

Guidance for Industry

MANUFACTURE AND LABELING OF RAW MEAT FOODS FOR COMPANION AND CAPTIVE NONCOMPANION CARNIVORES AND OMNIVORES

This guidance is intended to provide specific guidance on the manufacture and labeling of foods that contain raw meat, or other raw animal tissues, for consumption by dogs, cats, other companion or pet animals, and captive noncompanion animal carnivores and omnivores.

Comments and suggestions regarding this document should be sent to the Division of Dockets Management (HFA-305), Food and Drug Administration, 5630 Fishers Lane, Rm. 1061, Rockville, MD 20852. Submit electronic comments to <http://www.regulations.gov>. All comments should be identified with the Docket No. 02D-0468.

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Additional copies of this guidance document may be requested from the Communications Staff (HFV-12), Center for Veterinary Medicine, Food and Drug Administration, 7519 Standish Place, Rockville, MD 20855 and may be viewed on the Internet at <http://www.fda.gov/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/default.htm>.

According to the Paperwork Reduction Act of 1995, a collection of information should display a valid OMB control number. This guidance contains no collections of information.

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#122

Guidance for Industry

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NOTE: This guidance document is being revised to correct an inadvertent error in the guidance dated May 18, 2004 as follows:

- There was an error of fact in this guidance document originally on page 3, next to the last paragraph, last sentence. The sentence previously read: “Another study that cultured 10 raw meat diets based on chicken determined all 10 diets (100%) to be contaminated with *Salmonella* spp.¹⁴”
- On page 4, next to the last paragraph, last sentence, the sentence now reads: “Another study that cultured 10 raw meat diets based on chicken determined 8 diets (80%) to be contaminated with *Salmonella* spp.¹⁴”

May 18, 2004
Revised November 9, 2004

GUIDANCE FOR INDUSTRY

MANUFACTURE AND LABELING

OF RAW MEAT FOODS FOR COMPANION AND CAPTIVE

NONCOMPANION CARNIVORES AND OMNIVORES*

This guidance represents the agency's current thinking on the topic. It does not create or confer any rights for or on any person and does not operate to bind FDA or the public. You can use an alternative if the approach satisfies the requirements of the applicable statutes and regulations. If you want to discuss an alternative approach, contact the FDA staff responsible for implementing this guidance. If you cannot identify the appropriate FDA staff, call the appropriate number listed on the title page of this guidance.

I. Background

Foods for carnivorous and omnivorous animals containing raw meat, or other raw animal tissues, have been on the market for many years for use by zoos, mink farms, dog racing facilities, and other professional establishments. Some of these products may have included meat and other tissues from mammals or poultry that have died other than from slaughter or have otherwise been unfit for human consumption. Products containing tissues from animals that have died other than by slaughter are adulterated under Section 402(a) of the Federal Food, Drug, and Cosmetic Act (FFDCA) and animal tissues otherwise unfit for human consumption may be adulterated if not further processed to remove pathogenic contaminants.

Previously it was presumed that raw meat or raw animal tissues were primarily purchased and used by zoos, mink farms, dog racing facilities, or other professional establishments, and that these entities were aware of the potential risks of using such products, from both a food safety and nutritional deficiency perspective, and could take measures to mitigate those risks. However, an increasing trend is for use of raw meat foods for companion and captive noncompanion animals by owners who may not be as aware of the potential for harm. FDA is issuing this guidance because of the health risks and potential for adulteration including, but not limited to, when raw meat foods are used by pet owners.

FDA does not believe raw meat foods for animals are consistent with the goal of protecting the public from significant health risks, particularly when such products are brought into the home and/or used to feed domestic pets. Objective data derived specifically from commercial raw

* This guidance has been prepared by the Office of Surveillance and Compliance in the Center for Veterinary Medicine, Food and Drug Administration.

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meat pet foods are sparse for quantifying the magnitude of risk to human and animal health from such products. Therefore, CVM also reviewed data on the risks to humans, both from food-borne pathogens in general and from food-borne pathogens relating to raw foods for humans. These data are relevant because people are exposed to food borne pathogens in animal feed when they come in contact with that feed, and animals, in general, are affected by pathogens in the same manner as people. Based on these data, CVM believes the risk to public health from feeding raw meat products to animals warrants taking the precautionary measures described in this guidance.

The Centers for Disease Control and Prevention has estimated that known food borne pathogens account for 14 million illnesses, 60,000 hospitalizations and 1,800 deaths to humans in the United States each year.¹ Total food borne illness from both known and unknown pathogens is likely to be responsible for 76 million cases, 325,000 hospitalizations and 5,000 deaths annually.¹ Although *Salmonella* spp. and *Escherichia coli*, are often thought of as causes of food borne illness, likely because of their propensity to cause severe disease, current data indicate viruses, particularly Noroviruses (Norwalk-like viruses), are estimated to account for two-thirds (67%) of all food borne illnesses.^{1,2} Known pathogenic bacteria account for 30% of food borne illnesses, with *Campylobacter* spp., frequently associated with poultry, being responsible for the majority of the bacterial cases of food borne illness. Three percent of the total cases of food borne illness are caused by parasites.^{1,2} In looking specifically at deaths, the percentages are much different. Seventy-two percent of the deaths from food borne illness are attributable to bacteria, 21% to parasites and 7% to viruses.¹ The estimated annual cost of food borne illness has been placed in the range of 6.5 to 34.9 billion 1995 U.S. dollars.³ The scientific literature indicates that the very young (infants and children), the elderly, the immuno-compromised, and pregnant women are the members of the population at greatest risk for contracting, and being more severely affected by, food borne illnesses.^{4,5}

The prevalence of pathogenic bacterial contaminants in raw meat and poultry products sold for human consumption varies greatly, from less than 1 percent to 100 percent, depending on the specific microbial contaminant, the species of animal used to produce the raw product, the degree to which the raw product has been processed, the number of times the product has been handled, the facility producing the product, and the methods used to sample the product and identify the specific microbial contaminant.⁶⁻¹² Overall prevalence of 10 to 20% is frequently observed for raw human edible products being contaminated with *Campylobacter*, *Escherichia coli* or *Salmonella* species,^{8,9} with products that undergo multiple steps in processing and handling tending to be contaminated more frequently.⁶

In looking at data relating to raw foods for animal consumption, two studies are particularly relevant. One study of 112 samples of raw meat diets manufactured for racing greyhounds isolated *Salmonella* spp. from 50 of the samples (45%) and determined 70 of 106 samples (66%) to be positive for *Salmonella* spp. by DNA probe analysis.¹³ Another study that cultured 10 raw meat diets based on chicken determined 8 diets (80%) to be contaminated with *Salmonella* spp.¹⁴

There are published reports of gastroenteritis and death to animals from eating contaminated raw meat foods,¹⁵⁻¹⁷ and the scientific literature makes it readily apparent that instances of food borne illness in people, from food for human and animal consumption, are underreported and often not

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associated with the source of infection.¹ In addition to infection by pathogenic organisms from direct contact with the diet itself, there are also reports of the same pathogens isolated from raw diets fed to dogs being found in the dog's feces^{14,15} and passage of those organisms to people that have become ill.^{18,19} Thus, the scientific literature indicates that feeding raw meat products carries a risk to human and animal health that is significant given the microbiological results from studies of ingredients that could compose such products and the limited sampling of commercial raw pet foods themselves. Therefore, for firms choosing to manufacture and market raw meat and raw animal tissue products for animal food, more specific guidance is warranted for how such products could be manufactured and labeled in order to protect animals and people coming in contact with the animals and the animal's food from risks involving food safety. This guidance also addresses other risks posed by raw diets, such as nutritional deficiency, and is designed to help ensure compliance with other aspects of the law administered by FDA. The guidance is especially warranted since these products are foods that do not require pre-marketing approval or certification under current United States laws.

FDA's guidance documents, including this guidance, do not establish legally enforceable responsibilities. Instead, guidances describe the Agency's current thinking on a topic and should be viewed only as recommendations, unless specific regulatory or statutory requirements are cited. The use of the word "should" in Agency guidances means that something is suggested or recommended, but not required.

II. Guidance for manufacturing and labeling raw meat foods for companion and captive noncompanion carnivores and omnivores

1. Manufacture

a. Ingredient sources

- i) All meat- and poultry-derived ingredients should be United States Department of Agriculture (USDA)/Food Safety and Inspection Service (FSIS)-inspected and passed for human consumption.
- ii) We recommend that bones and other hard materials be ground.
- iii) All other ingredients should be suitable for use in animal feeds; that is, the ingredients should be of an appropriate grade that qualified experts would agree they are safe for use in raw food for animals.

b. Manufacturing process

Manufacturing facilities should take all measures necessary to prevent adulteration. These measures could include one or more of the following:

- i) irradiating the final packaged product as specified in 21 CFR Part 579,

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- ii) participating in the USDA voluntary inspection program for Certified Products for Dogs, Cats, and Other Carnivora (9 CFR Part 355),
 - iii) following other Good Manufacturing Practices, such as those for human foods in 21 CFR Part 110, and/or
 - iv) implementing a Hazard Analysis and Critical Control Point (HACCP) plan.
- c. Storage and transport
- i) We recommend that, unless freeze-dried, product remain frozen at all times prior to use.
 - ii) Product should be transported and stored in a manner to avoid microbial contamination and growth.

2. Labeling

Labels must conform to all pertinent FDA regulations and statutes. In addition, it is recommended that the labels conform to all applicable Association of American Feed Control Officials (AAFCO) Model Regulations.

a. Storage and Handling Information Statements

- i) It is recommended that raw frozen meat and/or poultry products for animal consumption bear a statement, “Keep Frozen”, displayed in a prominent manner on the principal display panel.
- ii) We recommend that raw frozen meat and/or poultry products for animal consumption conspicuously bear a statement under a heading “Handling Guidelines for Safe Use” on the outside of the immediate container, stating:
“Some raw food products may contain bacteria that could cause illness to you or the animals you are feeding if mishandled. For your protection, follow these instructions for safest use.
 1. Keep frozen until ready to use.
 2. Thaw in refrigerator or microwave.
 3. Keep raw meat and poultry separate from other foods. Wash working surfaces, utensils (including cutting boards, preparation and feeding

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bowls), hands, and any other items that touch or contact raw meat or poultry with hot soapy water.

4. Refrigerate leftovers immediately or discard.”

b. Ingredients and Guarantees

- i) Ingredients must be listed in descending order of predominance by weight using their common or usual names as provided in 21 CFR 501.4(a). In general, FDA has recognized the AAFCO-defined names as the common or usual name as specified in Compliance Policy Guide 7126.08, Section 665.100. Ingredients not defined by AAFCO must be declared by their common or usual names as defined under 21 CFR 501.4 and 21 CFR 102.5.
- ii) States that have adopted or adapted the AAFCO Model Regulations have certain requirements regarding nutritional adequacy. Model Regulation PF7 states that dog and cat food labels must include a statement of nutritional adequacy or purpose of the product, except when the dog or cat food is clearly and conspicuously identified on the principal display panel as a "snack" or "treat." This model regulation also says the nutritional adequacy statement must consist of either a claim that is substantiated as provided for by the Model Regulation or the statement: "This product is intended for intermittent or supplemental feeding only."
- iii) States that have adopted or adapted the AAFCO Model Regulations also have certain requirements regarding guarantees. Model Regulation PF4 states that a pet food or specialty pet food must list certain guarantees for crude protein, crude fat, crude fiber, and moisture. In addition, this model regulation says 1) a dog or cat food label must list other required or voluntary guarantees in the same order and units of the nutrients in the AAFCO Dog (or Cat) Food Nutrient Profiles; 2) guarantees for substances not listed in the AAFCO Dog (or Cat) Profiles, or otherwise not provided for in the Model Regulations, must be accompanied by an asterisk referring to the disclaimer “not recognized as an essential nutrient by the AAFCO Dog (or Cat) Food Nutrient

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Profiles;” and 3) the disclaimer must appear immediately after the last such guarantee in the same size type as the guarantees.

c. Claims

- i) Based upon the claims made for a product, its intended use may bring it within the definition of a drug under Section 201(g)(1) of the FFDCFA. An article’s intended use may be shown, for example, by labeling claims, advertising matter, historical use, and by oral or written statements. It may also be shown by the circumstances under which the article is offered and used, regardless of labeling or advertising. We recommend that a manufacturer consult CVM if it is uncertain whether a claim is acceptable for food or is a drug claim.
- ii) Claims that may imply the product itself has been inspected or certified by USDA or another regulatory body must not be false or misleading.
- iii) Claims that the product is equivalent to food for human consumption must not be false or misleading (21 U.S.C. 403(a)(1)).
- iv) We recommend that comparative claims be scientifically substantiated.

III. Considerations

Safety: It is unlawful to introduce into interstate commerce any food, including food for pets and for other animals, which is adulterated (Section 301(a) of the FFDCFA). Among the circumstances in which a food will be deemed adulterated are when: (a) it contains any poisonous or deleterious substance that may render it injurious to health, unless the quantity does not ordinarily render the food injurious to health; (b) it has been prepared, packed, or held under unsanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health; and (c) it is, in whole or in part, the product of a diseased animal or of an animal that has died otherwise than by slaughter (Section 402(a) of the FFDCFA). These circumstances are particularly relevant to raw meat products for animals, in large part because they are not heat treated and because raw animal tissues may harbor many potentially pathogenic organisms, including bacteria (e.g., *Salmonella*, *Escherichia coli*) and parasites.²⁰ FDA has promulgated a regulation specifying that meat scraps, or other similar animal by-products, or blended mixtures of these products are adulterated when they are found upon examination to be contaminated with *Salmonella* microorganisms (21 CFR 500.35). Not only are the animals consuming the product at risk of infection by organisms contained in the raw tissues, but the people handling the product are also at risk. Adequate heat treatment is the most effective and efficient means of mitigating this risk. Because some processes currently used,

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such as freezing or freeze-drying, do not achieve the same degree of effectiveness as heat treatment, the measures discussed and recommended below are important in reducing the risk of infection and the likelihood of the product being adulterated.

- *Source of ingredients* – There are generally three sources of animal tissues for raw meat foods for animals: meat obtained directly from human-food processing facilities; meat from animals that have died by means other than slaughter; and meat originally offered, but no longer suitable, for human consumption. All raw tissues, even those inspected by the USDA and judged acceptable for sale to people for their consumption after proper cooking, pose a risk of being contaminated with pathogenic organisms,^{6,8,9} and USDA requires safe handling instructions on raw meat products intended for human consumption (9 CFR 317.2(l)(3) and 9 CFR 381.125). However, raw tissues obtained from mammals or poultry that have died other than from slaughter pose significantly increased risk of contamination with pathogenic organisms.^{5,6} Even when collected from a USDA-inspected slaughter facility, tissues that are typically not offered for human consumption, but instead are permitted for use in animal feed, may not be subjected to the same rigorous inspection needed to minimize the risk of contamination and disease transmission. Likewise, tissues that originally passed USDA inspection for human consumption, but that were later diverted for use in animal feeds, pose a risk for increased numbers of bacterial organisms, some of which may be pathogenic.²¹ To minimize risk, we recommend that only sources of animal tissue ingredients that come from a USDA-inspected facility and have passed USDA inspection for human consumption should be used for manufacturing foods that contain raw meat, or other raw animal tissues, for consumption by dogs, cats, other companion or pet animals, and captive noncompanion animal carnivores and omnivores. In addition, we recommend that all other ingredients be suitable for use in animal feeds; that is, the ingredients are of an appropriate grade that experts qualified by scientific training and experience to evaluate the safety of substances directly or indirectly added to food would agree the ingredients are safe for use in raw food for animals.
- *Form of Ingredients* – In addition to contamination issues, the physical form of ingredients may pose a safety concern. When bone is included in other than ground form, there is an increased risk of dental or gastrointestinal trauma.⁹ To mitigate these risks, we recommend only bone in ground form be used in foods that contain raw meat, or other raw animal tissues, for consumption by dogs, cats, other companion or pet animals, and captive noncompanion animal carnivores and omnivores.

Manufacturing – Meats and animal tissues intended for animals other than people are not subject to USDA inspection, except those pet foods certified by USDA under its voluntary inspection program (9 CFR Part 355). Also, while FDA has Good Manufacturing Practice (GMP) regulations in place for human foods (21 CFR Part 110) and for medicated feeds for animals (21 CFR Part 225), FDA has not promulgated GMP regulations for non-medicated animal feeds. Given the safety concerns noted above, manufacturers of raw meat foods for animals should take all measures necessary to prevent adulteration. Measures that would help minimize contamination by pathogenic microorganisms and prevent the growth of pathogens could include irradiating the

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product after final packaging as provided for in 21 CFR Part 579, participation in the USDA's voluntary inspection program (9 CFR Part 355), and practicing GMP's such as those for human foods in 21 CFR Part 110. Development and implementation of a HACCP program would be an effective and rational means of fostering food safety through hazard identification and preventive controls. The desired outcome is to reduce the risk of microbial contamination or other adulteration for raw animal feed products. Manufacturers should also be aware that products made from tissues of animal origin not inspected and passed for human consumption may be subject to USDA regulations for transporting and denaturing as specified in 9 CFR Part 325.

- *Storage and handling* – Proper transport and storage of the product by manufacturers, distributors, and retailers is necessary to prevent growth of pathogens and other microorganisms that would degrade product quality and likely adulterate the product. To best prevent growth of microorganisms, we recommend that products that are not freeze-dried be kept frozen at all times. Even when all safety precautions are taken, the risk of contamination and disease transmission is increased if the final purchaser (i.e., the pet owner or animal caretaker) does not properly handle the product after sale. This includes risk not only to the animal consuming the food, but also to the person preparing or otherwise touching the food, working surfaces, bowls, or utensils that come in contact with the food. Attention to strict hygienic measures becomes extremely important because the raw meat products fed to animals are not cooked. Studies have demonstrated that failure by food preparers to wash their hands after handling raw animal tissues is a statistically significant risk factor for members of the household to contract food borne illness.^{22,23}
- The USDA requires that instructions for handling and preparing raw meat and poultry products intended for consumption by people be printed on package labels as specified in 9 CFR 317.2(1)(3) and 9 CFR 381.125. As stated in Section II, we recommend that similar instructions be on labels of raw meat foods for other animals to inform the purchaser of the risk of infection from contaminating microorganisms and how to mitigate that risk.

Nutritional adequacy: Manufacturers of products intended to be offered as the sole source of nutrition for pets should substantiate the nutritional adequacy of these products. There is significant risk of nutritional deficiency or excess when such products are improperly formulated.^{24,25} Calcium and phosphorus are often deficient in foods based on raw meat, and should be supplemented accordingly. In addition to the risk of physical trauma or impaction, large pieces of bone may not allow for efficient digestion and absorption, possibly resulting in nutritional deficiency when bone is intended to serve as a source of dietary calcium. Essential fatty acids and some trace minerals may also be deficient. Alternatively, foods based on raw meat could be excessive in vitamin A if liver is used as a major ingredient and cause vitamin A toxicity if fed for extended periods of time.²⁶ Other fat soluble vitamins may be either excessive or deficient as well.^{24,25}

Although there have been claims made that raw meat foods are superior with respect to providing adequate nutrition than other products substantiated to be complete and balanced, FDA

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is not aware of scientific evidence to support such claims. FDA has not issued regulations specifying the requirements for substantiating nutritional adequacy of sole source foods, but the Association of American Feed Control Officials (AAFCO) has developed Model Regulations for Pet Food and Specialty Pet Food. These model regulations require one of two methods be used to substantiate nutritional adequacy of foods for dogs and cats intended as the sole source of nutrients other than water. One of the methods is to have the product contain nutrients in the ranges specified in the AAFCO Dog Food Nutrient Profiles and Cat Food Nutrient Profiles for the appropriate life stage of the animal. Although these Nutrient Profiles were established on the presumption of the use of ingredients common in the manufacture of conventional canned or extruded pet foods, FDA knows of no basis to conclude that the minimum and maximum concentrations of nutrients listed in the Profiles should be altered for foods based on raw meat. Thus, under Model Regulation PF7 of the Model Regulations for Pet Food and Specialty Pet Food proposed by AAFCO, a raw meat diet intended as the sole source of nutrients for pet dogs and cats must be formulated to meet the AAFCO Dog or Cat Food Nutrient Profiles for the intended life stage(s), unless it has successfully passed the appropriate feeding trials using AAFCO protocols, which is the second method for substantiating nutritional adequacy. We recommend raw meat foods intended as the sole, or primary, source of nutrients for captive noncompanion animals be formulated to contain nutrient contents established by authoritative scientific review committees knowledgeable in the nutrient requirements of the specific species when such information exists and is available. In the absence of specific nutrient requirements and maximum tolerances, the AAFCO Cat Food Nutrient Profiles may be a useful reference for estimating adequate nutrient contents of foods for captive noncompanion animals.

Raw meat foods tend to be high in fat, resulting in increased caloric density. Although the foods are generally highly digestible, less total dry matter is required to supply a daily caloric need, which results in less absolute quantities of other nutrients being consumed unless the increase in caloric density is also accompanied by an increase in concentrations of other required nutrients. Thus, as directed in the profiles, it is recommended that product formulations used to substantiate nutritional adequacy be compared to the AAFCO Dog or Cat Nutrient Profiles Based on Calorie Content, not simply Profiles Based on Dry Matter.

Labeling and Claims: Raw meat foods are subject to the labeling requirements listed in 21 CFR Part 501. These include, but are not limited to, the need for an accurate ingredient declaration as specified in 21 CFR 501.4. In addition, states laws, many of which have adopted or adapted the AAFCO Model Regulations for Pet Food and Specialty Pet Food, usually set forth additional labeling requirements.

- *Drug claims* – Based upon the claims made for a product, its intended use may bring it within the definition of a drug under Section 201(g)(1) of the FDCA. An article's intended use may be shown, for example, by labeling claims, advertising matter, historical use, and by oral or written statements. It may also be shown by the circumstances under which the article is offered and used, regardless of labeling or advertising. We recommend that a manufacturer consult CVM if it is uncertain whether a claim is acceptable for food or is a drug claim.

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- *Other claims* – We recommend that comparative claims with other products be scientifically substantiated. Claims that imply the product is “USDA certified,” “USDA inspected,” or “human grade” must not be false or misleading under Section 403(a)(1).

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References

1. Mead PS, Slutsker L, Dietz V *et al.* Food-related illness and death in the United States. *Emerging Infectious Diseases* 5:607-625, 1999.
2. Jones TF & Gerber DE. Perceived etiology of foodborne illness among public health personnel. *Emerging Infectious Diseases* 7:904-905, 2001.
3. Buzby JC & Roberts T. Economic costs and trade impacts of microbial foodborne illness. *World Health Statistics Quarterly* 50:57-66, 1997.
4. Trevejo RT, Courtney JG, Starr M *et al.* Epidemiology of salmonellosis in California, 1990-1999: morbidity, mortality, and hospitalization costs. *American Journal of Epidemiology* 157:48-57, 2003.
5. Gerba CP, Rose JB & Haas CN. Sensitive populations: who is at the greatest risk? *International Journal of Food Microbiology* 30:113-123, 1996.
6. Duffy EA, Belk KE, Sofos JN *et al.* Extent of microbial contamination in United States pork retail products. *Journal of Food Protection* 64:172-178, 2001.
7. Duffy EA, Belk KE, Sofos JN *et al.* Microbial contamination occurring on lamb carcasses processed in the United States. *Journal of Food Protection* 64:503-508, 2001.
8. Zhao C, Ge B, de V, J. *et al.* Prevalence of *Campylobacter* spp., *Escherichia coli*, and *Salmonella* serovars in retail chicken, turkey, pork and beef from the greater Washington, D.C. area. *Applied and Environmental Microbiology* 67:5431-5436, 2001.
9. White DG, Zhao S, Suddler R *et al.* The isolation of antibiotic-resistant *Salmonella* from retail ground meats. *New England Journal of Medicine* 345:1147-1154, 2001.
10. Tamplin ML, Feder I, Palumbo SA *et al.* *Salmonella* spp. and *Escherichia coli* biotype I on swine carcasses processed under the hazard analysis and critical control point-based inspection models project. *Journal of Food Protection* 64:1305-1308, 2001.
11. Atanassova V, Meindl A & Ring C. Prevalence of *Staphylococcus aureus* and staphylococcal enterotoxins in raw pork and uncooked smoked ham - a comparison of classical detection and RFLP-PCR. *International Journal of Food Microbiology* 68:105-113, 2001.
12. Jorgensen F, Bailey R, Williams S *et al.* Prevalence and numbers of *Salmonella* and *Campylobacter* spp. on raw, whole chickens in relation to sampling methods. *International Journal of Food Microbiology* 76:151-164, 2002.

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13. Chengappa MM, Staats J, Oberst RD *et al.* Prevalence of *Salmonella* in raw meat used in diets of racing greyhounds. *Journal of Veterinary Diagnostics and Investigation* 5:372-377, 1993.
14. Joffe DJ & Schlesinger DP. Preliminary assessment of the risk of *Salmonella* infection in dogs fed raw chicken diets. *Canadian Veterinary Journal* 43:441-442, 2002.
15. Stone GG, Chengappa MM, Oberst RD *et al.* Application of polymerase chain reaction for the correlation of *Salmonella* serovars recovered from greyhound feces with their diet. *Journal of Veterinary Diagnostics and Investigation* 5:378-385, 1993.
16. Schiller CA, Wolff MJ, Munson L *et al.* *Streptococcus zooepidemicus* infections of possible horsemeat source in red-bellied tamarins and Goeldi's monkeys. *Journal of Zoo and Wildlife Medicine* 20:322-327, 1989.
17. Shaw M, Montali RJ & Bush M. *Streptococcus zooepidemicus* in small carnivorous mammals fed uncooked horsemeat. *Journal of Zoo Animal Medicine* 15:161-164, 1984.
18. Sato Y, Mori T, Koyama T *et al.* *Salmonella virchow* infection in an infant transmitted by household dogs. *Journal of Veterinary Medical Science* 62:767-769, 2000.
19. Morse EV, Duncan MA, Estep DA *et al.* Canine salmonellosis: a review and report of dog to child transmission of *Salmonella enteritidis*. *American Journal of Public Health* 66:82-84, 1976.
20. LeJune JT & Hancock DD. Public health concerns associated with feeding raw meat diets to dogs. *Journal of the American Veterinary Medical Association* 219:1222-1225, 2001.
21. Smulders FJM & Johnson JL. Meat hygiene: processing, packaging, preservation. *Outlook on Agriculture* 19:85-93, 1990.
22. Kohl KS, Rietberg K, Wilson S *et al.* Relationship between home food-handling practices and sporadic salmonellosis in adults in Louisiana, United States. *Epidemiology and Infection* 129:267-276, 2002.
23. Mead PS, Finelli L, Lambert-Fair MA *et al.* Risk factors for sporadic infection with *Escherichia coli* O157:H7. *Archives of Internal Medicine* 157:204-208, 1997.
24. Freeman LM & Michel KE. Evaluation of raw food diets for dogs. *Journal of the American Veterinary Medical Association* 218:705-709, 2001.
25. Freeman LM & Michel KE. Correction: Evaluation of raw food diets for dogs. *Journal of the American Veterinary Medical Association* 218:1716, 2001.
26. Goldman AL. Hypervitaminosis A in a cat. *Journal of the American Veterinary Medical Association* 200:1970-1972, 1992.