Fish and Wildlife

Policy, politics and the public's are major drivers in wildlife disease; how wildlife management agencies respond; what diseases they focus on and expend and commit resources towards. Avian influenza is a good example. Highly pathogenic avian influenza (HPAI) may be considered by many to be merely a problem of the domestic poultry industry. However, it moves and is transmitted through wildlife species that serve as reservoirs. Through wild reservoir species distribution, movements, proximity and interactions with domestic animals and humans, HPAI shows us that it is as important an issue due to wildlife's connection to the disease as the disease ever has been in poultry. These reservoir species are known to wildlife managers and the public as common and plentiful. They are the managed waterfowl including at the forefront the dabbling ducks, but also potentially all wetland bird species that share wetland habitats with waterfowl. Other important considerations in the HPAI response include the multitude of stakeholders, constituents, and all humans that may interact directly or indirectly with wild and domestic avian species from hunters to the poultry consumer to any animal or human that may contract illness from an influenza. HPAI and the very concepts and drivers of disease and their components show that wildlife management can be more about managing people and their poultry property than about managing wildlife directly. We are also reminded as managers that wildlife-related loss or damage to property and domestic animals associated with predation, crop loss, or disease like HPAI, is an issue involving management and wildlife policy.

In this presentation, the migratory bird flyways were discussed. A flyway is a geographic area where groups of migratory birds generally confine their movements between seasonal habitats. We examined the concept of the globe basically being one large over-lapping flyway extending North-South and also in an overlapping East-West direction. It is important from an animal and disease movement standpoint to understand how and why they are used by

waterbirds. In North America as in many places of the world, it is interesting that even non-adjacent flyways overlap in areas such as the Atlantic and Pacific flyways in their northern reaches. These animal and disease connections occur worldwide.

We looked at how the Eurasian H5N8 subtype was circulating in Korea in early 2014. This virus type occurred in the East Asian Flyway which covers about half of Eastern Siberia. It also overlaps with most if not all Eurasian Flyways and the Pacific flyway on the northern breeding grounds. One assumption of this outbreak was that infected birds migrated north from Korea/Japan. Then on Summer staging areas in Eastern Siberia they mixed with birds from all over Eurasia and North America. Newly infected flocks migrated then down their respective flyways including south in western Canada to Washington, Oregon, and California. By November 2014, the stage was set for the present North American outbreak. Detections were also seen simultaneously in England, Netherlands, and Germany.

Many of the carriers and reservoir waterfowl species are known. However, shorebirds and seabirds also share these habitats with infected waterfowl. And many of these species can carry disease extreme distances in short time periods (i.e. bar-tailed godwits c.6,000 km flight to Alaska in four and a half days).

Some Basic Principles of Current Outbreak: This virus causes no significant pathology in waterfowl or reservoir species. However, it does cause significant disease and is a threat to domestic poultry and is not currently a significant risk to wild or domestic mammals or humans.

So what are the issues in Wildlife? There are wildlife species at risk. We've seen some pathology and mortality to some raptor species consuming infected reservoir hosts and exposed Canada geese have indicated neurological pathology, so there is precedent for concern. There are industries and communities affected. Falconry has seen the greatest risk and mortality in the western US. Zoological collections are always a consideration although most generally have adequate biosecurity but are also magnets for wild birds. Gamebird farms and competitive gamebird dog trials are a constituency of wildlife management and requires reaching out and communicating and educating. Again, biosecurity is a major preventative measure. Wildlife rehabilitation is a major concern in HPAI outbreaks. Most state wildlife management agencies regulate and many interact closely with this community of important stakeholders. Rehabbers have the ability to provide tremendous community outreach – they are also high on the risk scale for having a HPAI bird in their possession. And then people that interact directly and indirectly with wild birds – hunters, agency personnel (duck banders) researchers, and the public, all are at some level of risk. HPAI can change from a poultry disease to a human health crisis in short order.

With this in mind, it is important to remember viruses change and evolve. This can increase virus virulence or make reservoir species become morbidity and mortality cases. A change in the virus from a seemingly innocuous poultry virus can suddenly affect mammal and other very mobile bird species. And

most importantly humans can become morbidity case. How viruses change and evolve is complex and unraveling how this occurs will take funding and time.

HPAI in Wild Birds and Plans for Future Surveillance – A report from the Interagency HPAI Steering Committee

Tom DeLiberto, USDA-APHIS, Wildlife Services (WS), National Wildlife Research Center (NWRC)

A novel H5 clade 2.3.4.4 highly pathogenic avian influenza virus (HPAIV) was detected in North America in late 2014. Motivated by both the alarming spread of new H5 variant viruses in Asia and Europe as well as by the detection of HPAIV in both domestic poultry in Canada and in wild and captive birds in Washington. An intensive study was initiated to conduct HPAIV surveillance in wild birds in the Pacific Flyway of the United States, followed by additional surveys in the Central and Mississippi Flyways. Findings of HPAIV positive samples widespread in wild waterfowl suggest that some species suffer no detectable morbidity and mortality once infected, although clinical disease has been documented for some wild bird species and losses in US domestic poultry are unprecedented. In July, 2015, state and federal agencies initiated a National Surveillance effort to provide information that will improve management actions that are taken to address the multitude of issues associated with HPAIVs. This includes risks to commercial poultry, backyard poultry, game bird farms, wild birds, wild bird rehabilitation facilities, falconry birds, and captive bird collections in zoos/aviaries. Specific objectives of the plan are to: 1) identify the distribution of influenzas of interest by US flyways and through select, high priority watersheds; 2) detect spread of influenzas of interest to new areas of concern; and 3) provide a flexible surveillance framework that can be modified to monitor wild waterfowl populations for re-assortments of influenzas, introductions of new viruses, and to estimate apparent prevalence of important influenzas once detected in an area of concern.

Update of Pneumonia in Bighorn Sheep

Peregrine Wolff, Nevada Department of Wildlife

Dr. Wolff reviewed bighorn sheep health during 2015 including topics concerning bighorn sheep (BHS) pneumonia and bighorn sheep/domestic sheep interactions; collaboration with the domestic sheep industry, policy, research, and publications.

The Western Association of Fish and Wildlife Agencies Herd Health Monitoring Recommendations were presented and completed in July 2014

In September of 2013, a bighorn sheep disease sampling/health assessment workshop was conducted at the request of the Western Association of Fish and Wildlife Agencies (WAFWA), Wildlife Health Committee (WHC) to prioritize and standardize testing protocols for respiratory pathogens of bighorn sheep. Specific concerns included that numerous tests for a variety of pathogens are available but interpretation of results is

challenging, laboratories do not have standard methodology and the 2009 WAFWA WHC Sheep Sampling Guidelines required updating.

The workshop included wildlife health professionals from nine Western state wildlife agencies and two Canadian provinces. WAFWA Wild Sheep Working Group members were surveyed prior to the workshop. Funding was secured from the Wild Sheep Foundation to support attendees with travel restrictions.

The group produced documents: 1) outlining sampling protocols for various herd management goals, 2) listing important terms and their concise definitions, 3) standardizing necropsy protocols, 4) providing a concise article on herd health monitoring recommendations. Also identified were several tests/protocols requiring future research as well as topics/techniques for agency staff training to support consistent approaches to sample collection and handling. These products will support recommendations across agencies for different management practices and provide a valuable resource and reference for all wildlife health and management professionals.

A July 2015 Train the Trainer workshop was conducted by the WAFWA BHS experts and held in Fort Collins, Colorado. Instructors were from British Columbia, Colorado, Nevada, Wyoming with attendees from all western state agencies, British Columbia (BC), Northwest Territories (NWT) and National Park Service (NPS). The training reviewed sampling guidelines, anatomy, equipment, laboratory techniques, clinical signs, under the microscope and photographic techniques along with case reviews. There was also hands on live animal sampling, sample handling, and necropsy.

Disease management: Lambs recruitment can be 0% for many years (+/- 18). Lambs are born healthy but later die of pneumonia. Survivors may still carry the bacteria.

Current management questions: Why do some herds suffer little to no annual lamb mortality? Why do some herds suffer annual lamb mortality? Can we do anything about it?

Mycoplasma ovipneumoniae: New Strain Introductions. Multiple strain types of M. ovi are found in large domestic sheep flocks. However, single strain type is found in nearly all in BHS die-offs. Interestingly, domestic goats carry separate strains of M. ovi.

Recently the American Association of Wildlife Veterinarians (AAWV) and The Wildlife Society (TWS) put together a Joint Issue Statement on Domestic sheep and goats disease transmission risk to wild sheep. This is available on both the AAWV and TWS websites.

The Federal Land Management Agency Risk Assessment Analysis for 2016 Appropriations Language directs the Forest Service and BLM to 1) Complete risk analysis of allotments with risk of contact between domestic and wild sheep; 2) Identify alternative grazing allotments suitable for domestic sheep; and 3) Engage stakeholders in the analysis and encourage collaboration in finding solutions.

Concordance in Diagnostic Testing for Bacterial Respiratory Pathogens in Bighorn Sheep

William Edwards, Wyoming Game and Fish Department
Other contributing authors: Daniel Walsh, Frances Cassirer, Michael Bonds, Daniel Brown, William Edwards, Glen Weiser, Mark Drew, Robert Biggs, Karen Fox, Michael Miller, Sudarvili Shandthalingam, Subramaniam Skirumaran, and Thomas Besser

Reliable diagnostic tests are essential for wildlife disease investigation and management. Laboratory diagnostic tests for wildlife diseases are generally adopted from published methods, but frequently vary between laboratories due to the lack of standardized commercial kits. Ring and proficiency tests provide independent measures of laboratory performance in comparison with known standards or results from other participating laboratories. To evaluate the reliability of diagnostic testing for bacterial respiratory pathogens of bighorn sheep (Ovis canadensis), we conducted a series of ring tests across six diagnostic/research laboratories and three reference laboratories routinely involved in detection of Mycoplasma ovipneumoniae, Pasteurellaceae, and/or the Pasteurellaceae gene encoding leukotoxin (lktA). Consistency of results for replicate samples within laboratories was high (median agreement = 1.0). Median agreement between laboratories was high for PCR detection of M. ovipneumoniae and culture isolation of Mannheimia spp. and B. trehalosi (median agreement 0.89 – 0.95, Kappa 0.65 - 0.74), and lower for PCR detection of Mannheimia spp. lktA (median agreement 0.58, Kappa 0.12). Most errors on defined status samples were false negatives, suggesting that test sensitivity was a greater problem than specificity. However, tests for M. haemolytica and for lktA also yielded some false positive results. Despite differences in testing protocols, median agreement among laboratories and correct classification of controls for most agents was 0.80 or higher, meeting or exceeding the standard required by federal proficiency testing programs. This information is valuable for interpreting test results, for laboratory quality assessments, and for advancing diagnosis of respiratory disease in wild sheep.

Bluetongue Virus in the Pacific Northwest: a Diagnostic Perspective

Danielle D. Nelson, Washington State University, Veterinary Microbiology and Pathology
Other contributing authors: PL Wolff, KG Mansfield, DJ Johnson, DS Bradway, JF Evermann, and TV Baszler

Bluetongue virus (BTV), an orbivirus that is closely related to epizootic hemorrhagic disease virus (EHDV), has periodically caused disease outbreaks in wild and domestic ruminants in the Pacific Northwest over the last 60 years. BTV is diagnosed in tropical, subtropical, and temperate regions during the summer and late fall between approximately 50o North and 35o South. Only a few Culicoides sp. have been proven to serve as vectors for viral transmission, and in the United States, C. sonorensis and C. insignis are the vectors. BTV infection can be clinical or subclinical in ruminants, and while domestic sheep and wild deer commonly have clinical disease, disease in domestic cattle,

goats, and South American camelids is sporadic. In 2015 (through mid-October), the Washington Animal Disease Diagnostic Laboratory detected BTV nucleic acid by RT-PCR from the following animals located in Washington, Idaho, Nevada, Oregon, and California: 33 deer, 14 domestic sheep, 8 domestic cattle, 6 bighorn sheep, and 1 yak. Serotype 17 was identified in 21 of the animals and serotype 13 was identified in 1 cow from Nevada. By contrast, in 2014 BTV was identified in 3 cattle and 1 domestic sheep from Washington, and the serotype was not determined. Clinical signs are associated with increased vascular permeability and can include fever, hyperemia and congestion, oculonasal discharge, facial edema, hemorrhage and erosions of mucous membranes, coronitis and lameness and generalized weakness and depression. In addition, internal postmortem lesions are related to systemic vascular endothelial damage and include edema (especially in the subcutis and lung), hemorrhage, and ischemic necrosis of many tissues from microvascular thrombosis. A “blue tongue” can develop in sheep due to necrotizing vasculitis, ischemia, and resultant cyanosis. Sudden death without detectable gross lesions is also considered a classic presentation. Histologically, vascular necrosis or inflammation are often not detected histologically, subtle lesions such as edema may be confounded by autolysis, and euthanasia due to gunshot may confound gross and histological detection. The clinical presentation, species affected, and lesions due to epizootic hemorrhagic disease virus are very similar, and these viruses should be considered when diagnosing outbreaks of hemorrhagic disease and sudden death in the late summer and fall. In subclinically affected species such as pregnant cattle, congenital malformations and reproductive losses are observed in the subsequent calving season, and while this may occur in subclinically infected wild ruminants, detection would be unlikely. Laboratory confirmation of BTV infection involves either identification of the virus or identification of the host response to infection (serology). Identification of BTV agent is most useful to confirm clinical cases, to determine individual animal freedom from infection, and to investigate infection prevalence. Serology is not useful to confirm clinical cases, but is useful for determination of population or individual animal freedom from infection, investigation of infection prevalence, and determining post-vaccination immune status. Identification of agent is most often done by Reverse transcription polymerase chain reaction (RT-PCR) to identify BTV genetic material and can be used for virus strain typing; RT-PCR can differentiate BTV from EHD. The best samples for RT-PCR testing are whole blood, and fixed or fresh lung, spleen, kidney, brain or other tissues with lesions. Agar gel immunodiffusion (AGID) is a good screening serology test for orbivirus infection. The competitive ELISA is specific for BTV, and virus neutralization test from an isolate can be used for strain serotyping.

Altogether, BTV causes outbreaks of acute disease and reproductive loss in domestic and wild ruminants. Tracking infection and serotype prevalence and distribution is necessary to understand the epidemiology of this important vector-borne virus infection.

US Hemorrhagic Disease Update 2014-2015

Mark G. Ruder, Clara Kienzle, David E. Stallknecht, SCWDS, University of Georgia

During 2014, there were 27 viruses isolated from 114 virus isolation attempts made, representing 22 states and 6 species (98 white-tailed deer, 6 bison, 4 mule deer, 3 big horn sheep, 2 black-tailed deer, and 1 elk). Isolations of EHDV-2, EHDV-6, BTV-17, and BTV-18 were made from white-tailed deer and EHDV-2 was isolated from a black-tailed deer (see Table). The isolation of BTV-17 represents the first isolation of any BTV serotype from New Jersey. As of September 30, 2015, there have been 40 viruses isolated from 113 virus isolation attempts made, representing 19 states and 5 species (103 white-tailed deer, 4 mule deer, 3 elk, 2 key deer, and 1 bison). Isolations of EHDV-1, EHDV-2, EHDV-6, and BTV-17 were made from white-tailed deer.

2014 SCWDS Hemorrhagic Disease Diagnostics
Virus Isolations

STATE	SPECIES	VIRUS
Florida	white-tailed deer	EHDV-6
		BTV-18
Georgia	white-tailed deer	EHDV-2
Idaho	white-tailed deer	EHDV-2
Kentucky	white-tailed deer	EHDV-2
Louisiana	white-tailed deer	EHDV-2
		EHDV-6
Mississippi	white-tailed deer	EHDV-2
Montana	white-tailed deer	EHDV-2
New Jersey	white-tailed deer	BTV-17
North Carolina	white-tailed deer	EHDV-6
Oregon	black-tailed deer	EHDV-2

2015 SCWDS Hemorrhagic Disease Diagnostics
Virus Isolations
Thru September 30, 2015

STATE	SPECIES	VIRUS
Florida	white-tailed deer	EHDV-1
		EHDV-6
Idaho	white-tailed deer	BTV-17
Indiana	white-tailed deer	EHDV-2
Kansas	white-tailed deer	EHDV-2
Kentucky	white-tailed deer	EHDV-2
Louisiana	white-tailed deer	EHDV-2
Mississippi	white-tailed deer	EHDV-2
Missouri	white-tailed deer	EHDV-2
Montana	white-tailed deer	BTV-17
North Carolina	white-tailed deer	EHDV-6

Current Status of Brucellosis in Wyoming

William Edwards, Wyoming Game and Fish Department
Other contributing authors: Hally Killion, Kylie Sinclair, Jessica Jennings-Gaines, and Mary Wood

Brucellosis is an infectious disease caused by bacteria of the genus Brucella. Despite nationwide eradication efforts in the US, Brucella abortus remains a significant concern to livestock producers due to wildlife reservoirs in the Greater Yellowstone Area (GYA). While it is believed that B. abortus has minimal population impacts in bison and elk, the disease can cause significant economic losses in the livestock industry. In Wyoming, B. abortus has remained localized within elk and bison in the GYA since its initial discovery in bison in 1917. Over the past three years, seven brucellosis seropositive elk have been documented in the Bighorn Mountains of North Central Wyoming. This represents the first detection of seropositive elk outside of the GYA in Wyoming and presents the threat of brucellosis spreading to and becoming established in areas outside of the GYA.

Chronic Wasting Disease Research and Updates in Colorado

Michael Miller, Colorado Division of Parks and Wildlife

Dr. Michael Miller, Colorado Division of Parks and Wildlife, led a brief discussion on the implications of a recent study on chronic wasting disease (CWD) host range. The Case Western study results, presented at an international prion conference in May 2015, complement other efforts to assess human susceptibility to chronic wasting disease that have been ongoing since the mid-1990s. Findings from a variety of experimental and epidemiological studies support messaging since the mid-1990s that human illness resulting from CWD exposure appears unlikely. The new study's results are consistent with other previous and contemporary data suggesting a low probability of human prion disease resulting from CWD exposure. Dr. Miller noted that even though human illness seems unlikely, minimizing the occurrence of CWD and encouraging other precautions for minimizing human exposure to CWD may be prudent. Trends observed in Colorado since 2002 suggest increasing infection rates in affected mule deer and elk herds, with the exception of one population unit intensively managed through harvest in the early 2000s. Controlling CWD will likely need to rely on hunting in order to remain politically, socially, and fiscally sustainable. Consequently, early intervention, while infection rates are still low, may offer the best opportunity to both suppress epidemics and minimize the likelihood of hunters harvesting infected animals. Dr. Miller suggested that the timing and approaches to CWD control may deserve more attention and reconsideration than given in recent years.

Summary of Recent Chronic Wasting Disease Events in Texas

Mitch Lockwood, Texas Parks and Wildlife Department
Other contributing authors: Bob Ditmar Texas Parks and Wildlife Department, Andy Schwartz, Texas Animal Health Commission

Introduction:

- 3.9 million free-ranging white-tailed deer
- 700K white-tailed deer hunters
- 600K white-tailed deer harvested annually
- $3.6 billion economic output for all hunting
- $2.1 billion for deer hunting
- 1,300 deer breeding facilities
- > 110,000 deer in breeding facilities
- > 2,200 free-ranging deer moved annually through various permits

Texas Parks and Wildlife Department (TPWD) has been conducting chronic wasting disease (CWD) surveillance throughout the state since 2002. Biologists have collected more than 26,000 samples from hunter-harvested deer, and others have collected more than 21,000 samples in order to meet TPWD permitting requirements, totaling almost 48,000 samples. Additionally, Texas Animal Health Commission (TAHC) has maintained a Voluntary CWD Herd Certification Program since 1995.

In 2012, CWD was discovered in two mule deer samples from far West Texas (Hueco Mountains) as a result of a targeted surveillance effort. This area is directly adjacent to a region in New Mexico with documented CWD occurrence. To date, five more positive samples have been obtained from this population through hunter harvested mule deer, indicating a disease prevalence of 10%.

Mule deer and white-tailed deer are regulated by TPWD, while other susceptible species (including elk) are regulated by the TAHC. This has generated the need for enhanced coordination and communication between these two agencies.

The TPWD/TAHC CWD Management Plan was developed by both agencies in consultation with the state's CWD Task Force. The Task Force is comprised of wildlife biologists, deer and elk breeders, veterinarians and other animal-health experts from TPWD, TAHC, Texas Veterinary Medical Diagnostic Laboratory, Texas Department of State Health Services, Texas A&M College of Veterinary Medicine, and USDA. The plan includes mandatory check stations for susceptible species taken inside the CWD Containment Zone, which covers portions of Hudspeth, Culberson, and El Paso counties. Artificial movement of deer is prohibited in the CWD Containment Zone.

On June 30, 2015 a sample from a Medina County (area on border of southern Edwards Plateau and northern South Texas Plains ecoregions) deer breeding facility was confirmed positive for CWD. The index breeding facility participated in TAHC's voluntary CWD Herd Certification Program, and had tested 62 of 65 mortalities prior to June 2015 (60 not detected, two location results) since permitted in 2006. There were a total of 136 adult deer in the inventory on June 30, 2015, and the herd was considered to be relatively young.

During the previous five years, 107 deer were transferred from 30 deer breeding facilities into the index facility. During that same period, 835 were transferred from the index facility to 147 different facilities including 96 deer

breeding facilities, 46 release sites, three Deer Management Permit (DMP) sites, and two sites in Mexico.

TPWD and TAHC immediately placed a temporary moratorium on movements of all captive deer in the state, and TAHC placed a Hold Order on the 177 “Tier 1” facilities. Since then, TPWD and TAHC worked with the CWD Task Force and industry stakeholders to develop a plan to lift the moratorium on deer transfers, which includes additional CWD testing requirements in deer breeding facilities or on registered release sites. Additionally, TAHC has removed the Hold Order for 120 facilities, leaving a total 57 facilities remaining under a Hold Order as of October 16, 2015. Most deer breeding facilities were authorized to transfer deer by August 24, 2015.

Depopulation at the index facility was initiated in July 28 and completed on September 30, 2015. CWD was detected in a total of 4 (out of 136 adults) white-tailed deer in the index facility, all of which were 2-year-old bucks that were natural additions.

On September 15, 2015, CWD was confirmed in one of the trace-forward facilities, from which 84 deer had transferred out to nine different facilities (five deer breeding facilities, three release sites, and one nursing facility) since it received deer from the index herd. This resulted in seven additional Hold Orders being issued by TAHC, four of which have since been released. The CWD-positive at the trace-forward facility was also a 2-year-old buck that was born in the index facility.

In summary, CWD has been detected in a total of five captive white-tailed deer in Texas, four of which were located in the index facility, and one was located in a trace-forward facility. There are 36 deer from the 2-year-old cohort originating in the index facility that are reported to be alive in seven deer breeding facilities, and possibly as many as six deer from that cohort still alive on release sites. Additionally, there are 33 deer that traced through the index facility that are still alive in 15 deer breeding facilities, and possibly as many as 51 trace-through deer are still alive on 24 different release sites, and two trace-through deer may still be alive in Mexico.

TPWD has intensified the statewide CWD surveillance efforts, with a goal to collect samples from more than 8,000 hunter-harvested deer, including 300 samples within a 5-mile radius of the index facility. TAHC will continue to pursue indemnity on exposed deer located in trace-forward facilities in an attempt to conduct a more thorough epidemiological investigation. TPWD and TAHC have committed to reevaluate movement qualification standards that apply to deer breeding facilities and release sites following the 2015-16 hunting season. Both agencies are exploring ante-mortem testing protocols, and will continue to seek guidance from experts in the field.

Epidemiology of Recent CWD Cases in Ohio

Susan Skorupski, USDA-APHIS-VS

Background

Ohio has had a voluntary Chronic Wasting Disease (CWD) Herd Certification Program for all cervidae for at least 12 years. Ohio has 331 cervidae herds in the CWD monitoring program with 256 at Certified level. In October 2012, Ohio White Tail Deer rule became effective. It includes several categories of white tail deer operations. Monitored herds cannot sell or give away animals and includes hunting preserves. Under this rule, hunting preserves cannot move live animals from the premises and must annually sample 30 animals or 30% of harvested deer, based on the number of deer harvested during the previous year. Herds with Status are herds enrolled in the CWD Certification Program but not yet at certified level. Certified Status Herds are enrolled in the CWD monitoring program and have reached certified status. Ohio has 135 Monitored Herds, including 24 hunting preserves, 75 Herds with Status, and 256 Certified Status herds.

Ohio's approach to infected animals and associated animals and herds

Infected herd – herd where a CWD infected animal resided when the test positive sample was collected. Herd quarantined.

Exposed herd – any herd where an animal that tested CWD positive has resided within the five years before the CWD diagnosis. Whole herd quarantined

Herd that contains an exposed animal – whole herd quarantined unless epidemiology information suggests the animal is of lower risk of spreading CWD.

Exposed animal – animal that was exposed to the CWD infected animal any time during the five years prior to when the animal died or was euthanized and sampled/tested positive for CWD.

Recent CWD History in Ohio

a. Pennsylvania traces

In the spring of 2014, Ohio received information on traces associated with CWD positive cases in Pennsylvania. Three Ohio herds were designated as Exposed herds because positive deer from infected herds in Pennsylvania had been in the Ohio herds during the previous five years. Fifty Ohio herds received 256 exposed deer from the five Pennsylvania herds and three Ohio exposed herds. Eighty-five of those animals were tested with Not Detected results in Ohio herds. Sixty-six animals were traced to Out of State herds. That leaves 101 animals either standing in quarantined herds or not tested when they died or were harvested. Eighteen herds/preserves remain under quarantine.

b. First CWD positive found in Ohio

On October 22, 2014, National Veterinary Services Laboratory (NVSL) confirmed a CWD positive result for a 2.5-year-old buck killed at a hunting preserve in Holmes County Ohio on October 2, 2014. The hunting preserve had been under quarantine since April 1, 2014 because of Pennsylvania traces and was required to do 100% sampling of harvested deer. The positive animal

had official identification tracing the animal to a CWD certified Pennsylvania herd. Records including a Certificate of Veterinary Inspection (CVI) indicate the animal moved to Ohio March 13, 2013. Genetic testing was conducted to support the accuracy of the trace to the Pennsylvania herd. This herd was depopulated without indemnity April 27-29, 2015. Two hundred twenty-four animals were depopulated at owner expense and sampled for CWD. All tests had Not Detected results for CWD. The premises was evaluated as a minimally contaminated facility. No cervidae have been added to the premises at this time.

The owner of the hunting preserve business also owns or is associated with breeding herds at other locations in Holmes County.

c. Second positive premises in Ohio

A white tail deer breeding herd owned by the same person who owned the CWD positive hunting preserve was designated as a positive herd in the spring of 2015. A CWD positive animal was sampled on March 12, 2015 and reported on March 25, 2015. The animal was a five-year-old whitetail doe purchased from a Wisconsin herd in February 2013. A second CWD positive animal was reported from this herd on May 22, 2015. This animal was a 1.5-year-old natural addition doe.

This herd was initially established in the fall of 2012 with the purchase of a CWD certified herd from the estate of a deceased owner. In the spring and fall of 2013, additional animals were added from at least nine Ohio herds, one Wisconsin herd, 17 Pennsylvania herds, and three Indiana herds. This herd had been quarantined since April 1, 2014 because of traces from several CWD exposed or positive herds in Pennsylvania, including the herd that was the source of the CWD positive deer in the Ohio hunting preserve. It had received over 120 animals from these herds.

On June 15 and 16, this herd was depopulated with federal indemnity. Samples were collected for research purposes. Two hundred forty-one animals including 44 fawns were euthanized, sampled and tested. Sixteen additional positive were identified. They originated from five Ohio CWD certified herds and four Pennsylvania CWD certified herds. One of the Ohio herds was the herd that was used to initially establish this herd. One positive animal was over 60 months of age so that Ohio herd was not designated as an exposed herd. The other three Ohio herds were quarantined as exposed herds.

Records reviews identified 334 exposed animals associated with Ohio exposed herds. Forty-two Ohio herds containing these animals were quarantined. They have remained under quarantine until the quarantined animal(s) are euthanized and tested Not Detected for CWD or 60 months have passed since animals entered the herd. From Ohio Exposed Herd 1, 56 animals moved to 21 Ohio herds and 83 animals moved out of state. Twenty-seven animals were either already dead and tested with CWD Not Detected results or have since been tested with CWD Not Detected results. From Ohio Exposed Herd 2, 76 animals moved to 16 Ohio herds and 94 animals moved out of state. Twenty-five animals were either already dead and tested with

CWD Not Detected results or have since been tested with CWD Not Detected results. From Oho Exposed Herd 3, 21 animals moved to five Ohio herds and four animals moved out of state. Seven animals were either already dead and tested with CWD Not Detected results or have since been tested with CWD Not Detected results. Ohio received two exposed animals from the exposed herd in Pennsylvania associated with this case. In summary, 334 exposed animals were identified and traced to 40 Ohio herds. Fifty-nine of those in Ohio have been tested with Not Detected CWD results. One hundred eighty-one have been traced out of state and 94 are still standing in 26 quarantined herds/hunting preserves.

Ohio Exposed Herd 1 has been in the CWD Certification Program since September 2003 and has an inventory as of 48 head over one-year-old. Ohio Exposed Herd 2 has been in the CWD Certification Program since October 2003 and has an inventory of 93 animals. Ohio Exposed Herd 3 has been in the CWD Certification Program since February 2009 but started with a status date of May 2001 and has an inventory of 17 deer.

In addition, Ohio received reports of 72 exposed deer from out of state (OOS) Exposed herds traced to 18 Ohio herds. Eighteen of those animals had moved to out of state herds. Thirty animals were tested in Ohio with Not Detected results. Twelve animals remain in Seven quarantined herds.

The summary of all traces associated with positive cases in Ohio and Pennsylvania in 2014 – 2015 are:

- Total exposed animals traced to Ohio: 661
- Total tested Not Detected: 176
- Total animals traced to Out of State Premises: 265
- Total premises initially quarantined: 87
- Total premises remaining quarantined: 40
- Total Hunting Preserves quarantined: 10

USDA Cervid Health Program Updates

Randy Pritchard, USDA-APHIS, Veterinary Services (VS)

Voluntary Chronic Wasting Disease (CWD) Herd Certification Program

The APHIS National CWD Herd Certification Program (HCP) was implemented in 2014. It is a voluntary Federal-State-industry cooperative program administered by APHIS and implemented by participating States. The program provides uniform national herd certification standards that minimize the risk of spreading CWD in farmed cervid populations. Participating States and herd owners must comply with requirements for animal identification, fencing, recordkeeping, inspections/inventories, as well as animal mortality testing and response to any CWD-exposed, suspect, and positive herds. APHIS monitors the Approved State HCPs to ensure consistency with Federal standards through annual reporting by the States. With each year of successful surveillance, participating herds will advance in status until reaching five years with no evidence of CWD, at which time herds are certified as being low-risk for CWD. Only captive cervids from enrolled herds certified as low risk for CWD may move interstate. Currently, 30 States participate in the voluntary CWD

Herd Certification Program; 29 have Approved HCPs and one has Provisional Approved status. VS is working with the remaining State to transition it to Approved status. FY2015 marks the second year that Approved States have submitted their CWD HCP annual reports to APHIS. APHIS is currently reviewing these reports.

Review of CWD Program Standards

The CWD Program Standards provide clarification and guidance on how to meet CWD Herd Certification Program and interstate movement requirements. VS committed to an annual review of the Program Standards by representatives of the cervid industry and appropriate State and Federal agencies. VS planned to perform a review in FY2015; however, this did not occur due to the response to highly pathogenic avian influenza (HPAI). VS expects to conduct a review in FY2016.

CWD in Farmed and Wild Cervids

Retrospective Epidemiology of CWD in Farmed Cervids: In response to a 2014 USAHA Resolution, VS asked States to include a retrospective summary of the epidemiology of all positive herds with their annual HCP reports for FY2015. Unfortunately, the response to HPAI delayed completion of this summary. Five States reported information to date. A few States indicated that they did not have the resources to devote to this request. VS will continue to gather this data and to collect more comprehensive data in the future.

Summary of CWD detections. As of September 30, 2015, CWD has been confirmed in wild deer and elk in 21 US States, and in farmed cervids in 16 States. In total, 23 States have identified CWD in wild and/or farmed cervids. CWD has been reported in 70 farmed cervid herds in the United States. Confirmation of the disease in three free-ranging, wild white-tailed deer in Michigan in 2015 marked the first report of CWD in the wild cervid population in this State.

FY2015 CWD Detections in Farmed Cervids: In FY2015, CWD was identified in eight farmed cervid herds: one white-tailed deer breeding herd in Pennsylvania, one elk breeding herd in Utah (traced back from a hunting facility in Utah), one white-tailed deer (WTD) breeding herd and one WTD hunting preserve in Ohio (owned by the same producer), two WTD breeding herds in Wisconsin, one WTD and elk herd in Texas, and a second WTD herd in Texas (traced from the first positive herd in Texas). The positive animals in Utah, Ohio, and Texas represented the first reported cases of CWD in captive cervids in all three of these States.

White-Tailed Deer Breeding Herd, Pennsylvania: On October 6, 2014, the National Veterinary Services Laboratories (NVSL) confirmed CWD in a 6-year-old doe from a captive WTD breeding facility in Reynoldsville, Pennsylvania. The doe was euthanized and tested because she was classified as a CWD-exposed animal that had previously resided in ***two*** trace back exposed herds. This herd was assembled in 2013 through the purchase of 16 animals from other HCP-certified herds in Pennsylvania, and had been under quarantine for receiving exposed animals from a trace back exposed herd. The remaining herd of eight WTD was depopulated with Federal indemnity on

February 18, 2015, and no additional positive animals were detected. USDA collected samples for research purposes.

Elk Breeding Herd, Utah: On December 23, 2014, NVSL confirmed CWD in 3-year-old captive elk. The elk had been at a hunting park located in northern Utah, where he had resided for approximately three weeks prior to being hunter killed. All hunter-killed animals at the hunt park are required to be tested for CWD, and this animal was sampled through routine surveillance. The elk was traced back to its herd of origin, and that facility was quarantined. The herd was assembled in 1999 with bulls, and later elk cows, that originated from Colorado. Historical testing records for the herd were unavailable. The remaining 70 elk were depopulated using Federal indemnity funds on March 3, 2015, and an additional 25 elk were confirmed as CWD-positive. USDA collected samples for research purposes.

White-Tailed Deer Hunting Preserve, Ohio: On October 22, 2014, NVSL confirmed CWD in a buck taken from a captive WTD deer hunting preserve in Ohio. This was the first time that CWD had been detected in Ohio. The preserve was tested as part of Ohio's CWD monitoring program. The herd had been under quarantine since April 2014 because it was a trace-forward herd associated with a CWD-exposed herd in Pennsylvania. The positive animal was traced to its herd of origin, a captive WTD breeding herd in Pennsylvania, through DNA identity testing. On November 26, 2014, the Ohio State Veterinarian issued an Order of Destruction for animals on the hunting preserve. The State executed this Order on April 27-30, 2015. The herd of 224 WTD was depopulated and no other positives were detected. USDA did not provide Federal indemnity.

White-Tailed Deer Breeding Herd, Ohio: On March 31, 2015, NVSL confirmed CWD infection in a 5-year-old WTD doe from a captive breeding herd in Holmesville, Ohio. The index animal was received from a Wisconsin WTD farm in January 2013. The CWD-positive herd was owned by the same individual as the Ohio hunt preserve that was found to be CWD positive in October 2014. On May 22, 2015, NVSL confirmed a second positive case in the same herd -- a yearling WTD doe that was a natural addition in the same breeding herd. The herd had been under quarantine since April 1, 2014 due to epidemiological linkages with two WTD herds in Pennsylvania – one a positive herd and the other a traceback exposed herd. USDA provided Federal indemnity and depopulated this herd on June 15 and 16, 2015. USDA collected samples for research purposes. NVSL confirmed CWD in 16 additional animals in the herd. Of the 16 positives, one was natural addition and the rest were purchased additions. The positive animals were purchased from February 26, 2013 through September 24, 2013, except for one purchased in 2012. Eleven purchased additions traced-back to three herds in Pennsylvania and four purchased additions traced to three other herds in Ohio.

White-Tailed Deer Breeding Herd, Wisconsin: On October 6, 2014, NVSL confirmed CWD in a 2-year-old doe born in June of 2012 that died on a Richland County farm. The facility is within the CWD management zone in Wisconsin. The remaining 51 deer were euthanized on November 20, 2014,

and seven additional positives (all males born in 2012) were found. Two of these seven were purchased additions with the last added to the herd in January 2013. All sales from this herd were to shooting preserves. This premises was double fenced and had been compliant in a herd certification program for over ten years.

White-Tailed Deer Breeding Herd, Wisconsin: On June 19, 2015, NVSL confirmed CWD in a 7-year-old female WTD from a breeding facility in Eau Claire County. The doe was a natural addition to this breeding herd. This is the first positive CWD case, captive or wild, in this county. The doe was found dead and was showing no clinical signs of CWD at the time of death. Since 2003, this herd has tested 391 animals for CWD and all had "not detected" results. In addition, 317 animals have tested "not detected" from the associated hunting preserve over the same time period. A second positive natural addition doe from this herd was confirmed positive by NVSL on September 10, 2015. Several escape episodes have occurred from this herd. The herd is currently under quarantine and plans are underway for depopulation with State indemnity.

White-Tailed Deer and Elk Breeding Herd, Texas: On June 30, 2015, NVSL confirmed CWD in a 2-year-old WTD buck from a captive WTD and elk breeding herd in Medina County, Texas, approximately 500 miles from previously reported positive free-ranging mule deer in far West Texas. This was the first time that the disease had been detected in farmed cervids in the State. The index buck was born on the premises and found dead on June 18, 2015. Over 40 high-risk deer (i.e., pen mates, dam, others) were euthanized and tested after the index case was found. The NVSL confirmed CWD infection in two of those deer. Interestingly, all three of the positive deer identified to date on this premises have the same AI sire. However, the significance of this finding is unclear. In the past five years, records indicate that 130 WTD from 33 facilities moved into the positive herd and 838 WTD moved out of the positive herd to 147 different herds. One positive WTD was found in one of these trace-out herds (see herd description below). Additionally, 23 elk were also moved from this herd to another herd in Texas in 2014. All trace-outs have been intrastate except for movements to two premises in Mexico. Premises that have received deer from the index herd are under movement restrictions. VS is collaborating with animal health authorities in Mexico. VS paid indemnity and depopulated this herd on September 30, 2015, and no additional positive animals were detected. USDA collected samples for research purposes.

White-Tailed Deer Herd, Texas: On September 14, 2015 NVSL confirmed CWD from tissues from a WTD in Lavaca County, Texas. This animal was a traceout from the first CWD positive herd from June 30, 2015. Additional epidemiology is ongoing.

Cervid Tuberculosis

The CervidTB Stat-Pak and Dual Path Platform (DPP) serologic tests were approved for use in captive and free-ranging North American elk, white-tailed deer, red deer, fallow deer, and reindeer effective February 4, 2013. In early 2014, the CervidTB Stat-Pak was discontinued by its manufacturer and an

amended interim final rule was published in July 2014 making the DPP test both a primary and secondary test for TB in cervids. Animals that have two consecutive positive tests at least 30 days apart are classified as TB reactors, and APHIS provides indemnity for these animals to conduct further diagnostic testing.

In FY2015, 15,486 cervids were tested serologically for bovine TB, and 31,862 cervids have been tested since introduction of the serological tests in 2013. In FY2015, primary DPP serological testing identified 62 TB suspects of which 21 of these animals had negative tests when retested at least 30 days after the primary test. Twenty-three cervids were identified as TB reactors when tested positive to the secondary DPP test. Thirty-one necropsies have been performed on suspect and reactor cervids in FY2015. Mycobacterial culture results are available on 30 of these animal's tissues at this time. Twenty-six of the cultures were negative, two were identified as *M. avium* and two identified as *M. intracellular.* No cultures have been positive for *M. bovis* in FY2015.

VS recently completed a statistical analysis of the DPP testing data, including optical density (OD) levels, for the previous three years of testing. The specificity of the first DPP test using the current cut-off OD value was 99.6% while the specificity after the second DPP test was 99.86%. The false positive percentage of 0.034% is considered very low. Based on this analysis, raising the OD cut-off value would increase the false negative percentage significantly (i.e. reduce test sensitivity) while having very little effect on the false positive percentage (i.e., no change in test specificity). As a result, VS does not intend to revise the DPP OD cut-off level for any species of cervids in 2016. We will continue to analyze these data to determine if changes are needed in the future.

National Animal Health Monitoring System Cervid Industry Study

Beginning early September 2014, VS, in cooperation with the National Agricultural Statistics Service (NASS), conducted the first national study of the US farmed cervid industry. The study surveyed 3,000 producers from all States that have farmed cervids. The survey response rate was 42.5%, which is exceptional for a mail survey. Responses indicate that the US captive cervid population is made up of 65.6% deer operations, 21.2% elk/red deer/sika deer operations, and 13.2% operations with both deer and elk. The study was initiated at the request of industry stakeholders. A report from the study is currently being finalized and should be available in 2015. The survey objectives are based on responses from a needs assessment that was conducted by VS in 2013. The study will provide baseline industry statistics, a description of current production practices and challenges, producer-reported disease occurrences, and an overview of health management and biosecurity practices.

Cervid Health Webpage

In 2015, the Cervid Health Team launched a new comprehensive webpage that consolidated all the cervid program disease and other information in one site. In addition to updating existing content, new information was also made

available. The new Cervid Health webpage can be found on the APHIS website under the Animal Health and Animal Disease Information links on the left-hand menu.

Cervid Health Program Budget

The Cervid Health Program includes the CWD herd certification program and the cervid TB program. It is funded through the Equine, Cervid, and Small Ruminant Line Item. In FY2015, the Cervid Health Program was appropriated $3.0 million by Congress for cervid health activities. This funding was allocated as follows:

- **Indemnity** − $1.1 million for CWD and cervid TB (an additional $230,000 was provided to support herd depopulation activities in Texas).
- **CWD Research** − $200,000 to support USDA Wildlife Services (WS) research for development of CWD live animal diagnostic testing.
- **Cervid Health Program** − $1.2 million for general program support (primarily field activities).

APHIS anticipates the FY2016 Cervid Health Program funding will remain at FY2015 levels.

Committee Business:

One resolution was proposed by a committee member titled Chronic Wasting Disease Testing Protocol for Wild Cervidae proposing the United States Animal Health Association (USAHA) urge the USDA to amend CFR 81.3 (b); proposing wild cervids captured for interstate movement and release, have two forms of identification, one of which that is official identification, must be PrP genotyped for chronic wasting disease resistance, tested for chronic wasting disease using a rectal biopsy test. The committee discussed and debated the terms and science related to this resolution proposal including that currently there is no science indicating there are “genotype resistant” cervids to acquiring the CWD prion. The term “resistant” is miss-leading. There are only different cervid genotypes that acquire the infectious prions at different rates and show clinical signs at variable rates, some at prolonged periods after acquiring the prion or they are slow to accumulate detectable levels. Since all infected animals would be presumed to be capable of shedding the prions into the environment, genotypes with clinical “resistance” or prolonged indication of clinical presentation of the disease, may well potentially be considered prolonged shedders of the prion. Additionally, there was discussion put forth by several committee members concerning the lack of regulatory validation of the rectal biopsy test. Also, the test can only be used on young animals and there is significant test sensitivity and specificity variability between cervid species when using this test. A new motion to the proposed resolution was to table this resolution, reword the resolution potentially to be a recommendation for USDA to provide a guidance document to the states for surveillance of CWD on interstate translocations of wild cervids. It was proposed that this new resolution/recommendation be discussed during the Farmed Cervid Subcommittee and forward then to the Committee on Captive Wildlife and

Alternative Livestock. The motion was proposed by member Charlie Seale and seconded by member Sean Shaffer which was passed by committee.

The Committee on Wildlife Diseases adjourned at 5:15 p.m.

II. F. Other Reports

1. 2015 Applied Animal and Public Health Research and Extension Veterinarians Symposium

Sponsored by the American Association of Extension Veterinarians

A characterization of services offered by food animal veterinarians in the southeast United States - *K. Johnson, D. Smith, and C. Huston*

Biological significance of reflective calf hutch covers during hot conditions - *Jade Haberman, Ted Friend and *Tom Hairgrove*

Enhancing Continuing Education with Clickers - GA Dewell

Evaluation of casein hydrolysate as an intramammary infusion for cessation of lactation at the quarter level in dairy cows - *Justine Britten, David Wilson, Kerry Rood, Brian Gowan*

H5N1, H5N2 and H5N8 Viruses in the United States and Public Health - *S. C. Trock*

Leptospirosis in the Arid Western United States - *Tara Whalen, Kerry A. Rood*

Simplification of Optimal Point of Entry for Gunshot and Captive Bolt Euthanasia in Bovines - *RD Dewell, GA Dewell, DA Bear, W Weber, DD Griffin, EW Rowe*

A CHARACTERIZATION OF SERVICES OFFERED BY FOOD ANIMAL VETERINARIANS IN THE SOUTHEAST UNITED STATES

K. Johnson, D. Smith, and C. Huston
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Veterinarians are important to protecting the safety and security of the food supply. Consequently, a shortage of food animal (FA) veterinary practitioners or in the availability of services they provide to livestock producers could pose a significant threat to the food supply. The objective of this study was to characterize the services offered by FA and mixed-animal veterinarians in order to evaluate the availability and variety of those services offered to livestock producers. A telephone survey of 645 veterinarians licensed to practice in Alabama, Arkansas, Georgia, Louisiana, and Mississippi well self-identified FA or mixed animal practice activities was conducted in the spring of 2015. Respondents were asked questions regarding individual/practice demographics, advertising practices, services offered and willingness to offer services as well as distances they were willing to travel to provide services. The response rate was 38% (245/645). Seventy percent (163/245) were practice owners, 29% (71/245) were associate veterinarians, 4% (10/245) had a board certification, and the average length of time in practice was 21 $\pm$ 1.93 years (range=1-52 years). Fifty-two percent (109/245) of respondents stated that their practice had a website, 58% (123/245) had a practice Facebook page, and 34% (71/245) advertised in the phonebook. Eighty-six percent (211/245) of respondents stated they were currently providing FA veterinary services (FAVS). The most common services offered were sick animal calls (93%), emergency services (92%), and pregnancy diagnosis by palpation (91%). Fetal sexing (14%), economic records analysis (14%), and carcass evaluation via ultrasound (9%) were the least offered services. Additionally, respondents stated they currently did not but were willing to offer emergency preparedness consultation (37%), economic records analysis (37%), fetal sexing (31%), performance records analysis (28%), and animal welfare/handling training (26%). Of those no longer providing FAVS, the primary reason given for the change was that their local economy could no longer financially support their practice. From these data we hope to develop targeted educational opportunities for practitioners and students with regards to those services which they were willing to offer in order to increase services available to livestock producers to ensure sustainability for FA veterinarians and FA producers in the Southeast US.

BIOLOGICAL SIGNIFICANCE OF REFLECTIVE CALF HUTCH COVERS DURING HOT CONDITIONS.

Jade Haberman, Ted Friend and *Tom Hairgrove

Previous research found reflective hutch covers reduced hutch temperature during hot weather, but the biological significance is unknown. The study was conducted from June to August, on two farms: one near Stanfield, Arizona (AZ) and one near Plainview, Texas (TX). Agriplastic hutches were used at AZ and CalfTel at TX. Covers were 3.0 mil (aluminized on the external side) white low-density polyethylene (LDPE) overlaying the top, sides, and back of the hutches; leaving the front exposed. Biological parameters were used to compare unweaned calves housed in reflectively covered hutches with calves in uncovered hutches. Average daily maximum temperature was 7.78 ºC warmer ($P < 0.01$) at AZ than at TX throughout the study. Internal hutch temperature of the reflective covered hutches was 2.16 ºC cooler ($P < 0.05$) at AZ, and 2.57 ºC cooler ($P < 0.05$) at TX than control hutches during the hottest 4-h portion of the day. Respiration rates at AZ were lower ($P < 0.01$) for reflectively housed calves than for control calves. While housed in reflective hutches, fewer ($P < 0.05$) calves were treated for ear infections than control calves and at four months of age, fewer calves that had been housed in reflective hutches were treated for pneumonia than control calves, possibly indicating long-term benefits. Reflective covers did not affect ($P > 0.05$) weight gain or immune response to an infectious bovine rhinotracheitis (IBR) vaccination at either farm. Reflective hutch covers moderate internal hutch temperature to a degree that can affect biological function. Absence of persistent infected calves with BVD, and high antibody titers to IBR indicate the farms' vaccination and biosecurity practices against BVD and colostrum programs were successful.

Key words: Heat, Stress, Dairy

ENHANCING CONTINUING EDUCATION WITH CLICKERS

GA Dewell
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Continuing education (CE) lectures for veterinarians are traditionally didactic and interaction can be difficult. Flipping the classroom has been promoted as a way to increase interaction between participants and the teacher and improve learning. However, since flipping usually requires participants review materials prior to the classroom it is difficult to implement in a typical CE setting. Nonetheless, clickers can be used during CE presentations to obtain demographic information, basic knowledge levels and to guide the presentation. Data collected from an audience of approximately 50 veterinarians indicated that most (76%) had used clickers before even though many (60%) had been in practice for 30 or more years. Additionally, 88% of participants had a positive opinion of clicker based presentations and 77% believed they learned more with the clicker format compared to a traditional slide presentation. Lastly, 65% would prefer to have future CE presentations utilize interactive measures such as clickers. More specifically during a CE presentation on fertility issues in beef cattle 80% of respondents reported that they were seeing same amount of fertility issues as normal while 20% indicated they were seeing more fertility issues. Sixty-five percent of participants believed that nutrition was the biggest cause of fertility issues while 20% indicated that sexually transmitted diseases were the biggest cause. Regarding preputial scrapping to collect samples for trichomoniasis testing, 44% of participants were capable of collecting samples while 17% were pretty good and 6% considered themselves professionals. However, 33% of participants indicated that they were not comfortable with the procedure and 68% had only collected ten or less preputial scrapping samples. This trial usage of clickers during a CE presentation identified that not only did participants appreciate the interactive format but valuable information can be collected to guide the presentation and topics for future CE offerings can be identified.

EVALUATION OF CASEIN HYDROLYSATE AS AN INTRAMAMMARY INFUSION FOR CESSATION OF LACTATION AT THE QUARTER LEVEL IN DAIRY COWS

Justine Britten, David Wilson, Kerry Rood, Brian Gowan
Department of Animal, Dairy, and Veterinary Sciences, Utah State University

Treatment options for dairy cows that have one persistently inflamed mammary quarter are limited. Cessation of milk production in only one quarter, without permanent damage, is difficult and unpredictable. This project investigates the efficacy of treating one mastitic quarter in any eligible cow (total-cow somatic cell count substantially increased only by that quarter) using casein hydrolysate. Cows will be screened and enrolled based on case definition parameters for total cow and quarter-level somatic cell count, stage of lactation, milk production data and milk culture results. There will be a total of three treatment groups: active casein hydrolysate, an inactivated casein hydrolysate placebo and a negative control. The experimental design is a completely randomized block; cows will be blocked by lactation and culture results into one of four blocks. Cows from multiple dairies will be enrolled and randomly assigned to one of the three treatment groups within each block. Cows will be assessed for pre- and post-treatment milk production, somatic cell count and bacteriological culture. Percentage of total-cow milk production from the infused mastitic quarter will be measured before involution and following the next calving to assess recovery of production postpartum in the infused quarter. Bacteriological cure rate based on multiple cultures, percent culled and percent mortality will also be compared among treatment groups. This will be the first well controlled study evaluating the creation of a three-quartered cow as a potential milk quality management tool.

H5N1, H5N2 and H5N8 Viruses in the United States and Public Health

S. C. Trock
Atlanta, GA

Highly pathogenic avian influenza (HPAI) H5N1, H5N2 and H5N8 infections have been reported in US domestic poultry (backyard and commercial flocks), captive wild birds, and wild birds. Between December 2014 and mid-June 2015, USDA reported H5 bird flu virus detections in 21 US states (15 states with outbreaks in domestic poultry or captive birds and six states with H5 detections in wild birds only).

No human infections with these viruses have been detected at this time, however similar viruses have infected people in other countries and caused serious illness and death in some cases. While the health risk posed to the general public by domestic HPAI outbreaks is low, it is possible that human infections with these viruses could occur. The response of public health engaged both field and laboratory effort.

Working with State Health Departments, USDA and other agencies, the Centers for Disease Control and Prevention (CDC) issued guidance which included monitoring and preventive treatment for those individuals with exposure or potential exposure to these HPAI viruses. Monitoring guidance focused on persons having contact with infected birds or contaminated environments from the time of initial contact to ten days after the last such contact. State Health Departments and/or local health departments were asked to assess exposure status of individuals associated with each positive bird report. Exposed persons having new onset of signs and symptoms of illness during this time period were asked to submit swabs for testing. State Departments of Health Laboratories then tested the specimens for influenza.

In addition, guidance regarding antiviral use was modified to permit use of stockpiled antiviral drugs for use in states affected by the avian outbreaks. Consideration for this modification included that appropriate use of antivirals may help reduce the risk of human cases and subsequent person-to-person spread.

Prompt sharing of the avian viruses by the USDA with the CDC allowed the laboratories to determine if the available diagnostic tests would identify this virus if present in human samples. Transmission studies involving ferrets showed that these H5 viruses did not spread to naïve ferrets placed in direct contact with challenged ferrets. Also illness in infected ferrets was generally mild. Antigenic characterization of these viruses allowed comparison of these viruses to vaccines in the global stockpile to determine if a new vaccine virus should be developed. Antiviral resistance testing was able to determine if genetic markers for resistance to Food and Drug Administration (FDA)-approved influenza antivirals were present.

LEPTOSPIROSIS IN THE ARID WESTERN UNITED STATES

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Leptospirosis is an environmentally derived zoonotic family of bacterium that is multitudinous in forms and geographic locations. In the western United States, there are several prevalent serovars that are currently of concern for cattle producers: *Leptospira hardjo, Leptospira pomona, Leptospira icterohemorrhagica, Leptospira grippotyphosa,* and *Leptospira canicola,* however, cattle are the maintenance species for the *Leptospira hardjo* serovar. Oftentimes *Leptospira* serovars are transmitted through natural breeding of infected bulls or urine contaminated water sources contacting mucosal surfaces and most commonly associated with high moisture areas and concentrated animal feeding operations. One of the common ramifications of the various strains of the *Leptospirosis* family is spontaneous abortions in bovines and may be one of the only clinical manifestations of a *Leptospira* infection. One case in particular has highlighted the difficulties presented to producers in the western United States. On this operation, cattle are placed on summer Utah high K mountain public grazing allotments and wintered on an arid (average annual precipitation = 2.25 cm) strip of land between the Utah border and Colorado River (i.e., Grand Canyon) referred to as the “Arizona Strip.” The producer began noting a significant reduction in reproductive performance as well as a dramatic increase in abortions beginning in 2012, with the calving crop decreasing from nearly 90% to below 50% in 2015. Serum samples were taken from six open cows and bovine abortion screening tests were performed. Titers of *Leptospira pomona* and *Leptospira icterohemhorrhagica,* 1:100 and 1:200 respectively, were reported. *Leptospira* serovars are still being considered above other abortion causing pathogens including Bovine Viral Diarrhea Virus (BVDV) and Infectious Bovine Rhinotracheitis (IBR) as the reproductive failure has persisted across a three-year span and the serum samples are producing characteristic low titers for *Leptospira* while yielding negative results for BVD and IBR. Because of the semi-arid landscape, samples were taken from common water catch tanks used by cattle and wildlife to determine if these limited, stagnant water sources were contaminated with *Leptospira* spp. Results are pending. While rare, these water tanks can be used by ranchers to bath in. The owner was informed of the zoonotic concern and the recommendation for implementing a commercial Leptospirosis vaccine was presented. This case illustrates that Leptospirosis can surface in arid regions and should be considered in spontaneous abortions regardless of geographical location.

SIMPLIFICATION OF OPTIMAL POINT OF ENTRY FOR GUNSHOT AND CAPTIVE BOLT EUTHANASIA IN BOVINES

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The use of gunshot or captive bolt devices to cause lethal brain damage are practical and common euthanasia methods for compromised cattle and calves that, when properly conducted, cause a rapid onset of unconsciousness and death. When using physical methods of euthanasia, brainstem destruction is the primary goal because of its importance in regulating both respiratory and cardiac function and is of vital importance in maintaining consciousness. Several methods have described the optimal point of entry when using gunshot or captive bolts for bovine euthanasia. Although accurate, some techniques for determining the point of entry may be difficult to remember, may require more than one step to ascertain the point of entry, may need to be adjusted based on breed type, and may be challenging to ascertain in polled cattle if the suggested protocol uses horns as a landmark. A simple, reliable and predictable description of the optimal point of entry for a bullet or captive bolt is to aim the trajectory towards the base of the tongue or spinal cord at the midpoint of a line drawn between the base of each ear (specifically where ear canal can be seen in the base of the ear). The orientation of the brainstem and ear is not altered by variables considered in some other protocols such as breed, presence or absence of horns, and age. A simple and reliable description for the optimal point of entry increases the likelihood that bovine euthanasia will be conducted quickly and humanely.

II. F. 2. 2015 USDA-ARS and NIFA Research Reviews

A Comeback for Genetically Modified Organisms: Developing an Effective Johne's Disease Vaccine from Discovery to Commercialization - Adel M. Talaat

Global Change in the Ecology and Epidemiology of HPAI H5 Clade 2.3.4.4 in Wild Birds and Poultry - David E. Swayne, Kateri Bertran, Darrell Kapczynski, Mary Pantin-Jackwood, Erica Spackman, David L. Suarez, Dong-Hun Lee, Mia Torchetti

Pathogenicity and Transmission of Eurasian HPAI H5 Clade 2.3.4.4 Viruses in Avian Species - Mary J. Pantin-Jackwood, Erica Spackman, David L. Suarez, Darrell R. Kapczynski, Kateri Bertran, Mar Costa-Hurtado, Eric DeJesus, David E. Swayne

The Complexity of Saving your Bacon: The Policy and Human Behavioral Challenges of Protecting Food Animal Health - Julia M. Smith

Vaccination with Recombinant Virus-like Particles Protects Chickens from Multiple H5 Influenza Strains Including Eurasian H5N8 Virus - Peter Pushko

A COMEBACK FOR GENETICALLY MODIFIED ORGANISMS: DEVELOPING AN EFFECTIVE JOHNE'S DISEASE VACCINE FROM DISCOVERY TO COMMERCIALIZATION

Adel M. Talaat
Professor of Microbiology, University of Wisconsin-Madison
Pan Genome Systems, INC.

Johne's disease or Paratuberculosis is a chronic debilitating disease that represents an economic threat to more than 90% of dairy herds in the USA and worldwide. The disease is caused by an environmentally persistence bacteria, *Mycobacterium avium SS. Paratuberculosis* (M. ap). The current inactivated vaccine licensed for use in the USA is not effective in controlling the infection and does not prevent shedding of *M.* ap from infected animals, further spreading infections to new animals. Almost a decade ago we launched our journey to utilize genetic and genomic approaches to identify effective vaccine against Johne's disease. One of our current vaccine candidates is a novel genetically modified organism (GMO) based on *M. ap* that elicit strong immune responses in both laboratory (mice) and farm (goats) animals. More importantly, in both murine and caprine models of paratuberculosis, the GMO vaccine provided superior protection against challenge with the virulent strains of *M. ap*. In this presentation, I will share our approaches used to selective effective vaccine candidates against Johne's disease. I will also discuss plans we currently have at Pan Genome Systems to allow this product reach our target market of dairy herd operations. We believe we have excellent vaccine candidates that could help in controlling Johne's disease in the USA and world-wide.

GLOBAL CHANGE IN THE ECOLOGY AND EPIDEMIOLOGY OF HPAI H5 CLADE 2.3.4.4 IN WILD BIRDS AND POULTRY

David E. Swayne, Kateri Bertran, Darrell Kapczynski, Mary Pantin-Jackwood, Erica Spackman, David L. Suarez, Dong-Hun Lee, Mia Torchetti

Southeast Poultry Research Laboratory, US National Poultry Research Center, USDA-Agricultural Research Service (ARS), Athens, Georgia; and National Veterinary Services Laboratories (NVSL), Veterinary Services (VS), USDA-Animal and Plant Health and Inspection Service (APHIS)

The first cases of highly pathogenic avian influenza (HPAI), previously termed fowl plague, were reported in 1878 in northern Italy, followed by widely dispersed geographic outbreaks throughout the late 1800's to 1950's in Europe, Asia, Africa, and North and South America. In general, since 1959, HPAI outbreaks have been more geographically restricted with 36 distinct HPAI epizootics. Such HPAI viruses have arisen from H5 or H7 low pathogenicity avian influenza (LPAI), which the latter are non-pathogenic flora in some migratory waterfowl and shorebirds. These LPAI viruses after exposure, adaptation and circulation in gallinaceous poultry developed specific mutations in the hemagglutinin protein that conferred phenotypic traits of high pathogenicity. Most of these epizootic HPAI viruses were geographically limited, involved farm-to-farm spread and were eradicated from poultry by stamping-out programs; i.e. the HPAI viruses did not circulate in wild birds. However, an H5N1 HPAI virus emerged in 1996 in Guangdong China, and unlike the viruses in the other 35 HPAI outbreaks, has caused deaths in wild birds, poultry and humans, and spread to over 70 countries in Asia, Europe, Africa and North America; drastically changing the perspective on HPAI biology. This H5N1 HPAI virus, through genetic drift in the hemagglutinin gene, has given rise to an interrelated family of different clades of H5 HPAI viruses. Most recently, the clade 2.3.4.4 H5N1 virus gave rise to a reassortant H5N8 HPAI virus that was spread by migratory waterfowl from Eastern Asia to Western Asia, Europe and North America. A further reassortant H5N2 clade 2.3.4.4 HPAI virus appeared in December 2014 in British Columbia, Canada, and within a few weeks the whole Asian H5N8 virus and the reassortant H5N2 HPAIV appeared in a wild duck and gyrfalcon in Washington State, subsequently spreading through Pacific Flyway and to the Midwest USA. Molecular analysis indicated that the infected premises (backyard and commercial) in Western and initial premises in Midwestern USA were point source introductions from wild birds, while most cases in the Midwest had secondary spread from common sources; i.e. linkages between Midwest farms. Experimental studies in chickens, turkeys, domestic ducks and mallard ducks demonstrated the waterfowl adaptation of early H5N2 HPAI viruses, with limited infectivity and spread among gallinaceous poultry, but the later Midwest H5N2 HPAI viruses were well

adapted to terrestrial poultry, accounting for easier infection of chickens and turkeys, with common occurrence of spread between Midwest farms.

PATHOGENICITY AND TRANSMISSION OF EURASIAN HPAI H5 CLADE 2.3.4.4 VIRUSES IN AVIAN SPECIES

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In late 2014 a reassortant H5N8 clade 2.3.4.4 highly pathogenic avian influenza (HPAI) virus spread to Europe and North America with further reassortment with North American low pathogenicity avian influenza (LPAI) viruses to produce H5N2 and H5N1 HPAI viruses. Infectivity, transmissibility and pathogenesis studies using two of the earliest isolates, A/gyrfalcon/WA/41088/2014 (H5N8) and A/Northern Pintail/WA/40964/2014 (H5N2), were undertaken with chickens, turkeys, Japanese quail, ring-neck pheasants, chukar partridges, Pekin ducks, Chinese geese, and mallards. The mean death time in all gallinaceous species was late (3-9 days post exposure) when compared to Guangdong lineage H5N1 HPAI viruses (2-3 days), with infections leading to death. Neither virus appeared to be well adapted to these species, requiring doses between 3 and 6 $\log_{10}$ 50% egg infectious doses (EID_{50}) per bird to achieve 50% infection (BID_{50}). The viruses did not transmit to contact exposed chickens, but did to turkeys, quail, pheasants and partridges. The last three species were the most susceptible to both viruses and transmitted the best to contacts. On the other hand, Pekin and mallard ducks showed no illness or deaths, with BID_{50} of 3 and ≤ 2 $\log_{10}$ respectively. Both viruses were highly transmissible in mallards, and moderately transmissible in Pekin ducks. Domestic geese infected with the high doses had neurological signs and some died. These results suggest that these earlier H5N8 and H5N2 HPAI viruses have reduced virulence and transmissibility for gallinaceous hosts compared to historical H5N1 HPAIV, but are highly adapted to mallards transmitting easily among them. In addition to these two viruses, H5N2 HPAI isolates from the more recent outbreaks in poultry were examined in chickens and shown to have lower BID_{50} than the earlier viruses, indicating adaptation after circulating in these populations.

THE COMPLEXITY OF SAVING YOUR BACON: THE POLICY AND HUMAN BEHAVIORAL CHALLENGES OF PROTECTING FOOD ANIMAL HEALTH

Julia M. Smith
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Emerging diseases of socio-economic importance have food security, perceived food safety, and domestic and international trade implications for the marketing of animals or animal products. Understanding the human behavioral dimensions of the introduction, spread, identification, reporting, and containment of new, emerging and foreign pests and diseases of livestock is critically important for developing effective strategies to sustain a productive, profitable and secure food animal sector. I am working with a team of experts in animal science and veterinary medicine, agricultural economics, public policy, anthropology, adult education and risk communication to conduct inter-disciplinary applied research and outreach. Our goal is to enhance the adoption of biosecurity practices and strategies that will effectively reduce the impact of incursions of new, emerging or foreign pests or diseases of dairy, beef, and swine. This work builds off of a previous USDA-funded project, “Costs and challenges associated with developing and implementing a community-wide biosecurity plan” (AFRI grant No. 2010-851122-20613). I will discuss highlights of the earlier project and provide an overview of the current USDA CAP project, “A human behavioral approach to reducing the impact of livestock pest or disease incursions of socio-economic importance” (NIFA grant No. 2015-69004-23273). The swine industry serves as the context for current project activities.

VACCINATION WITH RECOMBINANT VIRUS-LIKE PARTICLES PROTECTS CHICKENS FROM MULTIPLE H5 INFLUENZA STRAINS INCLUDING EURASIAN H5N8 VIRUS

Peter Pushko
Medigen, Inc.

Highly pathogenic avian influenza (HPAI) viruses of H5 subtypes including recent Eurasian H5N8 virus have caused widespread mortality in domestic poultry bird populations. Dissemination of the virus results primarily from the movement of the virus through infected poultry and poultry products. Migratory birds have served as secondary vectors, rapidly spreading HPAI to Asia, Europe, US and Africa. Vaccine development for HPAI is challenging because of multiple H5 clades and genetic drift and shift. Under USDA National Institute of Food and Agriculture (NIFA) Small Business Innovation Research (SBIR) grant, Medigen developed recombinant virus-like particles (VLPs) as an innovative vaccine against H5 HPAI. A VLP was prepared that contained H5 genes from recent H5N1 HPAI isolates A/chicken/Germany/2014 (clade 2.3.4.4), A/chicken/West Java/Subang/29/2007 (clade 2.1.3) and A/chicken/Egypt/121/2012 (clade 2.2.1). Immunogenicity and efficacy of VLP vaccine were evaluated in specific pathogen-free (SPF) chickens in collaboration with USDA Southeast Poultry Research Laboratory (SEPRL) using intranasal (i.n.) vaccine administration and i.n. challenges with three HPAI viruses. Vaccination of chickens with the VLPs resulted in induction of serum antibody responses and complete protection against experimental challenges with three challenge viruses including the recent Eurasian H5N8 isolate. We conclude that these novel VLPs represent a feasible strategy for vaccination against multiple clades of H5 HPAI including Eurasian H5N8.

III. Organizational Matters

A. Bylaws of USAHA
B. USAHA Administrative Policies
C. Previous Meetings
D. USAHA Award Recipients

III. A. BYLAWS OF THE UNITED STATES ANIMAL HEALTH ASSOCIATION

APPROVED 2007

ARTICLE I – NAME

The name of this Association shall be "The United States Animal Health Association."

ARTICLE II – PURPOSE

The United States Animal Health Association is a forum for communication and coordination among State and Federal governments, universities, industry, and other concerned groups for consideration of issues of animal health and disease control, animal welfare, food safety and public health. It is a clearinghouse for new information and methods, which may be incorporated into laws, regulations, policy, and programs. It develops solutions of animal health-related issues based on science, new information and methods, public policy, risk/benefit analysis and the ability to develop a consensus for changing laws, regulations, policies, and programs.

ARTICLE III – MEMBERS

3.1. Classes of Members. The classes of members are: Official Agency Members; Allied Organization Members; Individual Members; Student Members; Elected Regional Delegate Members; International Members; Life Members; and, Honorary Members.

a. Official Agency Member. The animal health department or agency of each state, U. S. territory or commonwealth, and the District of Columbia; the animal health department of the United States of America; and such other governmental departments or agencies as the Board of Directors may, by a two-thirds majority vote, approve.

b. Allied Organization Member. Any non-profit organization that is national in scope and actively and directly concerned with and supportive of the interests and objectives of the Association as outlined in Article II-Purpose, may become a member upon approval of the Board of Directors by a two-thirds majority vote.

c. Individual Member. Any person engaged in work related to animal production, animal health, food safety, public health, veterinary medicine and animal research and who supports the interests and objectives of

the Association as outlined in Article II-Purpose, may become a member upon approval of the Executive Committee by a majority vote.

d. Elected Regional Delegate Member. Such elected regional delegates as provided for in Article VI-Board of Directors shall by virtue of such election automatically become members of the Association and shall serve from the close of the annual meeting following their election to the close of the following annual meeting and shall pay dues as the Board of Directors may determine.

e. Student Member. Any person enrolled in the study of animal production, animal health, food safety, public health, veterinary medicine, and animal health research who supports the interests and objectives of the Association as outlined in Article II-Purpose is eligible to become a member of the Association. Student members may take part in the open proceedings and meetings of the Association but shall not hold voting privileges as provided in 3.2.

f. International Member. The chief official agency member from any foreign federal animal health, food safety, public health and animal health research agency or department, and any foreign national animal industry organization or person who supports the interests and objectives of the Association as outlined in Article II-Purpose, or said person's designee, is eligible to become a member of the Association upon approval of the Board of Directors by a two-thirds majority. International Members may take part in the open proceedings and meetings of the Association but shall not hold voting privileges as provided in 3.2. However, the Association recognizes that Australia, Canada, Mexico and New Zealand are voting members and shall continue to remain full voting members after the adoption of these bylaws. New International Members shall obtain voting rights only by amendment of the bylaws.

g. Life Member. Any individual member who has maintained membership in the Association for 35 years, or if such member is at the point of retirement, for 25 years, is eligible to be a life member. Past Presidents of the Association are deemed to be life members. Life members shall have all the privileges of regular membership and shall be exempted from payment of all dues. Election to Life Membership of individual members shall be by a majority vote of the Board of Directors. Life Members shall be exempt from the payment of one-half of annual meeting registration fees; provided that retired past presidents who receive no remuneration for expenses incurred while in attendance are fully exempt from the payment of annual meeting registration fees.

h. Honorary Member. Any person not otherwise a member of the Association who has contributed materially to the advancement of animal science, food safety, public health, veterinary medicine, animal research, or the purposes of the Association, may be nominated by the Executive Committee for Honorary Membership. Honorary Membership shall be conferred by a majority vote of the Board of Directors. Honorary Members shall be exempt from the payment of all dues and shall not have voting privileges as provided in 3.2.

3.2. Voting. Each member shall have one vote, unless otherwise provided in these By-Laws.

a. By State and Federal Official Agency Members and Allied Organization Members. The director or chief executive officer of each Official Agency Member and Allied Organization Member shall appoint and certify in writing to the Executive Director of the Association a person to be its representative who shall represent, vote, and act for each of these classifications of member in all the affairs of the USAHA, until further notification.

3.3. Dues. The Board of Directors at any annual meeting shall have the power to determine the amount of dues.

a. Non-payment of Dues. Subject to any policy the Board of Directors may establish for reinstatement, failure to pay dues within 90 days of notice of delinquency shall result in automatic termination of membership.

b. Voluntary Withdrawal of Membership. A member may voluntarily terminate membership effective upon submission of notice of withdrawal to the Association but shall not be entitled to a refund of any dues paid.

3.4. Effective Date of Membership. Membership shall become effective upon submission of written application in the form required, satisfaction of eligibility requirements, election to membership by an appropriate vote of the Executive Committee, and payment of annual dues.

3.5. Suspension or Expulsion. For cause, and upon reasonable notice setting forth the specific reasons therefore any member may be suspended or terminated. Sufficient cause for such suspension or termination of membership shall be violation of these bylaws or any lawful rule or practice duly adopted by this Association, or any other conduct prejudicial to its

interests. Suspension or expulsion shall be by two-thirds vote of the entire membership of the Board of Directors.

ARTICLE IV – MEETINGS

4.1. Annual. There shall be an annual meeting between September 15 and November 15 for receiving annual reports and the transaction of other business.

a. Notice Requirements. Written notice setting forth the Agenda and location of the annual meeting shall be mailed or transmitted electronically to all members at least 60 days prior to the first day of such meeting.

b. Annual Meeting Location. The location of the annual meeting shall be selected by the Regional Districts on the following rotational basis: North Central, Northeast, Western, and Southern; and with the concurrence of the state animal health official of the state in which the meeting is to be held. The location and site shall be finally selected in accordance with guidelines proposed by the Executive Director and approved by the Executive Committee. The Board of Directors shall be advised of the selected meeting location at least five years in advance of the meeting. In the event that any annual meeting location becomes unavailable and/or unacceptable the Executive Committee is authorized to select an alternate location.

c. Closure. The annual meeting shall be considered officially closed upon the completion of the Board of Directors' meeting held on the last day of the annual meeting.

4.2. Special. Special meetings may be called by the President, in consultation with the Executive Committee, or by a majority of the Board of Directors. Notice of any special meeting shall be mailed, published in the Association newsletter and/or transmitted electronically to the membership with a statement of time and place and information as to the subject(s) to be considered at least 30 days prior to the date of the meeting. Emergency situations shall be dealt with by the Executive Director with the approval of the Executive Committee who shall provide as much notice to the Board of Directors as may be practical under the circumstances.

4.3. Committee and General Membership Meetings. Unless otherwise specifically set forth in these bylaws, all committee and general membership

actions require a majority vote provided a quorum of the voting membership is present.

4.4. Quorum. A quorum of the Executive Committee shall consist of two-thirds of its membership. A quorum of the Board of Directors shall consist of thirty (30) or more members, providing that a majority of those in attendance is comprised of Official Agency Members. A quorum of all other committees shall be ten (10) voting members or thirty percent (30%) of the committee membership, whichever is less. A quorum of the general membership shall consist of thirty (30) or more members.

4.5. Proxy Voting. Proxy voting (the power of attorney given by one person to another to vote in his or her stead) is not permitted in any meeting.

ARTICLE V – OFFICERS AND EMPLOYEES

5.1. Elected Officers. The elected officers of the Association shall be a President, President-Elect, First Vice-President, Second Vice-President, Third Vice-President, and Treasurer. They shall be voting members in good standing of the Association.

a. President. The President is the chief officer of the Association and shall preside at the annual meeting and all meetings of the Executive Committee and perform such other duties as customarily belong to that office or which the Board of Directors or Executive Committee from time to time may assign. The president is an ex-officio member of all Committees and may designate an appropriately qualified member as his designee to attend any committee meetings of the Association in his place and stead.

b. President-Elect. The President-Elect shall act in place of the President in the event of his/her absence, death, or inability to act. When so acting the President-Elect shall have all the powers of and be subject to all restrictions upon the President. Specifically, he/she shall be the chairman of all meetings of the Board of Directors. He/she shall perform such other duties as the President, Board of Directors or Executive Committee from time to time may assign. The President-Elect shall automatically become President upon election at the close of the annual meeting.

c. First Vice-President. The First Vice-President shall act in place of the President Elect in the event of his/her absence, death or inability to

act; and shall perform such other duties as the President, Board of Directors or Executive Committee may assign.

d. Second Vice-President. The Second Vice-President shall act in place of the First Vice-President in the event of his/her absence, death or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.

e. Third Vice-President. The Third Vice-President shall take the place of the Second Vice-President in the event of his/her absence, death, or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.

f. Treasurer. The Treasurer shall be the chief financial officer of the Association, shall be chairman of the Audit Committee and perform those duties that are delegated to the office by the Board of Directors and the Executive Committee. The treasurer shall not be responsible for the day-to-day financial transactions of the Association, which will be assumed by the Executive Director.

g. Election.

1) The Committee on Nominations and Resolutions shall annually report its recommendations for the offices of President, President-Elect, First Vice-President, Second Vice-President, Third Vice-President, Treasurer and Regional Delegates to the Association membership at the first business session.

2) The District from which the President originated shall submit a nominee for the office of Third Vice President.

3) Should vacancy(ies) occur before the next annual meeting, the District(s) from which the officer(s) vacated shall submit a nominee for the office of Second Vice President (if two vacancies occur a First Vice President will also need to be nominated).

4) Nominees for Regional Delegates from the Districts shall be selected by the individual districts and supplied in a timely fashion to the Committee on Nominations and Resolutions for inclusion in its report.

5) The Committee on Nominations report will be presented during the first business session. The committee report shall be posted on the registration bulletin board immediately following its presentation

at the first business session. The report shall be read again during the second business session at a time certain specified in the program for "Report of Action of the Committee on Nominations and Resolutions." If a paper is being presented at the specified time, the presentation will be completed and, immediately after, the report shall be read. If the program is ahead of schedule, a recess will be taken until the time specified in the program for the amendments to the slate presented by the Committee.

6) The report or amendments approved by a majority vote of the membership is forwarded to the Board of Directors. The acceptance of the report by a majority vote of the Board of Directors shall constitute election of the nominees to office.

h. Term. The officers shall serve for one year or until their successors are elected and qualify.

5.2. Executive Director. The Executive Director shall be employed by and serve at the pleasure of the Executive Committee, manage the Association's day-to-day affairs and perform such other duties as customarily belong to that office or as the Board of Directors or Executive Committee may assign. The Executive Committee shall prepare and negotiate a contract with the Executive Director for a period of not more than five (5) years which shall be subject to approval by a majority of the Board of Directors. If the Association does not have an Executive Director, the Board of Directors shall elect a Secretary.

ARTICLE VI – BOARD OF DIRECTORS

6.1. Board of Directors. The Board of Directors shall have authority over all matters of the Association within the limits of the bylaws.

6.2. Composition. The Board of Directors shall be composed of the following:

- **a.** The Official Agency Members or their designees
- **b.** One representative selected by each of the Allied Organization Members
- **c.** Two delegates-at-large from each of the four regional districts
- **d.** Past presidents of the Association
- **e.** The International Member who is the chief animal health executive officer representing the principal federal animal health department of Canada, Mexico, Australia and New Zealand, or said person's designee.

f. Members of the Executive Committee

6.3. Meetings. The Board of Directors shall have a regular meeting at the time and place of the annual meeting, and shall meet at such other times and places selected by the President or by request of a majority of the directors, in which latter event, the President shall promptly set the time and place of the meeting. Notice of all meetings of the Board of Directors shall be mailed, published in the Association newsletter or transmitted electronically at least thirty days in advance of such meetings. The President, on such reasonable notice as may be practicable under the circumstances, may call emergency meetings of the Board of Directors. At any meeting of the Board of Directors, the President Elect (Chairman of the Board of Directors), with a majority vote of the Board of Directors, may call for an Executive Session limiting attendance.

6.4. Duties. The Board of Directors shall: receive all committee reports and accept or reject all or part of them; review and approve or disapprove with comment the actions of the Executive Committee; and perform such other functions set forth in the By-Laws of the Association.

ARTICLE VII – EXECUTIVE COMMITTEE

7.1. Executive Committee. The Association shall have an Executive Committee composed of the elected officers and the immediate Past President of the Association. In addition, the Executive Director shall serve as an ex officio, non-voting member of the Executive Committee and shall not be counted for the purpose of determining a quorum.

7.2. Duties. The Executive Committee shall manage the financial, administrative and internal affairs of the Association when the Board of Directors is not in session. To exercise the authority of the Board of Directors, the Executive Committee must act as a whole, and must forthwith submit its action for approval at the next meeting of the Board of Directors.

7.3. Meetings. The Executive Committee shall meet at least four times each fiscal year at such time and place and upon such notice as the President determines. The Executive Committee is authorized to take action upon the concurring votes of a majority of its total membership, provided that a quorum is present.

7.4. Emergency Meetings. Should the President determine that an emergency situation exists, the President may convene a telephone or other

type of electronic conference meeting of the Executive Committee, which may then act provided a quorum participates.

ARTICLE VIII – ORGANIZATIONAL DISTRICTS

8.1. Districts. The Association shall be organized into five districts composed of the Northeast Regional District, the North Central Regional District, the Southern Regional District, the Western Regional District and the District-At-Large.

a. The Northeast Regional District consists of Association members of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the District of Columbia.

b. The North Central Regional District consists of Association members of the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

c. The Southern Regional District consists of Association members of the states of Alabama, Arkansas, Georgia, Florida, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; and the Virgin Islands and Puerto Rico.

d. The Western Regional District consists of Association members of the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

e. The District-At-Large shall be composed of the Allied Organization Members and the Elected Regional Delegate Members and Past Presidents.

ARTICLE IX – STANDING AND SPECIAL COMMITTEES

9.1. General. The President shall annually appoint from the members of the Association such standing or special committees or subcommittees and their chairpersons as may be required by the bylaws or as he/she may find necessary. Each committee shall meet at least once per year at the time of the annual meetings of the Association, and at such other times as the President of the Association and committee Chairman deem necessary to accomplish the work of the Committee. Only members of the Association

permitted by these by-laws are permitted to vote on the work of the committee.

9.2. Program Committee. A program committee shall be appointed by the President and shall consist of the chairpersons of all committees and the elected officers of the Association to develop the programs for the annual and any special meetings of the Association with the goal of furthering the purposes of the Association. The Program Committee shall be chaired by the President-Elect and co-chaired by the First Vice-President.

9.3. Committee on Nominations and Resolutions. The Committee on Nominations and Resolutions shall be comprised of the living past presidents of the Association, the Presidents of the Northeast, North Central, Southern and Western Regional Districts, and the President of the District-At-Large.

a. Chairman. The immediate past President of the Association shall chair this committee.

b. Nomination of Elected Officers. This Committee shall receive, consider and recommend to the Association's membership at the annual meeting nominations for the elected officers specified in 5.1 and delegates from each district as specified in 6.2.c. The recommendation of elected officers and delegates from each district shall be submitted no later than the third day of September next preceding the annual meeting at which the election will be held.

c. Resolutions. This committee shall review all resolutions of the standing and special committees (the Executive Committee and Board of Directors are standing Committees) for ambiguities and redundancy, but shall not alter their intent. After this review, this committee shall present the resolutions to the general membership for approval, which shall require a majority vote.

9.4. Audit Committee. The Audit Committee shall receive the annual audit report, and confirm that all financial affairs of the Association are in order and make such recommendations to the Board of Directors as may be necessary to ensure the proper management of the finances of the Association.

9.5. Special Committees. The President with the advice of the Executive Committee shall appoint the chairman and members of such other committees as are necessary to accomplish the purposes of the Association.

ARTICLE X – MISCELLANEOUS

10.1. Amendments.

a. These bylaws may be amended by: (1) Specific proposed amendment(s) being presented in writing to the Executive Committee for review. The Executive Committee shall then provide their recommendations on the proposed amendments to the Board of Directors for deliberation and action; (2) If preliminarily approved by majority vote of the Board of Directors, the proposed amendment(s) shall then be presented to the membership; by publication in the next annual meeting proceedings; (3) The proposed amendment(s) shall then be presented to the membership at the next annual meeting.

b. Amendments to bylaws shall be presented section-by-section at a meeting of the members and shall be approved only upon an affirmative vote of two-thirds of the voting members, provided a quorum is present.

c. In the event the amendment(s) proposed are not approved by the Board of Directors as set forth in (1), then the proposed amendment(s) may be presented by a petition signed by at least thirty members which shall result in their proceeding through steps (2) and (3) above as if the Board of Directors had initially approved the proposed amendment(s).

10.2. Fiscal Year. The Executive Committee shall from time to time establish the Association's fiscal year.

10.3. Parliamentary Procedure. Robert's Rules of Order Newly Revised shall govern the proceedings of the Association, the Board of Directors and all committees in all cases not otherwise provided for in applicable federal or state statute or rule, the articles of incorporation or bylaws of the Association or its policies or procedures.

10.4. Confidential Information. Confidential information of the Association shall be maintained in confidence and not used for any other than Association purposes nor disclosed to others, except as permitted by law, these bylaws or written consent of the Association, by Association members, directors, officers, employees and agents.

10.5. Liability of Officers and Directors. The officers and directors of the Association shall not be personally liable for the debts or actions of the Association.

10.6. Annual Audit. The Association shall cause an independent certified public accountant, selected by the Executive Committee, to make an annual examination of its financial accounts and shall submit the report of examination to Audit Committee.

10.7. Compensation/Reimbursement. No member of the Board of Directors, committee member or elected officer of the Association shall receive any compensation for his or her services as such. The Association shall develop policies providing for reimbursement of expenses reasonably incurred in attending meetings and performing special assignments of the Association by the elected officers.

10.8. Dissolution. In the event of dissolution, the Association shall distribute its assets as required by the laws and statutes of the State of Delaware; and distribute its remaining net assets in a manner permitted an entity to maintain its status as exempt from taxation under Section 501 (c) (5) of the Internal Revenue Code of 1986, as amended, or any successor provision.

III. B. USAHA ADMINISTRATIVE POLICIES

ESTABLISHMENT AND OPERATION OF STANDING COMMITTEES

2012

1. All members of standing committees must be official members of USAHA in good standing in accordance with Section 3.4 of the bylaws.
2. The Chair, Vice Chair, and all members of USAHA Committees shall be appointed by the President. It is expected that member appointments will be made in consultation with Committee Chair.
3. Efforts should be made to keep committee size to a manageable number of members, and to maintain a geographical balance, as well as an appropriate balance of State, federal, industry and technical members.
4. Committee Chairs shall be appointed for term of not more than five years, and should not be reappointed Chair for at least one year.
5. All USAHA members present at committee meetings may enter into discussions. Only committee members may introduce resolutions or vote on items of business.
6. Committees shall submit reports only to the Board of Directors and Resolutions only to the Committee on Nominations and Resolution. Committee reports are not considered official actions until approved by the Board of Directors. Committee resolutions are not considered official actions of USAHA until approved by the general membership.
7. Committee Chairs may appoint subcommittees as necessary. Subcommittee members must be members of the parent committee. Subcommittees shall deliberate only the subject matter(s) delegated to them by the parent committee and shall report only to the parent committee.
8. Committee rosters for the current year should be finalized no later than 30 days prior to the start of the Annual Meeting.

PARTICIPATION IN USAHA OF FEDERAL AGENCIES AND FEDERAL EMPLOYEES

2009

Federal agencies and personnel have long been an integral and valuable part of USAHA. Agencies have taken part in the organization through official membership and representation on the Board of Directors. This provides the opportunity for presenting agency positions and concerns to the Association. Individual membership and participation of numerous animal health, food safety, and research professionals from a variety of federal agencies is critical to the committees' success.

A major function of USAHA is development of policies and procedures of national disease control and eradication programs. This means that many committee findings and resolutions constitute recommendations to the

appropriate federal agency which is responsible for the area of concern. Some of these recommendations are contrary to agency policy or position. For this reason, federal employees should actively share their expertise and opinions as committee members, but should not serve as chairs where they would be making recommendations to their employer.

A number of committees have used federal employees as assistant chairs to good advantage. Also, committees which do not deal with federal agency policy may be chaired by federally-employed USAHA members where appropriate.

The Executive Committee is responsible for the daily activities of the Association, and represents the Association on a year-round basis. To avoid conflict of interest, federal employees should not serve in elected officer positions of the Association. Individuals that serve as an officer that become employed by the federal government should resign their officer position, and a replacement should be sought in accordance with the bylaws.

FINANCIAL AND INVESTMENT POLICY

2008

The following policy outlines the administrative principles of the United States Animal Health Association reserve funds.

Goals

1. Build and maintain two year's operation expenses in reserves.
2. Maintain adequate liquidity in the instance funds must be called for use.
3. Earn reasonable interest on reserves to maintain principle and exceed economic inflation rates.

Delegation of Authority

Both Treasurer and Executive Director should be designated as signors on any USAHA accounts. At this time, USAHA will not employ a third-party account manager to manage investments. However, USAHA may utilize the services of a brokerage manager for locating investment opportunities and advice.

Responsibilities

- Treasurer: Primary authority for investment decisions, acting within parameters of investment policy. Responsible for monthly review of financials and chairing audit committee.
- Executive Director: Manager of investments, to act under direction of Treasurer. Provide research, recommendations to Treasurer for decisions. Responsibility for day-to-day bookkeeping and reporting (to Treasurer/Executive Committee) of financial information. Compile and distribute quarterly investment reports to EC.

- Executive Committee: Provide regular review of investments from quarterly reports. Provide oversight of Treasurer and Executive Director decisions.
- Board of Directors: Provide approval and/or amendments to investment policy for execution.

Asset Management

USAHA shall put at risk no principle of its reserve funds or operating funds. Investments will be held in secured, FDIC insured institutions. Investments should be less than $100,000 in any single financial institution whenever possible.

All cash received will be deposited into the checking account. To the extent possible, the checking account balance should not exceed $100,000 at the end of each monthly reporting period.

Reserve funds shall be invested in Certificates of Deposit, Money Market, Treasury Bills or Treasury Notes as determined by the Treasurer. The following guidelines will assist in determining terms to allow reasonable liquidity should the reserves be needed.

- Maximum of 25% of Reserve Funds in products of greater than 4 years.
- Maximum of 25% of Reserve Funds in products of 24 months to 4 years.
- Minimum of 40% of Reserve Fund in products less than 24 months.
- Minimum of 10 % of Reserve funds in money market savings account for immediate liquidity.

USAHA shall make efforts to ladder CD maturity dates so that at least $50,000 comes due in each fiscal quarter.

This policy will be reviewed annually by the Executive Committee, with any amendments to be brought before the Board of Directors.

Reserve Fund Balance *(2010)*

USAHA targets a financial reserves balance equal to two years of operating expenses. The Treasurer and Executive Director are responsible for monitoring this status, and reporting accordingly to the Executive Committee.

Should the reserve balance drop below the target amount, the following criteria should take place:

85-99% of Target Balance

The Executive Committee shall make appropriate budget adjustments to increase funds to target amount within one year, or an appropriate timeframe according to current economic conditions.

50% - 84% of Target Balance

The Executive Committee shall make appropriate financial cuts and budget adjustments to increase funds to target amount within three years, or a more appropriate timeframe according to current economic conditions.

Less than 50%

The Executive Committee shall undertake a major financial overhaul of the organization and develop a plan to: 1) operate in a sustainable manner and 2) rebuild the reserve funds to the target area. Adjustments should be made immediately upon Executive Committee approval of the new plan, with modifications subject to Board of Directors at the next annual meeting.

Should the above mitigations prove unsuccessful, the Executive Committee should evaluate all options for the organization to reduce expenses to a sustainable manner. This can include merging management with other organizations, merging the organization collectively with another, or ceasing operations altogether, in which case the organization will be dissolved according to the bylaws and applicable laws.

YEAR-ROUND ACTIVITIES

2008

USAHA is a year-round organization, and is often asked to comment on specific issues related to its mission. USAHA should first refer to its resolutions to address a given issue.

USAHA staff will act upon all resolutions as directed by the membership and Board of Directors, involving necessary correspondence. For issues that arise, that pertain to resolutions, can have direct action taken as deemed necessary. No additional voting is necessary, though the input of the executive committee is encouraged.

Should an issue be presented that no resolution has been approved, the Executive Director/Secretary will coordinate with President and First Vice President (Chair of Government Relations) to determine if USAHA should address the specific issue, with consensus from the Executive Committee.

SPECIAL FUNDS POLICY

2009

USAHA will manage special funds for Committees and closely related organizations to house finances and bookkeeping services. Special funds will be held separate of the general USAHA fund, and USAHA will record transactions accordingly. USAHA will enter into a written agreement for each account with the primary representative of the group or Committee and a designated treasurer for that account. The designated account treasurer holds authority for all transactions. Special fund oversight is held by the USAHA Treasurer with support of the Secretary/Executive Director.

JOB POSTINGS FOR NEWS ALERTS AND WEB SITE

2010

USAHA has available opportunities for distributing position announcements through its daily News Alert Summaries, currently on a weekly basis. The following policy sets forth guidelines for use of this service.

USAHA Job Postings are available to any member of the association at no fee. The association will post positions to its web site in addition to the distribution among members.

Non-member groups may also submit positions, however, are subject to review and approval for distribution. The following criteria will be considered:

1) Animal health or animal agriculture related
2) Fields of veterinary medicine, research, diagnostics, regulatory, technical services, non-profit, and/or other related supporting disciplines
3) Align with the mission of USAHA

USAHA reserves the right to refuse posting of any position.

OFFICIAL AGENCY, ALLIED ORGANIZATION MEMBER SUBSTITUTIONS

2011

Official Agency and Allied Organization Members have a designated representative to serve on the board of directors and receive the member benefits for that organization. Occasionally, the designated representative is unable to attend all or some of the annual meeting. In these instances, the representative can designate a substitution to fulfill their obligations on behalf of their agency/organization. This includes:

-Board of Directors Meetings
-Membership Meetings
-Committee Meetings (of which the original representative is an appointed member)

While the USAHA Bylaws state that proxy voting is not allowed, the substitution is treated differently as a transfer of the representative duties.

STUDENT MEMBERSHIP POLICY

2012

Students must be a full-time student in an accredited college or university, in a field of study outlined in the bylaws, part 3.1, E in order to be eligible as a student member and to receive student meeting registration rates.

POLICIES REGARDING USAHA ANNUAL MEETING

ANNUAL MEETING SPEAKER REGISTRATION/COMPLIMENTARY REGISTRATION

Revised 2011

USAHA will not provide complimentary registration to any member or regular attendee of USAHA annual meetings that is speaking on a committee agenda.

USAHA will provide a complimentary registration to non-member, invited speakers by request for committees for the purpose of presenting to a committee or general session. Requests must be submitted to the USAHA office.

USAHA will consider providing for travel expenses for general session and committee speakers on a limited basis. Requests must be submitted to the Executive Committee in advance, with consideration being given to a proposed speaker's expertise, timeliness of subject matter, likelihood of attending the meeting otherwise, and budgetary capabilities.

VIDEO & AUDIO RECORDING OF COMMITTEE PROCEEDINGS
2008

USAHA prohibits third-party video and audio recording of committee meetings at the Annual Meeting.

THIRD PARTY MEETINGS
2008

USAHA will permit related organizations, with missions consistent with those of USAHA, to partner in its Annual Meeting to provide a venue for their gatherings. Agreements are arranged on a case-by-case basis, with input from the Program Chair and approval by the Executive Committee. In general, these organizations are expected to cover related expenses to USAHA for their event. Attendees are also expected to pay registration fees for the Annual Meeting.

AAVLD PARTNERSHIP
2008

USAHA will maintain a Memorandum of Understanding with AAVLD regarding all issues surrounding the Annual Meeting execution. The MOU will serve as a basis for coordination between the two organizations, and be reviewed annually.

ANNUAL MEETING HOST STATE BENEFITS POLICY
2010

As the State hosting the Annual Meeting is often requested to provide support to the organization in terms of staff, supplies and time commitments, USAHA will provide reciprocal in-kind benefits to the hosting State to help offset those costs. USAHA will provide one complimentary registration for every three (3) paid registrations for host state employees. The state animal health official is responsible for communicating the complimentary registration designees to USAHA by the pre-registration deadline. Exceptions to this guideline are subject to review and approval by the Executive Committee.

DIRECTOR, OFFICER AND STAFF RELATED POLICIES

REIMBURSEMENT AND EXPENSES

2008

In accordance with the Bylaws, Section 10.7, USAHA may provide reimbursement or stipend to its officers, board of directors or committee leadership for reasonable expenses incurred while performing specific assignments of the Association. Requests must be submitted to the Executive Committee for approval in advance of the assignment. The Executive Committee will remain judicious in granting requests and mindful of budgetary limitations when considering requests.

USAHA will reimburse staff for all reasonable expenses incurred while performing duties of the Association. Each individual will furnish full documentation of expenses for audit purposes, subject to review of the Treasurer.

Mileage will be reimbursed at the federal Internal Revenue Service rate.

CONFLICT OF INTEREST POLICY

2008

Due to increased scrutiny of non-profit organizations, by the IRS and requirements for increased transparency, USAHA should have in place a conflict of interest policy for its Board of Directors, Officers and Employees. Policy:

Any member or employee involved in a business transaction of the United States Animal Health Association in which a conflict of interest may be present, shall notify the Executive Committee promptly. Said individual shall refrain from voting on such transactions, and exclude themselves from deliberations. The individual will refrain from any personal influence on the transaction. A transaction that involves a conflict of interest should be reviewed against relative competitive bids or proposals. Decisions to pursue a transaction with a potential conflict of interest should first uphold the best interests of USAHA, and include terms that are reasonable to USAHA within the given marketplace.

Approvals will be made by the Executive Committee. A written disclosure summarizing any possible conflict of interest shall be kept on file at the USAHA office. Discussion and resolution shall be indicated in the minutes of the USAHA Executive Committee session.

Conflict of interest should be disclosed if: a transaction of USAHA involves any close relative of a Director or Employee as the direct vendor/provider, or the Director/Employee stands material gain through a transaction. A Director or Employee holds financial interest if holdings are of 5% or greater of the potential vendor, or holds position of influence with an organization that seeks to do business with USAHA.

A close relative is defined as any parent, spouse, sibling, child, grandchild, or spouse of the aforementioned. Also to be included would be

any individual residing in the same household that would resemble a parental or marital relationship.

WHISTLEBLOWER POLICY

2008

Employees and members of USAHA should report illegal or unethical activities, directly relating to the business of USAHA, to the President. The President, in consultation with the Executive Committee, will then determine appropriate actions for investigation, reporting to proper authorities, and reconciliation as necessary.

Employees and members will be provided full confidentiality for reporting such activities, and the President and Executive Committee will ensure due diligence in protecting against retaliation by the organization, its members or other employees and supervisors.

DOCUMENT RETENTION AND DESTRUCTION POLICY

2008

USAHA will maintain all financial records for seven years. They will then be disposed of by either cross-shredding or incineration.

Meeting registrations and membership renewals will be kept for three years.

USAHA PROFESSIONAL DEVELOPMENT SUPPORT

2011

USAHA sees the importance of continuing education for its employees. USAHA may support the opportunities sought by its employees to enhance his/her skill sets. The following is an outline of benefit for employees.

USAHA may provide support as follows:

General

Support for professional development must be pre-approved by the employee's supervisor prior to commitment in order to receive benefits. Any opportunity should be directly beneficial to current job functions or can be justified as direct future benefit to the Association.

Flexible Scheduling

USAHA may work with employee to accommodate scheduling of work hours to allow for professional development. This can include:

- University/College courses during normal work hours
- Conferences/seminars for professional development
- Other events with pre-approval of supervisor

Employees should strive to maintain a full work week (40 hours) by making up any lost time at hours mutually agreed upon by employee and supervisor.

Academic Courses

USAHA may support tuition for courses directly beneficial to the employee's job duties, up to $1000 per fiscal year. Tuition will be reimbursed

upon completion of the course by the employee, with a minimum of a C grade or relative “passing” status when grading is not applicable. Courses will be considered regardless of degree/non-degree track.

(*Reimbursements are a taxable benefit.)

Conference/Seminar Registration

USAHA may support registration costs for conferences, seminars or other related courses (self-directed, web-based, etc.) Such programs should enhance the employee’s ability to do current job functions, or expand skill sets to take on additional duties. USAHA may support up to three conferences per year to a maximum of $1000, unless employee is taking academic courses.

Travel

Travel, lodging and meals are reimbursable at federal per diem rates for development opportunities outside of local meetings, such as the St. Joseph or Kansas City areas.

III. C. Previous Meetings of the United States Animal Health Association

No.	Date	Place of Meeting	President	Secretary/Executive
1	Sept. 27-28, 1897 †	Fort Worth, TX	*Mr. C.P. Johnston, Springfield, IL	*Mr. D. O. Lively, Fort Worth, TX
2	Oct. 11-12, 1898	Omaha, NE	*Mr. C.P. Johnston, Springfield, IL	*Mr. Taylor Riddie, KS
3	Oct. 11-12, 1899 ††	Chicago, IL	*Mr. C.P. Johnston, Springfield, IL	*Mr. Mortimer Levering, Lafayette, IN
4	Oct. 2-3, 1900	Louisville, KY	*Mr. C.P. Johnston, Springfield, IL	*Dr. E.T. Eisenman, Louisville, KY
5	Oct. 8-9, 1901	Buffalo, NY	* Dr. E.P. Niles, VA	*Dr. E.T. Eisenman, Louisville, KY
6	Sept. 23-24, 1902	Wichita, KS	*Mr. W.H. Dunn, TN	*Mr. Wm. P. Smith, Monticello, IL
7	Sept. 22-23, 1903	Denver, CO	*Mr. E. Bolton, Woodward, OK	*Mr. Wm. P. Smith, Monticello, IL
8	Aug. 23-24, 1904	St. Louis, MO	*Dr. J.C. Norton, AZ	*Mr. Wm. P. Smith, Monticello, IL
9	Aug. 15-16, 1905	Guthrie, OK	*Mr. Wm. P. Smith, Monticello, IL	*Dr. S. H. Ward, St. Paul, MN
10	Aug. 15-16, 1906	Springfield, IL	*Mr. M. M. Hankins, Quanah, TX	*Dr. S. H. Ward, St. Paul, MN
11	Sept. 16-17, 1907	Richmond, VA	*Dr. D. F. Luckey, Columbia, MD	*Dr. S. H. Ward, St. Paul, MN
12	Sept. 14-16, 1908	Washington, DC	*Dr. Charles G. Lamb, CO	*Dr. C. E. Cotton, St. Paul, MN
13	Sept. 13-15, 1909 ‡	Chicago, IL	*Dr. W. H. Dalrymple, Baton Rouge, LA	*Dr. C. E. Cotton, St. Paul, MN
14	Dec. 5-7, 1910	Chicago, IL	*Dr. C. E. Cotton, St. Paul, MN	*Mr. J. J. Ferguson, Chicago, IL
15	Dec. 5-6, 1911	Chicago, IL	*Dr. John F. Devine, Goshen, NY	*Mr. J. J. Ferguson, Chicago, IL
16	Dec. 3-5, 1912	Chicago, IL	*Dr. Macyck P. Ravener, Madison, WI	*Mr. J. J. Ferguson, Chicago, IL
17	Dec. 2-4, 1913	Chicago, IL	*Dr. Peter F. Bahnsen, Atlanta, GA	*Mr. J. J. Ferguson, Chicago, IL
18	Feb. 16-18, 1914	Chicago, IL	*Dr. S.H. Ward, St. Paul, MN	*Mr. J. J. Ferguson, Chicago, IL
19	Dec. 2-3, 1915	Chicago, IL	*Dr. J. L. Gibson, Des Moines, IA	*Mr. J. J. Ferguson, Chicago, IL
20	Dec. 5-7, 1916	Chicago, IL	*Dr. O. E. Dyson, Springfield, IL	*Mr. J. J. Ferguson, Chicago, IL
21	Dec. 3-5, 1917	Chicago, IL	*Dr. J. G. Wills, Albany NY	*Dr. S. H. Ward, St. Paul, MN
22	Dec. 2-4, 1918	Chicago, IL	*Dr. M. Jacob, Knoxville, TX	*Dr. S. H. Ward, St. Paul, MN
23	Dec. 1-3, 1919	Chicago, IL	*Dr. G. W. Dumphy, Lansing, MI	*Dr. D. M. Campbell, Chicago, IL

No.	Date	Place of Meeting	President	Secretary/Executive
24	Nov. 29-Dec. 1, 1920	Chicago, IL	*Dr. S. F. Musselman, Frankfort, KY	*Dr. D. M. Campbell, Chicago, IL
25	Nov. 28-30, 1921	Chicago, IL	*Dr. W. F. Crewe, Bismarck, MD	*Dr. Theo. Burnett, Columbus, OH
26	Dec. 6-8, 1922	Chicago, IL	*Dr. T. E. M. Munce, Harrisburg, PA	*Dr. Theo. Burnett, Columbus, OH
27	Dec. 5-7, 1923	Chicago, IL	*Dr. W.J. Butler, Henena, MT	*Dr. O.E. Dyson, Kansas City, MO
28	Dec. 3-5, 1924	Chicago, IL	*Dr. J. G. Ferneyhough, Richmond, VA	*Dr. O.E. Dyson, Kansas City, MO
29	Dec. 2-4, 1925	Chicago, IL	*Dr. J. H. McNeil, Trenton, NJ	*Dr. O.E. Dyson, Kansas City, MO
30	Dec. 1-3, 1926	Chicago, IL	*Dr. John R. Mohler, Washington, DC	*Dr. O.E. Dyson, Kansas City, MO
31	Nov. 30-Dec. 2, 1927	Chicago, IL	*Dr. L. Van Es, Lincoln, NE	*Dr. O.E. Dyson, Kansas City, MO
32	Dec. 5-7, 1928	Chicago, IL	*Dr. C. A. Cary, Auburn, AL	*Dr. O.E. Dyson, Kansas City, MO
33	Dec. 4-6, 1929	Chicago, IL	*Dr. Chas. O. Lamb, Denver, CO	*Dr. O.E. Dyson, Kansas City, MO
34	Dec. 3-5, 1930	Chicago, IL	*Dr. A. E. Wright, Washington, DC	*Dr. O.E. Dyson, Kansas City, MO
35	Dec. 2-4, 1931	Chicago, IL	*Dr. J. W. Connaway, Columbia, MD	*Dr. O.E. Dyson, Kansas City, MO
36	Nov. 30-Dec. 2, 1932	Chicago, IL	*Dr. Peter Malcolm, Des Moines, IA	*Dr. O.E. Dyson, Kansas City, MO
37	Dec. 6-8, 1933	Chicago, IL	*E. T. Faulder, Albany, NY	*Dr. O.E. Dyson, Kansas City, MO
38	Dec. 5-7, 1934	Chicago, IL	*Dr. T. E. Robinson, Providence, RI	*Dr. O.E. Dyson, Kansas City, MO
39	Dec. 4-6, 1935	Chicago, IL	*Dr. Edward Records, Reno, NV	*Dr. O.E. Dyson, Kansas City, MO
40	Dec. 2-4, 1936	Chicago, IL	*Dr. Walter Wisnicky, Madison, WI	*Dr. O.E. Dyson, Kansas City, MO
41	Dec. 1-3, 1937	Chicago, IL	*Dr. R. W. Smith, Concord, NH	*Dr. O.E. Dyson, Kansas City, MO
42	Nov. 30-Dec. 2, 1938	Chicago, IL	*Dr. D. E. Westmoreland, Frankfort, KY	*Dr. O.E. Dyson, Kansas City, MO
43	Dec. 6-8, 1939	Chicago, IL	*Dr. J. L. Axby, Indianapolis, IN	*Dr. O.E. Dyson, Kansas City, MO
44	Dec. 4-6, 1940	Chicago, IL	*Dr. H. D. Port, Cheyenne, WY	*Dr. Mark Welsh, College Park, MD
45	Dec. 3-5, 1941	Chicago, IL	*Dr. E. A. Crossman, Boston, MA	*Dr. Mark Welsh, College Park, MD
46	Dec. 2-4, 1942	Chicago, IL	*Dr. I. S. McAdory, Auburn, AL	*Dr. Mark Welsh, College Park, MD

No.	Date	Place of Meeting	President	Secretary/Executive
47	Dec. 1-3, 1943	Chicago, IL	*Dr. W. H. Hendricks, Salt Lake City, UT	*Dr. R.A. Hendershott, Trenton, NJ
48	Dec. 6-8, 1944	Chicago, IL	*Dr. J. M. Sutton, Atlanta, GA	*Dr. R. A. Hendershott, Trenton, NJ
49	Dec. 5-7, 1945	Chicago, IL	*Dr. C. U. Duckwork, Sacramento, CA	*Dr. R. A. Hendershott, Trenton, NJ
50	Dec. 4-6, 1946	Chicago, IL	*Dr. William Moore, Raleigh, NC	*Dr. R. A. Hendershott, Trenton, NJ
51	Dec. 3-5, 1947	Chicago, IL	*Dr. Will J. Miller, Topeka, KS	*Dr. R. A. Hendershott, Trenton, NJ
52	Oct. 13-15, 1948	Denver, CO	*Dr. Jean V. Knapp, Tallahassee, FL	*Dr. R. A. Hendershott, Trenton, NJ
53	Oct. 12-14, 1949	Columbus, OH	*Dr. T. O. Brandenburg, Bismarck, ND	*Dr. R. A. Hendershott, Trenton, NJ
54	Nov. 1-3, 1950	Phoenix, AZ	*Dr. C. P. Bishop, Harrisburg, PA	*Dr. R. A. Hendershott, Trenton, NJ
55	Nov. 14-16, 1951	Kansas City, KS	*Mr. F. E. Mollin, Denver, CO	*Dr. R. A. Hendershott, Trenton, NJ
56	Oct. 29-31, 1952	Louisville, KY	*Dr. Ralph L. West, St. Paul, MN	*Dr. R. A. Hendershott, Trenton, NJ
57	Sept. 23-25, 1953	Atlantic City, NJ	*Dr. T. Childs, Ottawa, Canada	*Dr. R. A. Hendershott, Trenton, NJ
58	Nov. 10-12, 1954	Omaha, NE	*Dr. T. C. Green, Charleston, WV	*Dr. R. A. Hendershott, Trenton, NJ
59	Nov. 16-18, 1955	New Orleans, LA	*Dr. H. E. Wilkins, Helena, MT	*Dr. R. A. Hendershott, Trenton, NJ
60	Nov. 28-30, 1956	Chicago, IL	*Dr. A. L. Brueckner, Baltimore, MD	*Dr. R. A. Hendershott, Trenton, NJ
61	Nov. 13-15, 1957	St. Louis, MO	*Dr. G. H. Good, Cheyenne, WY	*Dr. R. A. Hendershott, Trenton, NJ
62	Nov. 4-6, 1958	Miami Beach, FL	*Dr. John G. Milligan, Montgomery, AL	*Dr. R. A. Hendershott, Trenton, NJ
63	Nov. 15-18, 1959	San Francisco, CA	*Mr. F. G. Buzzell, Augusta, ME	*Dr. R. A. Hendershott, Trenton, NJ
64	Oct. 17-21, 1960	Charleston, WV	*Dr. J. R. Hay, Chicago, IL	*Dr. R. A. Hendershott, Trenton, NJ
65	Oct. 30-Nov. 3, 1961	Minneapolis, MN	*Dr. A. P. Schneider, Boise, ID	*Dr. R. A. Hendershott, Trenton, NJ
66	Oct. 30-Nov. 2, 1962	Washington, DC	*Dr. W. L. Bendix, Richmond, VA	*Dr. R. A. Hendershott, Trenton, NJ
67	Oct. 15-18, 1963	Albuquerque, NM	*Dr. T. J. Grennan, Jr. Providence, RI	*Dr. R. A. Hendershott, Trenton, NJ
68	Oct. 19-23, 1964	Memphis, TN	*Dr. L. A. Rosner, Jefferson City, MO	*Dr. R. A. Hendershott, Trenton, NJ

No.	Date	Place of Meeting	President	Secretary/Executive
69	Oct. 25-29, 1965	Lansing, MI	*Dr. J. W. Safford, Helena, MT	*Dr. R. A. Hendershott, Trenton, NJ
70	Oct. 10-14, 1966	Buffalo, NY	*Dr. C. L. Campbell, Tallahassee, FL	*Dr. R. A. Hendershott, Trenton, NJ
71	Oct. 16-20, 1967	Phoenix, AZ	*Dr. Grant S. Kaley, Albany, NY	*Dr. R. A. Hendershott, Trenton, NJ
72	Oct. 6-11, 1968	New Orleans, IA	*Dr. John F. Quinn, Lansing, MI	*Dr. W.L. Bendix, Richmond, VA
73	Oct. 12-19, 1969	Milwaukee, WI	*Dr. John L. Oharra, Reno, NV	*Dr. W.L. Bendix, Richmond, VA
74	Oct. 18-23, 1970	Philadelphia, PA	*Dr. Frank B. Wheeler, Baton Rouge, LA	*Dr. W.L. Bendix, Richmond, VA
75	Oct. 24-29, 1971	Oklahoma City, OK	*Dr. M.D. Mitchell, Pierre, SD	*Dr. W.L. Bendix, Richmond, VA
76	Nov. 5-10, 1972	Miami Beach, FL	*Dr. J. C. Shook, Mechanicsburg, PA	*Dr. W.L. Bendix, Richmond, VA
77	Oct. 14-19, 1973	St. Louis, MO	*Dr. W. C. Tobin, Denver, CO	*Dr. W.L. Bendix, Richmond, VA
78	Oct. 13-18, 1974	Roanoke, VA	*Mr. O. H. Timm, Dixon, CA	*Dr. W.L. Bendix, Richmond, VA
79	Nov. 2-7, 1975	Portland, OR	*Dr. J. E. Andrews, Atlanta, GA	*Dr. W.L. Bendix, Richmond, VA
80	Nov. 7-12, 1976	Miami Beach, FL	*Dr. H. E. Goldstein, Columbus, OH	*Dr. W.L. Bendix, Richmond, VA
81	Oct. 16-21, 1977	Minneapolis, MN	*Dr. A. E. Janawicz, Montpelier, VT	*Dr. W.L. Bendix, Richmond, VA
82	Oct. 21-Nov. 3, 1978	Buffalo, NY	**Dr. L. E. Bartell, Sacramento, CA	*Dr. W.L. Bendix, Richmond, VA
83	Oct. 28-Nov. 2, 1979	San Diego, CA	*Dr. T. F. Zweigart, Raleigh, NC	*Dr. J. C. Shook, Hyattsville, MD
84	Nov. 2-7, 1980	Louisville, KY	*Mr. B. W. Hawkins, Ontario, OR	*Dr. J. C. Shook, Hyattsville, MD
85	Oct. 11-16, 1981	St. Louis, MO	*Dr. L. W. Hinchman, Indianapolis, IN	*Dr. J. C. Shook, Hyattsville, MD
86	Nov. 7-12, 1982	Nashville, TN	Dr. G. B. Rea Salem, OR	*Dr. J. C. Shook, Hyattsville, MD
87	Oct. 15-21, 1983	Las Vegas, NV	Dr. J. R. Ragan, Nashville, TN	*Dr. J. C. Shook, Annapolis, MD
88	Oct. 21-26, 1984	Fort Worth, TX	*Mr. J. O. Pearce, Jr. Okeechobee, FL	*Dr. J. C. Shook, Annapolis, MD
89	Oct. 27-Nov. 1,1985	Milwaukee, WI	*Dr. David U. Walker, Montpelier, VT	*Dr. J. C. Shook, Annapolis, MD
90	Oct. 14-19, 1986	Louisville, KY	*Dr. N. W. Kruse, Lincoln, NE	*Dr. J. C. Shook, Mechanicsburg, PA

No.	Date	Place of Meeting	President	Secretary/Executive
91	Oct. 25-30, 1987	Salt Lake City, UT	*Dr. J. F. Hudelson, Denver, Co	*Dr. J. C. Shook, Mechanicsburg, PA
92	Oct. 16-21, 1988	Little Rock, AR	*Dr. J. A. Cobb, Atlanta, GA	*Dr. J. C. Shook, Mechanicsburg, PA
93	Oct. 28-Nov. 3, 1989	Las Vegas, NV	Mr. P. E. Bradshaw, Griggsville, IL	*Dr. J. C. Shook, Mechanicsburg, PA
94	Oct. 6-12, 1990	Denver, CO	Dr. M. A. Van Buskirk, Harrisburg, PA	*Dr. J. C. Shook, Mechanicsburg, PA
95	Oct. 26-Nov. 1, 1991	San Diego, CA	*Dr. P. L. Smith, Sacramento, CA	*Dr. J. C. Shook, Mechanicsburg, PA
96	Oct. 31-Nov. 6, 1992	Louisville, KY	Dr. J. Lee Alley, Montgomery, AL	*Dr. J. C. Shook, Mechanicsburg, PA
97	Oct. 23-29, 1993	Las Vegas, NV	Dr. T. J. Hagerty, St. Paul, MN	*Dr. J. C. Shook, Mechanicsburg, PA
98	Oct. 29-Nov. 4, 1994	Grand Rapids, MI	Mr. J. B. Finley, Jr., Encinal, TX	*Dr. J. C. Shook, Mechanicsburg, PA
99	Oct. 28-Nov. 3, 1995	Reno, NV	Dr. H. Wesley Towers, Dover, DE	*Dr. J. C. Shook, Mechanicsburg, PA
100	Oct. 12-18, 1996	Little Rock, AR	Dr. M. R. Marshall, Salt Lake City, UT	*Dr. J. C. Shook, Mechanicsburg, PA
101	Oct. 17-24, 1997	Louisville, KY	Dr. Larry L. Williams, Lincoln NE	*Dr. J. C. Shook, Mechanicsburg, PA
102	Oct. 3-9, 1998	Minneapolis, MN	Dr. Jones W. Bryan, Columbia, SC	*Dr. J. C. Shook, Mechanicsburg, PA
103	Oct. 7-14, 1999	San Diego, CA	Dr. Richard H. McCapes, Davis, CA	*Dr. J. C. Shook, Mechanicsburg, PA
104	Oct. 19-26, 2000	Birmingham, AL	Dr. Ernest W. Zirkle, Trenton, NJ	Dr. J Lee Alley, Montgomery, AL
105	Nov. 1-8, 2001	Hershey, PA	Dr. Bob R. Hillman, Boise, ID	Dr. J Lee Alley, Montgomery, AL
106	Oct. 1-24, 2002	St. Louis, MO	Dr. Maxwell Lea, Jr., Baton Rouge, LA	Dr. J Lee Alley, Montgomery, AL
107	Oct. 9-16, 2003	San Diego, CA	*Mr. Bob Frost, Lincoln, CA	Dr. J Lee Alley, Montgomery, AL
108	Oct. 21-27, 2004	Greensboro, NC	Dr. Donald Lein, Ithaca, NY	Dr. J Lee Alley, Montgomery, AL
109	Nov. 3-9, 2005	Hershey, PA	Dr. Richard D. Willer, Phoenix, AZ	Dr. J Lee Alley, Montgomery, AL
110	Oct. 12-18, 2006	Minneapolis, MN	Dr. Bret D. Marsh, Indianapolis, IN	Dr. J Lee Alley, Montgomery, AL
111	Oct. 18-24, 2007	Reno, NV	Dr. Lee M. Myers, Atlanta, GA	§Dr. J Lee Alley, Montgomery, AL

No.	Date	Place of Meeting	President	Secretary/Executive
112	Oct. 23-29, 2008	Greensboro, NC	Mr. James W. Leafstedt, Alcester, SD	Mr. Benjamin Richey, St. Joseph, MO
113	Oct. 8-14, 2009	San Diego, CA	Dr. Donald E. Hoenig, Belfast, ME	Mr. Benjamin Richey, St. Joseph, MO
114	Nov. 11-17, 2010	Minneapolis, MN	Dr. Richard E. Breitmeyer, Sacramento, CA	Mr. Benjamin Richey, St. Joseph, MO
115	Sept. 29-Oct.5, 2011	Buffalo, NY	Dr. Steven L. Halstead, East Lansing, MI	Mr. Benjamin Richey, St. Joseph, MO
116	Oct. 18-24, 2012	Greensboro, NC	Dr. David T. Marshall, Raleigh, NC	Mr. Benjamin Richey, St. Joseph, MO
117	Oct. 17-23, 2013	San Diego, CA	Dr. David L. Meeker, Alexandria, VA	Mr. Benjamin Richey, St. Joseph, MO
118	Oct. 16-22, 2014	Kansas City, MO	Dr. Stephen K. Crawford, Concord, NH	Mr. Benjamin Richey, St. Joseph, MO
119	Oct. 22-28, 2015	Providence, RI	Dr. Bruce L. King, Axtell, UT	Mr. Benjamin Richey, St. Joseph, MO

Key
* Deceased

‡ Last meeting of the Interstate Association of Livestock Sanitary Boards

** Resigned Dec. 12, 1977

§ USAHA hired an Executive Director, in lieu of the Secretary, effective 2006-2007

† Reprinted in 54th Annual Proceedings †† Reprinted in 66th Annual Proceedings

III. D. USAHA Award Winners

USAHA MEDAL OF DISTINCTION RECIPIENTS

110th Annual Meeting, Minneapolis, Minnesota – 2006
Dr. Clarence L. Campbell, Tallahassee, Florida
Dr. Richard H. McCapes, Davis, California

111th Annual Meeting, Reno, Nevada – 2007
Dr. J. Lee Alley, Montgomery, Alabama
Mrs. Linda B. Ragland, Richmond, Virginia

112th Annual Meeting, Greensboro, North Carolina – 2008
Dr. John C. Shook, Mechanicsburg, Pennsylvania

113th Annual Meeting, San Diego, California – 2009
Dr. Bret E. Marsh, Indianapolis, Indiana

114th Annual Meeting, Minneapolis, Minnesota – 2010
Mr. Neal F. Black, Eagan, Minnesota
Dr. Thomas J. Hagerty, St. Michael, Minnesota

115th Annual Meeting, Buffalo, New York– 2011
Dr. Bob E. Hillman, Boise, Idaho

116th Annual Meeting, Greensboro, North Carolina – 2012
Dr. John E. Ragan, Bowie, Maryland

117th Annual Meeting, San Diego, California – 2013
Dr. Don H. Lein, Ithaca, New York

118th Annual Meeting, Kansas City, Missouri – 2014
Mr. William Hawks, Washington, District of Columbia

119th Annual Meeting, Providence, Rhode Island – 2015
Dr. Richard Breitmeyer, Davis, California

USAHA FEDERAL PARTNERSHIP AWARD RECIPIENTS

115th Annual Meeting, Buffalo, New York– 2011
Dr. Jack Shere, Raleigh, North Carolina
Dr. William Smith, Sutton, Massachusetts

116th Annual Meeting, Greensboro, North Carolina – 2012
Dr. Donald Otto, Knoxville, Iowa

117th Annual Meeting, San Diego, California – 2013
Dr. Donald Evans, Topeka, Kansas

118th Annual Meeting, Kansas City, Missouri – 2014
Dr. Sarah Tomlinson, Fort Collins, Colorado

119th Annual Meeting, Providence, Rhode Island – 2015
Dr. Kevin Petersburg, Des Moines, IA

IV. GLOSSARY OF COMMONLY USED ACRONYMS

3D	Decontamination, depopulation, and disposal
AAC	Animal Agriculture Coalition
AADAP	Aquatic Animal Drug Approval Partnership
AAEP	American Association of Equine Practitioners
AAFCO	Association of American Feed Control Officials
AAHSC	Aquatic Animal Health Standards Commission
AALAS	Association of Laboratory Animal Science
AAMD	Acquisition and Asset Management Division
AAMD	American Association of Mycobacterial Diseases
AAMMC	American Association of Medical Milk Commissions
AASV	American Association of Swine Veterinarians
AAVCT	American Academy of Veterinary and Comparative Toxicology
AAVLD	American Association of Veterinary Laboratory Diagnosticians
AAVMC	Association of American Veterinary Medical Colleges
AAZV	American Association of Zoo Veterinarians
ABADRL	Arthropod-Borne Animal Disease Research Laboratory
ABF	Antibiotic-free
ABS	Adult bovine serum
ABSL	Animal Biosafety Levels
AC	Animal Care (USDA-APHIS)
ACE	Automated Cargo Environment
ACE	Automated Commercial Environment
ACE	Antigen Capture ELISA
ACVIM	American College of Veterinary Internal Medicine
ADDs	Assistant District Directors
ADG	Average daily gain
ADOL	Avian Disease and Oncology Laboratory
ADRU	Animal Disease Research Unit
ADT	Animal Disease Traceability
ADUFA	Animal Drug User Fee Act
AE	Approved Establishment
AEC	Area Emergency Coordinator
AEC	Anion-exchange chromatography
AERs	Adverse event reports

AF	Accredited free
AFBF	American Farm Bureau Federation
AFBIS	American Farm Bureau Insurance Services
AFIA	American Feed Industry Association
AFRI	Agriculture and Food Research Initiative
AFS	American Fisheries Society
AFWA	Association of Fish and Wildlife Agencies
AGD	Agricultural Defense
AGID	Agar gel immunodiffusion
AGPs	Antibiotics growth promoters
AHC	American Horse Council
AHEM	Animal Health Emergency Management
AHISC	Animal Health Information Systems Committee
AHP	Animal Health and Production Division
AHPA	Animal Health Protection Act
AHRSII	Animal Health Regulatory Science Innovation Initiative
AHS	African horse sickness
AHSM	Animal Health Surveillance and Management
AHTs	Animal Health Technicians
AI	Avian influenza
AIC	Animal Import Centers
AICAP	Avian Influenza Coordinated Agricultural Program
AI-CMC	Avian Influenza Crisis Management Center
AID	Animal Industry Division
AIMS	Animal Identification Management System
AIN	Animal Identification Number
AIPL	Animal Improvement Programs Laboratory
AIV	Avian influenza virus
AKAV	Akabane virus
AMD	Age-related macular degeneration
AMEVEA	South American cooperative of veterinarians and avian specialists
AMPs	Antimicrobial peptides
aMPV	Avian metapneumovirus

AMR	Antimicrobial resistance
AMVC	Audubon-Manning Veterinary Clinic
ANSI	American National Standards Institute
ANV	Avian Nephritis Virus
AOCS	American Oil Chemists' Society
AOS	Active Observational Surveillance
APHIS	Animal and Plant Health Inspection Service
APIC	Association for Professionals in Infection Control and Epidemiology
APTA	Authorized Poultry Testing Agent
AQHA	American Quarter Horse Association
AQSIQ	Administration of Quality Supervision, Inspection and Quarantine
ARC	Agricultural Research Center
ARMS	Antiparasitic Resistance Management Strategy
ARS	Agricultural Research Service
ASF	African Swine Fever
ASI	American Sheep Industry
AST	Agriculture Screening Tools
AST	Aspartate aminotransferase
ATCC	American Type Culture Collection
AU-IBAR	African Union InterAfrican Bureau on Animal Resources
AV	Adult Vaccinates
AVBP	Association of Veterinarians in Broiler Production
AVEP	Association of Veterinarians in Egg Production
AVIC	Area veterinarian in charge
AVMA	American Veterinary Medical Association
AVMC	Aquatic Vet Med Committee
AWA	Animal Welfare Act
AWI	Animal Welfare Institute
AWW	Adjusted weaning weight
AZA	Association of Zoos and Aquariums
BAC	Bacterial artificial chromosome
BAIS	Branch of Aquatic Invasive Species
BCF	Bacterial culture of the feces

BCG	Bacille Calmette-Guerin
BCV	Bovine Coronavirus
BCWD	Bacterial cold water disease
BDM	Bio-development module
BEAP	Brucellosis Emergency Action Plan
BEFV	Bovine ephemeral fever virus
BFB	Biosecurity for Birds
BHS	Bighorn Sheep
BM	Borrelia miyamotoi
BMAPs	Brucellosis Management Action Plans
BMP	Brucellosis Management Plan
BMPs	Best management practices
BMST	Brucellosis Milk Surveillance Testing
BNC	Bi-National Committee
BOAH	Board of Animal Health
BoCV	Bovine coronavirus
BoHV-1	Bovine herpesvirus-1
BP	Border Patrol
BPI	Business Process Improvement
BPS	Bovine Papular Stomatitis
BQA	Beef Quality Assurance
BQFS	Bison Quarantine Feasibility Study
BRD	Bovine Respiratory Disease
BRSV	Bovine respiratory syncytial virus
BRT	Brucellosis ring test
BSA	Bovine serum albumin
BSC	Biological Standard Commission
BSE	Bovine spongiform encephalopathy
BSL	Breed Specific Legislation
BSL	Bio-safety level
BSVE	Biosurveillance Ecosystem
bTB	Bovine tuberculosis
BTD	Black-tailed deer
BTRA	Biological Threat Risk Assessment

BTV	Bluetongue virus
BVDV	Bovine viral diarrhea virus
BY	Biological year
CABS	Consortium for the Advancement of Brucellosis Science
CAC	Codex Alimentarius Commissions
CAFO	Concentrated Animal Feed Operation
CAHFS	California Animal Health and Food Safety
CAHFSE	Collaboration for Animal Health, Food Safety and Epidemiology
CAHPS	Commercial *Aquaculture* Health Program Standards
CAMAVET	Committee of the Americas for the Harmonization of the Registration and Control of Veterinary Medicines
CAP	Conservation Assessment Program
CARB	Combating Antibiotic Resistance Bacteria
CARPOL	Certificates, Accreditations, Registrations, Permits, and Other Licenses
CART	County Animal Response Team
CAST	Council for Agricultural Science and Technology
CAstV	Chicken Astrovirus
CatEx	Categorical Exclusion
CATT	Card agglutination test
CB	Chemical and Biological
CBDD	Chemical and Biological Defense Division
CBP	Customs and Border Protection
CBPP	Contagious bovine pleuropneumonia
CBRNE	Chemical, biological, radiological, nuclear and explosive weapons
CCAS	Cooperative Compliance Agreements
CCC	Consumer Complaint Coordinators
CCT	Comparative cervical tuberculin
CD	Clostridial Dermatitis
CDA	Colorado Department of Agriculture
CDC	Centers for Disease Control and Prevention
CDD	Center for Disease Detection
CDLVWD	Committee on Diagnostic Laboratory and Veterinary Workforce Development
CDPH	California Department of Public Health

CDPHE	Colorado Department of Public Health and Environment
CDR	Complementarity determining regions
CD-ROM	Compact disc, read-only-memory
CEAH	Centers for Epidemiology and Animal Health
CEEZAD	Center of Excellence for Emerging and Zoonotic Animal Diseases
CEI	Center for Emerging Issues
CEM	Contagious equine metritis
CENAPA	National Parasite and Toxic Residue Laboratory (Mexico)
CENASA	National Animal Disease Laboratory (Mexico)
CEO	Chick embryo origin
CF	Complement fixation
CFIA	Canadian Food Inspection Agency
CFR	Code of Federal Regulations
CFSAN	Center for Food Safety and Applied Nutrition
CFSPH	Center for Food Security and Public Health
CFT	Complement Fixation Test
CFT	Caudal fold tuberculin
CFT	Cattle fever tick
CFT	Caudal fold tuberculin
CFTEP	Cattle Fever Tick Eradication Program
CFU	Colony forming units
CGAHR	Center for Grain and Animal Health Research
CGMP	Current Good Manufacturing Practice
CHeRI	Cervidae Health Research Initiative
CI/KR	Critical infrastructure and key resources
CIMBS	The Center for Research at the Interface of Mathematical and Biological Sciences
CIPSEA	Confidential Information Protection and Statistical Efficiency Act
CIS	Integrated surveillance system
CISS	Comprehensive and Integrated Swine Surveillance
CK	Creatine kinase
CMC	Crisis Management Center
CMC-AH	Crisis Management Centre for Animal Health
CNS	Central nervous system

CoA	Census of Agriculture
COB	Continuity of Business
COE	Centers of Excellence
COMEXA	Mexico - United States Commission on the Eradication of Livestock Screwworm
CONASA	National Council for Animal Health (Mexico)
CONSULT	Collaborative, Online, Novel, Science-based, User-friendly, Learning, Tool
COOL	Country of Origin Labeling
COSDA	Communications Officers for State Department of Agriculture
CPA	United States Commission on the Eradication of Foot-and-Mouth Disease and Other Foreign Animal Diseases (Mexico)
CPCVM	Center for Public and Corporate Veterinary Medicine
CPG	Compliance policy guide
CPG-101	Comprehensive Preparedness Guide 101
CPI	Consumer price index
CR	Continuing resolution
CRADA	Cooperative Research and Development Agreement
CRIS	Current Research Information System
CRISPR	Clustered regularly interspaced short palindromic repeat
CRM	Customer relationship management
CRWAD	Conference of Research Workers in Animal Diseases
CS	Calf serum
CSF	Classical swine fever
CSHC	Coalition of State Horse Councils
CSL	Commonwealth Serum Laboratories
CSPI	Center for Science in the Public Interest
CSPS	Caprine Scrapie Prevalence Study
CSREES	Cooperative State Research Education and Extension Service (USDA)
CST	Canine Search Teams
CSTE	Council of State and Territorial Epidemiologists
CT	Cycle threshold
CTAB	Counterterrorism Advisory Board
CU	Customs Union
CVB	Center for Veterinary Biologics (USDA)

CVB-IC	Center for Veterinary Biologics - Inspection and Compliance (USDA)
CVI	Certificate of Veterinary Inspection
CVM	Center for Veterinary Medicine
CVMA	Canadian Veterinary Medical Association
CVMP	Committee for Medicinal Products for Veterinary Use (E.U.)
CVR	Canadian Veterinary Reserve
CWC	Cell-wall competent
CWD	Chronic wasting disease
DAL	District at Large (USAHA)
DBE	Designated brucellosis epidemiologist
DBL	Diagnostic bacteriology laboratory
DBS	Donor bovine serum
DDC	Domestic dog/coyote
DEA	Drug Enforcement Administration
DEFRA	Department for Environment, Food, and Rural Affairs (UK)
DEG	Diethylene glycol
DFM	Direct-fed microbial
DHHS	Department of Health and Human Services
DHIA	Dairy Herd Improvement Association
DHIA	Dairy Records Management Systems
DHS	Department of Homeland Security
DIVA	Differentiating Infected from Vaccinated Animals
DJC	Designated Johne’s Coordinator
DMA	Disease Management Area
DMI	Dairy Management, Inc.
DMI	Dry matter intake
DMP	Deer Management Permit
DNA	Deoxyribonucleic acid
DNR	Department of Natural Resources
DOD	Department of Defense
DOI	Department of the Interior
DPI	Day postinoculation
DPP	Dual Path Platform

DPW	City of Detroit Public Works
dRIT	immunohistochemical test
dRIT	Direct rapid immunohistochemistry test
DRMS	Dairy Records Management System
DS	Diplomatic security
DSA	Designated surveillance area
DSHS	Department of State Health Services
DSS	Diagnostic Services
DTD	Dangerous transmissible diseases
DTE	Designated Tuberculosis Epidemiologist
DTRA	Defense Threat Reduction Agency
DVL	Diagnostic virology laboratory
DVM	Doctor of Veterinary Medicine
E2E	Engage to Excel
EAP	Export Animal Products
EAs	Environmental Assessments
EAV	Equine arteritis virus
EAZWV	European Association of Zoo and Wildlife Veterinarians
EC	Executive Committee (USAHA)
ECE	Embryonated chicken eggs
ECSR	Equine, Cervid and Small Ruminant
ECT	Elephant Care Task Force
ECVI	Electronic Certificate of Veterinary Inspection
EDCC	Equine Disease Communication Center
EDEN	Extension Disaster Education Network
EDFZ	Equine Disease Free Zone
EDI	Emerging disease incidents
EEE	Eastern equine encephalitis
EEZ	Exclusive Economic Zone
EFSA	European Food Safety Authority
EG	Ethylene glycol
EHD(V)	Epizootic hemorrhagic disease (virus)
EHM	Equine herpesvirus myeloencephalopathy
EHV	Equine herpesvirus

EIA	Equine infectious anemia
EID	Electronic identification
EIS	Environmental impact statement
ELDU	Extra-label drug use
ELISA	Enzyme Linked Immunsorbent Assay
ELR	Electronic laboratory reports
EM	Election microspray
EM&D	Emergency Management and Diagnostics
EMEA	European Medicines Evaluation Agency
EMPRES	Emergency Prevention System
EMRS	Emergency Management Response System
END	Exotic Newcastle disease
EOP	Emergency Operations Plan
EP	Equine piroplasmosis
EPA	Environmental Protection Agency
EpiUnit	Epidemiologic Unit
EPM	Equine Protozoal Myelitis
EPS	Enhanced Passive Surveillance
EPWG	Equine Piroplasmosis Working Group
ERSS	Emergency Response Support System
ESF	Emergency Support Function
ESRI	Environmental Systems Research Institute
EU	European Union
FA	Food animal
FA	Fluorescent antibody
FAC	Fish and Aquatic Conservation
FAD	Foreign animal disease(s)
FAD PReP	Disease Preparedness and Response Plan
FADDL	Foreign Animal Disease Diagnostic Laboratory (USDA)
FADDs	Foreign Animal Disease Diagnosticians
FADRU	Foreign Animal Disease Research Unit
FAO	Food and Agriculture Organization (United Nations)
FARAD	Food Animal Residue Avoidance Database
FARC	Fisheries and Aquatic Resource Conservation

FAS	Foreign Agricultural Service (USDA)
FAST	Federal and State Transport
FAVD	Food, Agriculture and Veterinary Defense
FAVN	Fluorescent antibody virus neutralization
FAVRE	Food Agriculture and Veterinary Response Exercise
FAVS	Food animal veterinary services
FAZD	Foreign Animal and Zoonotic Disease
FBS	Fetal bovine serum
FBS	Farm business survey
FD&C	Food, Drug and Cosmetic Act
FDA	Food and Drug Administration
FDCs	Follicular dendritic cells
FDN	Focal duodenal necrosis
FEAD	Foreign or Emergin Animal Disease
FECRT	Fecal egg-count reduction test
FEDEGAN	Colombian Federation of Cattle Raisers
FEI	Federation Equestrian International
FEMA	Federal Emergency Management Agency (DHS)
FERN	Food Emergency Response Network
FFE	Feather follicle epithelium
FFPE	Formalin-fixed, paraffin-embedded
FHS	Fish Health Section
FIC	Fractional inhibitory concentration
FLS	Fanconi like syndrome
FLUC	Firefly luciferase
FMD	Foot-and-mouth disease
FMP	Fishery Management Plan
FOIA	Freedom of Information Act
FPA	Flurescent polarization assay
FPD	Foreign poultry diseases
FS	Fanconi Syndrome
FSA	Food Safety Assessments
FSEP	Food Safety Enteric Pathogens
FSIS	Food Safety and Inspection Service

FSMA	Food Safety Modernization Act
FTA	Free Trade Agreements
FTEs	Full Time Equivalents
FTOs	Foreign Terrorist Organizations
FWD-IRN	Food and Waterborne Diseases Integrated Research Network
FWS	Fish and Wildlife Services
FY	Fiscal Year
GAO	Government Accountability Office
GAP	Good aquaculture practice
GC/MS	Gas chromatography–mass spectrometry
GCC	General Conference Committee
GCC	Government Coordinating Council
GDB	Generic Database
GDP	Gross domestic product
GEMP	Good Emergency Management Practice
GFI	Guidance for Industry
GFRA	Global Foot-and-Mouth Disease Research Alliance
GGT	Gamma-glutamyl transferase
GHG	Greenhouse gas emissions
GHTP	Gunnison River/Harrison Lake Triploids
GI	Gastrointestinal illnesses
GIEFA	InterHemispheric Group for the Eradication of FMD
GIFS	Global Animal Health and Food Safety
GIN	Gastrointestinal nematode
GISAID	Global Initiative on Sharing All Influenza Data
GLEWS	The Global Early Warning System
GLP	Good laboratory practice
GMA	Grocery Manufacturers Association
GMP	Good manufacturing practice
GPS	Global Positioning Systems
GST	Glutathione S-transferase
GTNP	Grand Teton National Park
GVL	GlobalVetLink
GWAS	Genome wide association study

GYA	Greater Yellowstone Area
GYE	Greater Yellowstone Ecosystem
GYIBC	Greater Yellowstone Area Interagency Brucellosis Committee
HA	Hemagglutinin
HACCP	Hazard analysis and critical control points
HAZMAT	Hazardous Materials
HCP	Herd certification program
HD	Hemorrhagic disease
HEYM	Herrold's egg yolk medium
HHP	High health, high performance
HHS	Department of Health and Human Services
HI	Hemagglutination inhibition
HL7	Health Level Seven
HLS	Hair-loss syndrome
HMP	Herd monitored plan
HPAI	Highly pathogenic avian influenza
HPLC	High pressure liquid chromatography
HRD	Human Remains Detection
HSIN	Homeland Security Information System
HSPD	Homeland Security Presidential Directive
HSR	Health Service Region
HSUS	Humane Society of the United States
HTGS	High throughput genomic sequences
HVT	Herpesvirus of turkeys
IAI	Integrated agricultural intelligence
IAP	Incident Action Plan
IAV	Influenza A virus
IAVBC	International Aquatic Veterinary Biosecurity Consortium
IAV-S	Influenza A virus - swine
IBD	Infectious bursal disease
IBH	Inclusion body hepatitis
IBMP	Interagency Bison Management Plan
IBR	Infectious bovine rhinotracheitis
IC	Inspection and Compliance

ICA	Colombian Agricultural Institute
ICCM	Institute of Computational Comparative Medicine
ICE	Immigration and Customs Enforcement
ICLN	Integrated Consortium of Laboratory Networks
ICP	Incident Command Post
ICS	Incident Command System
ICVI	Interstate certificate of veterinary inspection
IDC	Infectious Disease Committee
IDF&G	Idaho Department of Fish and Game
IDHC	Infectious diseases of horses committee
IES	Investigative Enforcement Services
IFA	Immunofluorescence assay
IFAH	International Federation for Animal Health
IFAT	Indirect fluorescent antibody
IFHA	International Federation of Horseracing Authorities
IFN	Interferon
IHC	Immunohistochemistry
IHN	Infectious hematopoietic necrosis
IIAD	Institute of Infectious Animal Diseases
IICA	Inter-American Institute for Cooperation on Agriculture
IICAB	Institute for International Cooperation in Animal Biologics
iiPCR	Insulated isothermal PCR
ILRI	International Livestock Research Institue
ILT	Infectious laryngotracheitis
IMHA	Immune-mediated hemolytic anemia
IMT	Incident Management Team
IMT	Incident Management Teams
INAD	Investigational New Animal Drug
IPVN	Immuno-peroxidase Virus Neutralization test
IS	International Services (USDA)
ISAV	Infectious Salmon Anemia Virus
ISDA	Idaho State Department of Agriculture
ISDH	Indiana State Department of Health
ISIA	International Serum Industry Association

ISO	International Organization for Standardization
ISR	Intergenic sequence ribotyping
IT	Information Technology
ITDS	International Trade Data System
ITRCB	International Technical Regulatory Capacity Building
IVD	Idiopathic vesicular disease
IVI	Institute of Virology and Immunology
IVT	In-vitro transcribed
JAC	Joint Advisory Committee
JD	Johne's disease
JDIP	Johne’s Disease Integrated Program
JEI	Johne's Education Initiative
JIC	Joint Information Center
JIT	Just-In-Time
JPPD	Johnin purified protein derivative
JPT	Jerky pet treat
JSA	Joint Subcommittee on Aquaculture
JVDI	Journal of Veterinary Diagnostic Investigation
KAP	Knowledge, attitudes, and practice
KBUSLIRL	Knipling-Bushland United States Livestock Insects Research Laboratory
KSVDL	Kansas State Veterinary Diagnostic Laboratory
KWL	Kauffman-White-LeMinor
LADIVES	Regional Vesicular Laboratory
LA-MRSA	Livestock-associated methicillin-resistant *S. aureus*
LBMS	Live Bird Marketing System
LC/MS	Liquid Chromatography/Mass Spectroscopy
LCEM	Laboratory Capacity Estimation Model
LCMSMS	Liquid chromatography-tandem mass spectrometry
LCMV	Lymphocytic Choriomeningitis virus
LDPE	Low-density polyethylene
LERP	Livestock Emergency Response Plan
LHD	Local Health Departments
LIDs	Location Identifications

LIMS	Laboratory Information Management System
LIRN	Laboratory Investigation and Response Network
LIS	Laboratory Information System
LLMDA	Lawrence Livermore Microbial Detection Array
LMH	Leghorn male hepatoma
LMS	Laboratory Messaging Service
LOD	Limit of detection
LOINC	Logical Observation Identifiers Names and Codes
LPAI	Low pathogenic avian influenza
LPDV	Lymphoproliferative disease virus
LPNAI	Low pathogenic notifiable avain influenza
LRF	Laser range finder
LSRTIS	Licensing Serial Release and Testing System
LTR	Long terminal repeat
MA	Modified Accredited
MAA	Modified Accredited Advanced
MAbs	Monoclonal Antibodies
MAC	Multi-agency corrdination committee
MAH	Market Authorization Holders
MAK	Modified Atmosphere Killing
MALDI	Matrix-assisted laser desorption ionization
MAP	Mycobacterium Avium Paratuberculosis
MAT	Microscopic agglutination test
MAZ	Modified Accredited Zone
MBM	Meat-and-bone meal
MBP	Maltose binding protein
MCI	Market cattle identification
McM	McMillan strain
MCT	Mid-cervical tuberculin
MD	Mule deer
MD	Marek’s disease
MDA	Mycobacterial diseases of animals
MDA-CAP	Mycobacterial diseases of animals coordinated agricultural project

MDARD	Michigan Department of Agriculture and Rural Development
MDOL	Montana Department of Livestock
MDR	Multi-drug resistant
MDV	Marek's disease virus
MERS	Middle East respiratory syndrome
MFWP	Montana Fish, Wildlife and Parks
MG	*M. gallisepticum*
MG	Mycoplasma gallisepticum
MHC	Histocompatibility complex
MIC	Minimum inhibitory concentration
MIM	Mobile Information Management
MLCh	Matrix, Decision Loop and Checklist
MLV	Modified Live Viral
MM	Mycoplasma meleagridis
MNDNR	Minnesota Department of Natural Resources
MOA	Ministry of Agriculture
MOU	Memorandum of Understanding
MQ	Macrophages
MRC	Medical Reserve Corps
MRSA	Methicillin-resistant Staphylococcus aureus
MS	Mycoplasma synoviae
MS	Mass spectra
MSIs	Minority serving institutions
MSP	Multi-State Partnership
MST	Microbial Source Tracking
MSU-DCPAH	Michigan State University Diagnostic Center for Population and Animal Health
Mtb	Mycobacterium tuberculosis
MTWG	Methods Technical Working Group
MUMS	Minor Use/Minor Species
NA	Neuraminidase
NAA	National Aquaculture Association
NAADSM	North American Animal Disease Spread Model
NAAHP	National Aquatic Animal Health Plan

NABC	National Agricultural Biosecurity Center
NADA	New Animal Drug Application
NADC	National Animal Disease Center
NAFMDVB	North American Foot and Mouth Disease Vaccine Bank
NAHEMS	National Animal Health Emergency Management System
NAHERC	National Animal Health Emergency Response Corps
NAHITB	National Animal Health Information Technology Board
NAHLN	National Animal Health Laboratory Network
NAHMS	National Animal Health Monitoring System
NAHRS	National Animal Health Reporting System
NAHSS	National Animal Health Surveillance System
NAI	No Action Indicated
NAIS	National Animal Identification System
NAL^r	Nalidixic acid-resistant
NARMS	National Antimicrobial Resistance Monitoring System
NASAAEP	National Alliance of State Animal and Agricultural Emergency Programs
NASS	National Agricultural Statistics Service
NAVMEC	North American Veterinary Medical Education Consortium
NBAF	National Bio and Agro-Defense Facility
NCAHD	National Center for the Analysis of Healthcare Data
NCAHEM	National Center for Animal Health Emergency Management
NCBA	National Cattlemen's Beef Association
NCC	National Chicken Council
NCFAD	National Centre for Foreign Animal Disease
NCFDD	National Center for Food Protection and Defense
NCIE	National Center for Import and Export
NCP	Noncytopathic
NCS	Newborn calf serum
NCUSAHA	North Central USAHA (District)
NDAA	National Defense Authorization Act
NDMS	National Disaster Medical System
NDV	Newcastle disease virus
NE	Necrotic enteritis

NEHP	National Equine Health Plan
NEHV	Neurotropic Equine Herpes Virus
NEPA	National Environmental Protection Act
NER	National Elk Refuge Bison
NESAASA	New England States Animal Agricultural Security Alliance
NEUSAHA	Northeast USAHA (District)
NFAVI	National Food Animal Veterinary Institute
NFSMS	National Feral Swine Mapping System
NGFA	National Grain and Feed Association
NGOs	Non-governmental organizations
NGS	Next Generation Sequencing
NIAA	National Institute for Animal Agriculture
NIES	National Import and Export Services
NIFA	National Institute of Food and Agriculture
NIH	National Institue of Health
NIMS	National Incident Management System
NITC	National Information Technology Center
NJDDHP	National Johne's Disease Demonstration Herd Project
NJWG	National Johne's Working Group
NK	Natural killer
NLRAD	National List of Reportable Animal Diseases
NMFS	National Marine Fisheries Service
NMPF	National Milk Producers Federation
NOAA	National Oceanic and Atmospheric Administration
NP	Nucleoprotein
NPB	National Pork Board
NPD	National Preparedness Directorate
NPIC	National Preparedness and Incident Coordination Center
NPIP	National Poultry Improvement Plan
NPIS	New Poultry Inspection System
NPLA	Neutralizing peroxidase-linked assay
NPPC	National Pork Producers Council
NPS	National Park Service
NRF	National Research Foundation

NRF	National Response Framework
NRI	National Research Initiative's
NRMP	National Rabies Management Program
NS	Nasal swabs
NSAIDS	Nonsteroidal anti-inflammatory drugs
NSEP	National Scrapie Eradication Program
NSTC	National Science and Technology Council
NSU	National Survelliance Unit (USDA)
NTF	National Turkey Federation
NUES	National Uniform Eartagging System
NVAP	National Veterinary Accreditation Program
NVS	National Veternary Stockpile (USDA)
NVSL	National Veterinary Services Laboratories
NWC	New World Camelids
NWDP	National Wildlife Disease Program
NWHC	National Wildlife Health Center
NWRC	National Wildlife Research Center
NWS	New World screwworm
NWT	Northwest Territories
NYSCHAP	New York State Cattle Health Assurance Program
NYSDAM	New York State Department of Agriculture and Markets
OAI	Official Action Indicated
OCES	Oklahoma Cooperative Extension Service
OCV	Official Calfhood Vaccinates
OCVI	Online Certificate of Veterinary Inspections System
OD	Optical Density
ODAFF	Oklahoma Department of Agriculture, Food and Forestry
OHA	Office of Health Affairs (DHS)
OHCC	One Health Coordination Center
OIE	World Animal Health Organization
OM	Osteomyelitis
OMB	Office of Management and Budget
OOS	Out of state
OPPV	Ovine progressive pneumonia virus

ORST	Oubreak Response and Surveillance Team
ORT	*Ornithobacterium rhinotracheale*
ORV	Oral rabies vaccination
OSA	Official State Agency
OSTP	Office of Science and Technology Policy
OTC	Over-the-counter
OTF	Officially free of bovine Tuberculosis
OVWG	Orbivirus Working Group
OWC	Old World Camelids
PA	Plains Area
PAC	Positive amplification
PADOH	Pennsylvania Department of Health
PADRAP	Production Animal Disease Risk Assessment Program
PAHO	Pan American Health Organization
PAMTA	Preservation of Antibiotics for Medical Treatment Act
PANAFTOSA	Pan American Foot-and-Mouth Disease Center
PARA	Preventing Antibiotics Resistance Act
PAST	Prevent All Soring Tactics
PBMCs	Peripheral blood mononuclear cells
PBS	Phosphate buffered saline
PBV	Picobirnavirus
PC	Pre-conditioning
PCAST	President’s Council of Advisors on Science and Technology
PCR	Polymerase chain reaction
PCV 2	Porcine Circovirus 2
PDCoV	Porcine deltacoronavirus
PDS	Professional Development Staff
PEC	Positive extraction
PEDv	Porcine Epidemic Diarrhea virus
PEL	Policy, Evaluation, and Licensing
PEMS	Poult Enteritis Mortality Syndrome
PEP	Post-exposure prophylaxis
PETA	People for the Ethical Treatment of Animals

PETS	Pets Evacuation and Transportation Standards Act
PFE	Polarized Fractal Efficiency
PFGE	Pulsed-field gel electrophoresis
PFI	Pet Food Institute
PG	Propylene glycol
PGHs	Peptidoglycan hydrolases
PhD	Doctor of Philosophy
PHLIS	Public Health Laboratory Information Systems
PI	Post inoculation
PI	Persistently infected
PI3-BRSV	Parainfluenza-3-Bovine Respiratory Syncytial Virus
PI3V	Parainfluenza- 3 virus
PIADC	Plum Island Animal Disease Center
PIIWG	Pork Industry Identification Working Group
PIJAC	Pet Industry Joint Advisory Council
PIN	Premise identification number
PIOS	Public Information Officers
PKEMRA	Post Katrina Management Reform Act
PL	Pathobiology Laboratory
PMCA	Protein Misfolding Cyclic Amplification
PMO	Pasteurized Milk Ordinance
PMWS	Post-weaning multisystemic wasting syndrome
PNF	Payette National Forest
PPD	Purified protein derivative
PPE	Personal protective equipment
PPPMD	Pesticide and Plant Pest Management Division
PPQ	Plant Protection & Quarantine
PPR	Peste des petits ruminants
PQA	Pork Quality Assurance
PQZ	Permanent Quarantine Zone
PRCA	Professional Rodeo Cowboys Association
PRDA	Puerto Rican Department of Agriculture
PReP	Preparedness and Response Plan
PREVENT	Pan-Provincial Vaccine Enterprises

PRNP	Prion protein
PRRS(V)	Porcine reproductive and respiratory syndrome (virus)
PRV	Pseudorabies virus
PSAs	Public Security Advisors
PSS	Program Support Services
PTs	Proficiency testing schemes
PVS	Performance of Veterinary Services
QA	Quality assurance
QCS	Quality Certification Services
QFT	Quantiferon Gold In-Tube
QMS	Quality Management System
QT	Quality Assurance
RA/HMP	Risk Assessments/Herd Management Plans
RAMALT	Recto-anal mucosalassociated lymphoid tissues
RAPIDD	The Research and Policy for Infectious Disease Dynamics
RE	Reticuloendotheliosis
REEMO	Electronic Registration Mobilization
RES	Regionalization Evaluation Services
REV	Reticuloendotheliosis virus
RFID	Radio frequency identification
RFP	Request for proposal
RFS	Renewable Fuel Standards
RML	Rocky Mountain Laboratory
RNA	Ribonucleic acid
ROW	Rest of world
RPF	Request for Proposals
RPV	Rinderpest virus
RRT	Rapid Response Team
RRT	Real time reverse transcription
RRT-PCR	Reverse transcriptase, polymerase chain reaction
RSS	Runting-stunting syndrome
RSSS	Regulatory Scrapie Slaughter Surveillance
RT-PCR	Real-time polymerase chain reaction
RT-QuIC	Real-time quaking-induced conversion

RVC	Reserve Veterinary Corps
RVFV	Rift Valley fever virus
RVNA	Rabies virus neutralizing antibody
RVSS	Reagents and Vaccine Services
SA	Select Agent
SAADRA	Southern Agriculture and Animal Disaster Response Alliance
SAGARPA	Secretary of Agriculture, Ranching, Rural Development, Fisheries and Food Supply (Mexico)
SAHA	Southern Animal Health Association (District)
SAHO	State animal health official
SALMS	State Animal Laboratory Messaging Service
SARChI	South African Research Initiative
SARS	Severe Acute Respiratory Syndrome
SARTs	State Animal Response Team
SAS	Scientific Advisory Subcommittee
SB	Swine brucellosis
SBIR	Small business innovation research
SBS	Secure Broiler Supply Plan
SBV	Schmallenberg virus
SCAD	Scientific Commission for Animal Diseases
SCC	Somatic cell count
SCS	South Central skunk
SCS	Surveillance Collaboration System
SCT	Single cervical tuberculin test
SCWDS	Southeastern Cooperative Wildlife Disease Study
SD	Salmonella Dublin
SDO	Standards Development Organizations
SDS	Sodium dodecyl sulphate
SDZ	Sulfadiazine
SE	Salmonella enteritidis
SECD	Swine enteric coronavirus diseases
SECWDS	Southeastern Cooperative Wildlife Disease Study
SENASICA	National Services of Animal and Plant Health, Quality and Food Safety (Mexico)
SEOP	State Emergency Operations Plan

SEPRL	Southeastern Poultry Research Laboratory (ARS)
SES	Secure Egg Supply
SFCP	Scrapie Flock Certification Program
SFS	Secure Food Supply
SH	*Salmonella heidelberg*
SH	Salmonella heidelberg
SHI	Synergistic Hemolysin Inhibition
SHIC	Swine Health Information Center
SHMP	Swine Health Monitoring Project
SHTP	Slaughter Horse Transport Program
SICAMORA	Compliance documentation for exporting cattle from Mexico to the U.S.
SINIIGA	National System of Individual Cattle Identification
SIT	Sterile Insect Technique
SIV	Swine Influenza Virus
SME	Subject Matter Expert
SMS	Short message service
SMX	Sulfamethoxazole
SN	Serum neutralization
SNGD	Scrapie National Generic Database
SNPs	Single nucleotide polymorphisms
SODA	Statistical Outbreak Detection Algorithm
SOP	Standard operating procedure
SOSS	Scrapie Ovine Slaughter Surveillance
SPP	Security and Prosperity Partnership of North America
SPRS	Surveillance, Preparedness and Response Services
SPS	Sanitary and phytosanitary
SPS	Secure Pork Supply
SPV	Sylvatic plague vaccine
SRM	Specified risk materials
SRU	Screwworm Research Unit
STA	Science, Technology and Analysis
STAS	Science, Techology and Snalysis Services
S&TD	Science and Technology Directorate (DHS)

STEC	Shiga toxin–producing *Escherichia coli*
SVD	Swine vesicular disease
SVV	Seneca Valley virsu
SWAP	Swine Welfare Assurance Program
SWOT	Strengths, weaknesses, opportunities, and threats
T&E	Training and Exercise
TAD	Targeted advanced development
TB SAS	Tuberculosis Scientific Advisory Subcommittee
TBT	Tropical Bont tick
TCF	Tissue culture fluid
TCO	Tissue culture origin
TDC	Tibial dyschondroplasia
TDSHS	Texas Department of State Health Services
TEP	Training/Exercise Plan
TF	Texas fox
TGEV	Transmissible gastroenteritis virus
TIPP	Transatlantic Trade and Investment Partnership
TLR	Toll-like receptor
TMAC	Talent Management Advisory Council
TMP	Timethoprim
TOC	Turkey osteomyelitis complex
TOF	Time-of-Flight
TPP	Trans-Pacific Partnership
TPWD	Texas Parks and Wildlife Department
tra	Transformer
TR-DFTR	Turkey Reovirus Digital Flexor Tendon Rupture
TRICH	Trichomoniasis
TRIG M	Triple reassortant influenza A virus M gene
TRV	Turkey-origin reovirus
TSE	Transmissible spongiform encephalaphies
tTA	Tetracyclin-repressible transactivator
TTX	Table Top Exercise
TWRC	Thorne-Williams Wildlife Research Center
TXGF	Texas gray fox

UAE	United Arab Emirates
UAPB	University of Arkansas-Pine Bluff
UDB	Unified database
UEP	United Egg Producers
UHF	Ultra-high frequency
UM&R	Uniform Methods & Rules
UPE	United Egg Producers
USAID	United States Agency for International Development
USALIMS	US Animal Laboratory Information Management System
USAMM	United States Animal Movement Model
USARK	United States Association of Reptile Keepers
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USDOS	United States Disease Outbreak Simulation
USEF	United States Equestrian Federation
USFRA	U.S. Farmers & Ranchers Alliance
USFS	United States Forest Service
USFWS	United States Fish & Wildife Services
USGS	United States Geological Survey
USSHB	U.S. Swine Health Board
USTRA	United States Team Roping Championships
VAC	Vaccine antigen concentrate
VAI	Voluntary Action Indicated
VBJDCP	Voluntary Bovine Johne's Disease Control Program
VCPR	Veterinarian-Client-Patient Relationship
VEE	Venezuelan equine encephalomyelitis
VEHCS	Veterinary Export Health Certification System
Vet-LIRN	Veterinary Laboratory Investigation and Response Network
VFD	Veterinary Feed Directive
VHSV	Viral Hemorrhagic Septicemia Virus
VI	Virus isolation
VICH	Veterinary International Committee on Harmonisation (International)
VIC-S	Veterinary Infection Control Society

vILT	Vaccinal infectious laryngotracheitis
VJDHSP	Voluntary Johne's Disease Herd Status Program
VLPs	Virus-like particles
VLT	Vaccinal laryngotracheitis
VMAT	Veterinary Medical Assistance Teams
VMD	Veterinariae Medicinae Doctoris
VMLRP	Veterinary Medicine Loan Repayment Program
VN	Virus neutralization
VNTR	Variable number tandem repeats
VOCs	Volatile organic compounds
VPSG	Veterinary Practice Sales Group
VRT	Veterinary Response Team
VS	Veterinary Services (USDA)
VSCP	Veterinary Science Certificate Program
VSD	Ventilation shutdown
VSIV	Vesicular stomatitis Indiana virus
VSLS	Veterinary Services Laboratory Submission
VSNJV	Vesicular stomatitis New Jersey virus
VSPS	Veterinary Services Process Streamlining
VSV	Vesicular stomatitis virus
vvIBD	very vigilant infectious bursal disease
WAFWA	Western Association of Fish and Wildlife Agencies
WAFWA WHC	Western Association of Fish and Wildlife Agencies, Wildlife Health Committee
WAHID	World Animal Health Information Database
WAHIS	World Animal Health Situation
WEE	Western Equine Encephalitis
WG	Working group
WGFD	Wyoming Game and Fish Department
WGS	Whole genome sequencing
WHC	Wildlife Health Committee
WHO	World Health Organization
WLSB	Wyoming Livestock Board
WMA	Wildlife Management Areas

WNND	West Nile neuroinvasive disease
WNV	West Nile virus
WRC	Wildlife rehabilitation center
WS	Wildlife Services (USDA)
WSLHA	Western States Livestock Health Association (USAHA district)
WTD	White-tailed deer
WTO	World Trade Organization
XML	Extensible markup language
XRM	Extended Relationship Management
YC	Year class
YNP	Yellowstone National Park
YWHP	Yellowstone Wildlife Health Program
ZAAHP	Zoo and Aquarium All-Hazards Preparedness
ZADD	Zoonotic and Animal Disease Defense