GraINzyme® Phytase

A phytase feed enzyme produced by *Zea mays* expressing a phytase gene derived from *Escherichia coli* K12

SUMMARY of DATA SUPPORTING a NOTIFICATION of GRAS STATUS

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Executive Summary

Agrivida, Inc. has developed a new phytase feed enzyme product to improve phosphorus utilization in poultry feeds. This phytase is referred to as the Phy02 phytase in this document but it will be marketed under the trade name GraINzyme® Phytase. The gene encoding the Phy02 phytase (*phy02*) is derived from the *appA* phytase gene of *Escherichia coli* strain K12. The *phy02* gene under the control of monocot derived seed specific promoters was transformed into maize (*Zea mays*) using *Agrobacterium* mediated plant transformation techniques. The resulting transformed maize produces 4,000 – 7,000 units of Phy02 phytase activity (FTU) per gram of grain. The Phy02 product is produced using common agronomic practices for the production of maize grain followed by milling to form a course meal. The Phy02 phytase product can be added to the feed of poultry at a rate of 75 g to 1.7 kg per ton of feed to deliver an effective dose of phytase. Agrivida, Inc. has conducted studies to characterize the Phy02 phytase product in order to demonstrate its safety and efficacy and to support a conclusion that the Phy02 phytase product is generally recognized as safe (GRAS) for its intended use. The details and results of the studies that support the functionality and a conclusion of the GRAS nature of the Phy02 phytase are presented herein.

The *phy02* gene construct that was used in the transformation of maize contained three copies of the *phy02* gene, each under the control of a different monocot derived seed specific promoter. The maize *phy02* gene transformants were selected using the well-known phosphomannose isomerase (*pmi*) gene whose safety and utility has been well established. Characterization of the Phy02 phytase producing maize revealed that there are two separate insertions of the *phy02* gene construct in the genome of maize. One of the *phy02* gene insertions is located in maize chromosome (b)(4) and it contains the complete transformed DNA (T-DNA) with three copies of the *phy02* gene. The second insertion is located in maize chromosome 2 and contains a truncated version of the complete *phy02* gene T-DNA that contains two of the three copies of the *phy02* gene. The complete sequence of both insertions including 1 to 2 kilobase pairs (Kb) of flanking maize DNA on each side of both insertions was determined. No known maize genes were identified in the region of either of the insertion sites. The plasmid that contains the T-DNA fragment that was used to transform maize contains an antibiotic resistance gene for maintenance in bacterial hosts. The antibiotic resistance gene was not transformed into the maize genome since it is not located within the T-DNA region of the *phy02* gene plasmid. The absence in the maize genome of the antibiotic resistance gene and other elements of the transformation plasmid outside of the T-DNA was confirmed by Southern hybridization techniques. The stability of both *phy02* gene insertions in maize over multiple generations was also demonstrated.

The Phy02 phytase enzyme derived from three representative product batches was fully characterized. The molecular weight, immunoreactivity and phytase activity were confirmed. The pH and thermal optima for the Phy02 phytase were determined and the N-terminal amino acid sequence of the Phy02 phytase was confirmed to be as expected. It was further demonstrated that the Phy02 phytase produced by maize is not glycosylated and does not catalyze significant levels of other enzymatic activities. Three Phy02 product batches were demonstrated to meet all JECFA specifications for food enzymes with the exception of number of coliforms and total bacteria. However, the product is within the range for coliforms and total bacteria that are known to be typical for maize grain that is produced by common agricultural practices and widely used in food and feed.

The functionality of the Phy02 phytase in poultry was demonstrated in four broiler chicken feeding studies. Performance parameters of chickens consuming a basal diet low in available phosphorus that was supplemented with different amounts of Phy02 phytase were compared to negative control groups (NC) that were fed the basal diet with low available phosphorus without Phy02 phytase supplementation and to positive control groups (PC) fed the same basal diet with high levels of available phosphorus. In all studies, body weight gain over the 42 day duration of the trials was greater in the PC groups compared to the NC groups and the chickens consuming feed supplemented with Phy02 phytase had body weights that increased in a Phy02 dose dependent manner and that were significantly greater than those of the NC groups and equal or greater to that of the PC groups. Feed conversion rates were reduced in a manner that was dependent upon the Phy02 dose with higher Phy02 dose groups demonstrating lower feed conversion rates. The phosphorus digestibility and the amount of tibia bone ash at 21 and 42 days were also assessed in all trials and the results demonstrated the functionality of the Phy02 phytase in improving the availability of phosphorus in the feed. The supplementation of feed with the Phy02 phytase resulted in increased amounts of bone ash in a dose dependent manner.

The Phy02 phytase product is assumed to be safe based upon the history of safe use of phytase enzymes in animal feed, the maize production host, and *E. coli* K12 from which the *phy02* gene was derived. In addition, a high dose of the Phy02 phytase equal to 30,000 FTU/kg feed was included in one of the chicken feeding studies and 60,000 FTU/kg in another to assess the safety of high doses of Phy02 in chickens. Key hematological assessments of the high Phy02 dose groups were compared to those of the NC and PC groups and there were no indications of toxicity or abnormalities in the high Phy02 dose groups. Further, post-mortem examinations of animals from the high Phy02 dose groups did not reveal any indications of abnormalities or toxicity. In general the chickens treated with the high doses of Phy02 phytase demonstrated further improvements in body weight gain and feed conversion rate over the NC, PC, and lower Phy02 dose groups.

Based on the above information which is supported by the information contained in this document, Agrivida, Inc. concludes that the Phy02 phytase product is safe and effective and is GRAS when used as intended in the feed of chickens. In addition, this information was reviewed by a panel of experts and based upon it, this panel concluded that the Phy02 phytase product is GRAS for use in poultry feed.

1.0 Introduction

Phytic acid, or phytate (myo-inositol 1,2,3,4,5,6-hexakis dihydrogen phosphate), accounts for up to 80% of the phosphorus in the seeds of cereals and legumes and is the primary storage form of phosphate in these materials (Reddy, et al. 1982). Phytate phosphorus is nutritionally unavailable to monogastric animals such as poultry and swine and therefore, inorganic forms of phosphorus are commonly added to animal feed to supply the nutritional needs for this important nutrient. The addition of high amounts of inorganic phosphorus to animal feeds results in the generation of high-phosphorus manure that can contaminate rivers and streams resulting in algal blooms, oxygen depletion and the death of fish and aquatic animals due to eutrophication (Jongbloed and Lenis 1998; Correll 1999; Mallin 2000; Poulsen 2000). In addition, phytate forms a complex salt called phytin with several mineral ions such as K^{+}, Mg^{+2}, Ca^{+2} and Zn^{+2} that renders them nutritionally unavailable to monogastric animals (Lott 1984; Harland and Morris 1995; Minihane and Rimbach 2002). For this reason, phytate is considered an anti-nutrient.

Phytases are a class of acid phosphatase enzymes that hydrolyze phosphates from phytate to produce free phosphate and inositol. One strategy for making phosphorus from phytate nutritionally available to monogastric animals is the addition of phytase to animal feeds (Jongbloed and Lenis, 1998; Onyango et al., 2005). The use of phytase in the diets of poultry and swine has been shown to improve feed and phosphorus utilization (Baker and Augspurger, 2002; Nyannor et al., 2007 and 2009). A number of phytase products are currently marketed for this use and include Natuphos™ (BASF) a phytase derived from *Aspergillus niger*, Ronozyme™ (DSM) a phytase derived from *Peniophora lycii*, and Quantum Blue (AB Vista) a phytase that is also derived from the AppA phytase of *Escherichia coli*. The use of phytase in animal feeds allows a reduction in the amount of inorganic phosphorus added to animal feeds and has been reported to result in reductions in fecal phosphorus by as much as 60% (Nahm, 2002; Sharpley *et al*., 1994; Wodzinski and Ullah 1996). In December 2002 a regulation issued from the US EPA was implemented that regulates the application of manure from concentrated animal farming operations onto land based on the amount of phosphorus being applied (EPA, 2002). The use of phytase in poultry and swine feed results in a more efficient utilization of phosphorus and reduces phosphorus in animal wastes. Therefore, its use may assist concentrated animal farming operations in meeting the EPA guidelines without reducing the size of their operations or having to utilize other more expensive waste handling technologies. In addition, phytase supplementation might improve amino acid availability. Phytate–protein interaction may induce changes in protein structure that can decrease enzymatic activity, protein solubility and proteolytic digestibility (Cowieson et al., 2006; Selle et al., 2012). Supplemental phytase has also been reported to improve utilization of minerals by animals (Lei et al., 1993; Adeola, 1995; Lei and Stahl, 2001; Debnath et al., 2005) and it has been hypothesized that phytase supplementation results in an increased energy utilization in monogastric animals (Selle and Ravindran, 2007).

Phytase enzymes are widespread in nature, occurring in plants, microorganisms and in some animal tissues (Konietzny and Greiner, 2002). Significant levels of endogenous phytase activity (>1000 FTU/kg) have been reported in rye, wheat, rye bran and wheat bran (Viveros, 2000). Multiple forms of phytase have been reported in barley, maize, rice, wheat, spelt, soybean, rape seed, pumpkin, lily, as well as in *Aspergillus niger, A. oryzae, Escherichia coli*, and *Saccharomyces cerevisiae* (Konietzny and Greiner, 2002). Phytase has been shown to be produced by microorganisms used in food fermentations, including yeasts such as *S. cerevisiae* (Nakamura, 2000) and *Schwanniomyces castellii* (Lambrechts, 1992). Bacteria that inhabit the intestinal tracts of animals are known to produce phytase and phytase activity has been measured in the gastrointestinal tracts of animals, including humans (Iqbal, 1994). In ruminants, production of phytase by anaerobic ruminate bacteria is most likely responsible for the increased rate of phytate degradation that has been noted in these animals (Yanke, 1998).

Phytases are included in human dietary supplements currently marketed in the U.S. and are claimed to improve the digestion of foods and the absorption of minerals. The absorption of iron in humans has been shown to be dramatically improved when at least 2 of the 6 phosphate groups of phytic acid are removed by phytase (Sandberg, 1996), thereby demonstrating the positive nutritional affects of phytase in alleviating the anti-nutritive properties of phytic acid. General Nutrition Centers (Pittsburgh, PA) markets a dietary supplement (GNC Multi-Enzyme Formula; GNC, 2016) consisting of a mixture of different enzymes including phytase. Nurtiteck-Ultra Bio-Logics Inc. (Montreal, Canada) markets a dietary supplement called Phytase NSP Blend that contains 200 FTU/g of a phytase derived from *Aspergillus niger*. Global Healing Center (Houston, TX) markets a phytase containing enzyme mixture named VeganZyme® (GHC, 2016). CereCalase (NEC, 2016) is another phytase-containing human dietary supplement. It is produced by the National Enzyme Company (Forsyth, MO) and contains a phytase from *A. niger*. Most of the phytase enzymes included in the abovementioned dietary supplement products are derived from *Aspergillus niger*. The AppA phytase that is nearly identical to the Phy02 phytase has been shown to be structurally similar to the phytase from *Aspergillus niger* (Lim et al., 2000).

All of the current phytase animal feed enzyme products are produced by genetically modified microorganisms through fermentation and purification of the phytase from the fermentation medium. The Phy02 phytase that is being developed by Agrivida, Inc. is produced in the grain of maize (*Zea mays*). Genes encoding the Phy02 phytase under the expression of [redacted] (b) (4) monocot derived promoters were introduced into maize to achieve the production of Phy02 phytase specifically in the grain of maize. The gene encoding the Phy02 phytase is derived from the native *Escherichia coli* strain K-12 phytase gene (*appA*) and the Phy02 phytase protein differs from the *E. coli* AppA phytase by only [redacted] (b) (4) f the 412 total amino acid residues in the mature protein. The *appA* gene and the App phytase it encodes have been previously described (Dassa, *et al*., 1990). The AppA phytase is known to be structurally similar to the phytase from *Aspergillus niger* that is the phytase in the commercial phytase product Natuphos™ (Lim et al., 2000) that is marketed as an animal feed additive. The Phy02, AppA, and many other phytase enzymes that have been developed as animal feed additives belong to the histidine acid phosphatase subfamily of phytases.

The Phy02 phytase is produced in the grain of maize but due to the relatively low water content in grain it is not enzymatically active in the grain nor has it any obvious effect on the grain or the maize plant. The maize grain producing Phy02 phytase is harvested and ground into a course meal that can be added as a feed additive at relatively low inclusion levels (100 to 1000g/ton of feed) to the feed of poultry in order to improve the nutritional availability of phosphorus in the diet. The intended effect of the Phy02 phytase in animal feed is to enzymatically remove phosphate from phytic acid and phytin in the diet in order to provide enhanced phosphorus availability thereby reducing the need to add exogenous mineral phosphate to the feed.

The native *E. coli appA* phytase gene was optimized using Gene Site-Saturation Mutagenesis (Short, 2001) to generate a gene encoding the NOV9X phytase with increased thermotolerance. Thermotolerance is a desirable trait for commercial feed enzymes since many animal feeds are produced by a pelleting process that involves a heat treatment that inactivates thermolabile enzymes. The Phy02 phytase gene was derived from the NOV9X gene by further optimization to create additional specific amino acid substitutions for the purpose of making the Phy02 phytase more thermotolerant and sensitive to digestion in the gastric environment. The NOV9X phytase is the active phytase in the commercial phytase product named Quantum that is produced by the yeast *Pichia pastoris* and that has been approved by FDA Center for Veterinary Medicine (CVM) for inclusion in animal diets since 2008. The NOV9X phytase has 8, and the Phy02 phytase has (b)(4) amino acid substitutions relative to the AppA phytase from *E. coli* that consists of 412 amino acids. The NOV9X and Phy02 phytases are nearly identical as they differ from each other by only (b)(4) amino acid substitutions. The Phy02 phytase demonstrates considerable tolerance to high temperatures, maintaining significant activity after incubation in aqueous conditions at temperatures up to 70°C for 5 minutes.

2.0 Description of the Production Organism

2.1 *Zea mays* L. (Maize)

Zea is a genus (Poaceae) of the grass family Graminae. Maize (*Zea mays* L.) is a tall, monecious annual grass with overlapping sheaths and broad conspicuously distichous blades. Plants have staminate spikelets in long spike-like racemes that form large spreading terminal panicles (tassels) and pistillate inflorescences in the leaf axils, in which the spikelets occur in 8 to 16 rows, approximately 30 cm long, on a thickened, almost woody axis (cob). The whole structure (ear) is enclosed in numerous large foliaceous bracts and long styles (silks) protrude from the tip of the ear as a mass of silky threads (Hitchcock and Chase, 1971). Pollen is produced entirely in the staminate inflorescence and eggs, entirely in the pistillate inflorescence. Maize is wind-pollinated and both self and cross-pollination are usually possible. Shed pollen usually remains viable for 10 to 30 minutes, but can remain viable for longer durations under favorable conditions (Coe *et al*., 1988). Cultivated maize is presumed to have been derived from teosinte (*Z. mexicana*) and is thought to have been introduced into the old world in the sixteenth century. Maize is cultivated worldwide and represents a staple food for a significant proportion of the world's population. No native toxins are reported to be associated with the genus *Zea* (International Food Biotechnology Council, 1990).

As discussed above, the indigenous peoples of North America have cultivated maize for thousands of years. The modern era of maize hybrid production began in the United States where research conducted in the early part of the 20th century proved that hybrid maize could produce a yield superior to open-pollinated varieties (Sprague and Eberhart, 1976). Gradually, hybrid-derived varieties replaced the open-pollinated types in the 1930's and 1940's. Almost all maize grown in the United States now comes from hybrid seed that is obtained every planting season from private enterprises and the older open-pollinated varieties are virtually unknown in commerce.

Maize is planted when soil temperatures are warm (greater than or equal to 10°C) usually mid to late April until mid-May in the U.S. Corn Belt. Optimum yields occur when the appropriate hybrid maturity and population density are chosen. In addition, exogenous sources of nitrogen fertilizer are generally applied and weed and insect control measures are generally recommended. Choice of the appropriate hybrid for the intended growing area helps to ensure that the crop will mature before frost halts the growth of the plant at the end of the season; hybrids are categorized according to the amount of Growing Degree Units (GDU) that will be required for maturity (Monsanto, 2015). Therefore, a hybrid developed for a specific climate zone will not mature in cooler areas that receive fewer GDUs during a typical growing season.

In 2015, there were about 88 million acres planted to maize in the United States that produced 13.6 billion bushels of grain and 128 million tons of silage (USDA-NASS, 2016). Maize grown in the United States is predominantly of the yellow dent type, a commodity crop largely used to feed domestic animals, either as grain or silage. The remainder of the crop is exported or processed by wet or dry milling to yield products such as high fructose corn syrup and starch or oil, grits and flour. These processed products are used extensively in the food industry. For example, maize starch serves as a raw material for an array of processed foods, and in industrial manufacturing processes. Since the early 1980's a significant amount of grain has also been used for fuel ethanol production. The by-products from these processes are often used in animal feeds.

In addition to the above, the Organization for Economic Co-operation and Development (OECD) Consensus Document on the biology of maize (OECD, 2003) provides key information on:

- a general description of maize biology, including taxonomy and morphology and use of maize as a crop plant

- agronomic practices in maize cultivation, geographic centers of origin, reproductive biology, and cultivated maize as a volunteer weed

- inter-species/genus introgression into relatives and interactions with other organisms

- a summary of the ecology of maize.

2.2 Origin of the gene encoding phytase Phy02

The native *E. coli appA* phytase gene was optimized using Gene Site-Saturation Mutagenesis (Short, 2001) to generate a gene encoding the NOV9X phytase with increased thermotolerance. Thermotolerance is a desirable trait for commercial feed enzymes since many animal feeds are produced by a pelleting process that involves a heat treatment that inactivates thermolabile enzymes. The Phy02 phytase gene was derived from the NOV9X gene by further optimization to create additional specific amino acid substitutions for improved thermotolerance and sensitivity to digestion in the gastric environment. The NOV9X phytase is the active phytase in the commercial phytase product named Quantum that is produced by the yeast *Pichia pastoris* and that was approved by FDA-CVM for inclusion in animal diets since 2008. The amino acid sequence of the Phy02 phytase and the amino acid substitutions between it and the native *E. coli* AppA and NOV9X phytases are depicted in Figure 1. The nucleotide coding sequence and deduced amino acid sequence of the *phy02* phytase gene are shown in Figure 2. The NOV9X phytase has (b) (4) and the Phy02 phytase has (b) (4) amino acid substitutions relative to the AppA phytase from *E. coli* that consists of (b) (4) amino acids. The Phy02 phytase differs from the NOV9X phyase by 12 amino acids. The Phy02 phytase demonstrates considerable tolerance to high temperatures, maintaining significant activity after incubation in aqueous conditions at temperatures up to 70°C for 5 minutes (§3.6) and stability in feed mixtures during the pelleting process up to 90°C (§7.4).

2.3 Characteristics of the Phy02 Expression Construct.

A transformation gene cassette containing three copies of the Phy02 phytase gene, each with a different monocot derived promoter and (b) (4) terminator was constructed in plasmid (b) (4). The genetic elements of plasmid (b) (4) that was used to transform maize are shown in Figure 3. The individual genetic elements within plasmid (b) (4) are described in Table 1. This plasmid was transformed by *Agrobacterium*-mediated transformation into immature maize embryo tissue as described by Negrotto *et al.* (2000) and transformants were selected based on the presence of the plant selectable marker *manA* gene on the transformed DNA fragment that encodes the enzyme phosphomannose isomerase (PMI). The PMI enzyme enables maize tissue to grow on mannose as a sole source of carbon (Negrotto *et al.*, 2000). The *pmi* gene has been used as a selectable gene in several genetically modified maize varieties that have completed review by the USDA, FDA, and EPA for food and feed safety, including maize events 5307 and Mir604 maize with resistance to corn rootworm, lepidoptera resistant Mir162, and α-amylase expressing 3272, all products of Syngenta Seeds. Maize plants containing the Phy02 phytase gene were cultivated and were demonstrated to produce more than 4000 units of phytase activity (FTU) per gram of grain. The transformation event chosen as a development candidate was designated PY203.

Figure 1. Comparison of the amino acid sequences of the Phy02, *E. coli* AppA and Nov9X phytases.

The amino acid sequence of the *E. coli* AppA phytase is presented. [redacted] (b) (4) The consensus phytase active site (RHGxRxP) is shown in yellow shading. Other residues that are involved in substrate binding that are conserved in other phytases are shaded in blue.

(b) (4)

[redacted]

Figure 2. The nucleotide and predicted polypeptide sequence of Phy02, as expressed in maize. [redacted] (b) (4)

(b) (4)

[redacted]

Figure 3. Plasmid map of (b) (4) that was used in the transformation of maize to create the phytase producing event PY203.

(b) (4)

Table 1. Description of the genetic elements in the [redacted] (b) (4) containing three copies of the Phy02 phytase gene that was used to transform maize.

(b) (4)

[redacted]

2.4 Characterization of the maize Phy02 expression host

2.4.1 Determination of number of DNA insertions.

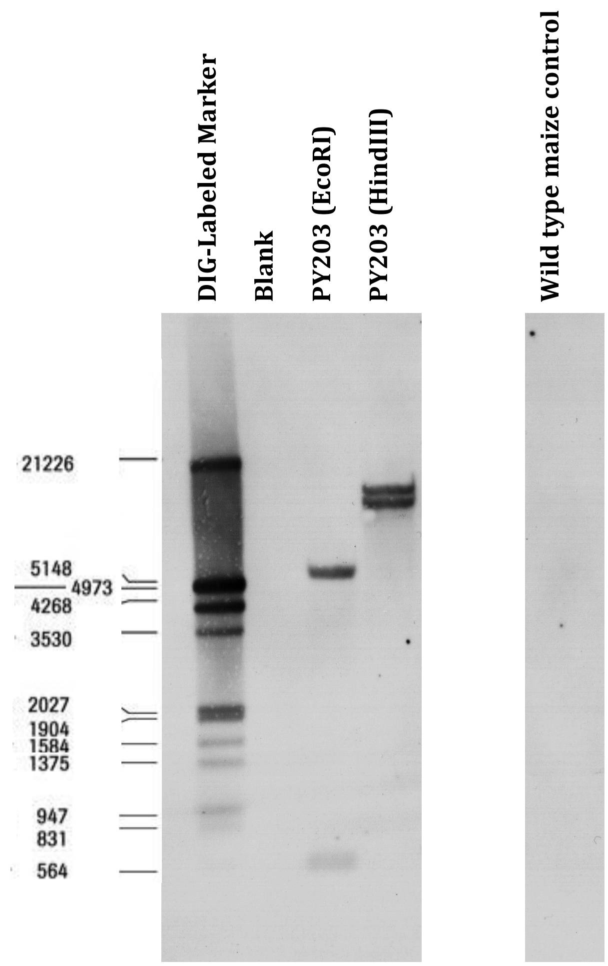
Isolation and sequencing of genomic DNA flanking the insertions in event PY203 revealed that this event contains two T-DNA insertions that were designated locus 3293 and locus 3507. Southern hybridization was used to confirm the presence of two independent insertions of the T-DNA from transformation plasmid (b) (4) in event PY203. Genomic DNA from event PY203 was digested independently with the restriction endonucleases EcoRI and HindIII. EcoRI and HindIII restriction sites are present in the T-DNA and/or the genomic maize flanking DNA (Figure 4). Therefore, restriction of the genomic DNA of event PY203 with these restriction endonucleases followed by probing in a Southern blot with the T-DNA right border (RB) region results in one unique DNA restriction fragment for each locus. Two different DNA fragments were visualized in restriction digests of PY203 genomic DNA with EcoRI and HindIII thereby indicating the presence of two independent insertions (Figure 5). The presence of the two insertions represented by loci 3293 and 3507 was confirmed by DNA sequencing of the insertions and the associated maize flanking DNA as described in §2.4.3.

Figure 4. Gene maps of PY203 3293 and 3507 insertion loci. EcoRI and HindIII restriction sites, hybridization region of the T-DNA RB probe, and expected hybridizing fragments in a Southern blot (pattern filled boxes) are indicated. Promoters are magenta, coding regions are orange, intergenic regions and introns are gray, and genomic regions are green.

(b) (4)

[redacted]

Figure 5. Southern hybridization blot of EcoRI and HindIII restricted genomic DNA of event PY203 with a DNA fragment from the T-DNA RB region. DIG-labeled DNA marker fragments are shown (left lane) with their corresponding sizes in base pairs indicated to the left of the blot. A separate lane of restricted genomic DNA from untransformed maize probed with the T-DNA RB probe is shown on the right to demonstrate that the probe does not hybridize to genomic maize DNA.



2.4.2 Screening for plasmid backbone fragments.

The absence of DNA fragments outside of the T-DNA that are derived from the vector portion of plasmid (b) (4) in the genome of the Phy02 expressing maize event PY203 was demonstrated by two different approaches. First, DNA fragments derived from the genetic elements within the vector portion of plasmid (b) (4) including the ColE1 origin of plasmid replication and the Streptothricin acetyltransferase and *aadA* genes (Figure 3 and Table 1), were used as hybridization probes in Southern blots containing restricted genomic DNA of the Phy02 expressing maize event PY203. None of the DNA fragments derived from the vector portion of plasmid (b) (4) demonstrated hybridization to genomic DNA from the Phy02 expressing maize event PY203. This result demonstrates the absence of DNA fragments derived from the vector portion of plasmid (b) (4) in the genome of maize event PY203. Second, a series of DNA primer sets designed to amplify a series of small, overlapping DNA fragments from the vector portion of plasmid (b) (4) were used in PCR amplifications from genomic DNA of maize event PY203. None of these PCR reactions produced DNA amplicons thereby confirming the absence of vector derived DNA fragments in the genome of maize event PY203.

2.4.3 Sequence of the *phy02* gene insertions and the flanking maize genome. As described in §2.4.1 above, the Phy02 expressing maize event PY203 contains two independent insertions in its genome that contain DNA coding for the *phy02* gene each derived from the T-DNA fragment of (b) (4). These independent insertions have been designated locus 3293 and locus 3507. Using genome walking and PCR cloning and sequencing strategies, the nucleotide sequence of each locus, including the inserted DNA and the flanking maize genomic DNA, has been determined. The insertion at locus 3293 includes the complete T-DNA fragment of (b) (4) with three copies of the *phy02* phytase gene. The compete nucleotide sequence and a genetic map of the insertion at locus 3293 and flanking maize genomic DNA is presented in Appendix 1 and Figure 6, respectively. The other insertion at locus 3507 contains a truncated version of the T-DNA fragment that includes two of the three *phy02* genes from the T-DNA fragment. This insertion lacks the (b) (4) copy of the *phy02* gene and much of the (b) (4) from which the gene is expressed. A genetic map and the complete nucleotide sequence of the truncated T-DNA insertion and the flanking maize genomic DNA of this locus is presented in Figure 7 and Appendix 2, respectively.

Figure 6. Genetic map of the T-DNA of locus 3293 of the maize Phy02 expressing event PY203 including (b) (4) bp. The genetic elements within the T-DNA are described in Table 1.

(b) (4)

Figure 7. Genetic map of the T-DNA of locus 3507 of the maize Phy02 expressing event PY203 including (b) (4) [redacted] bp. The genetic elements within the T-DNA are described in Table 1.

(b) (4) [redacted]

The nucleotide sequence of 1812 bp of maize genomic DNA at the right border of the T-DNA of locus 3293 was determined. A BLASTN comparison of this sequence against the publicly available B73 maize genome sequence database (http://www.maizegdb.org) demonstrated that it has 100% identity to sequence on maize chromosome (b) (4) [redacted] This genomic region does not contain annotated genes or defined genetic elements. At the left border of the T-DNA of locus 3293, the nucleotide sequence of 1662 bp of the maize genome was determined. A BLASTN comparison of this sequence against the publicly available B73 maize genome sequence database revealed 99.94% sequence identity to a region of maize chromosome (b) (4) [redacted] Analysis of the complete nucleotide sequence at locus 3293 and comparison to the genomic sequence of the B73 maize chromosome (b) [redacted] reveals that the T-DNA insertion into the maize genome at locus 3293 resulted in the (b) (4) [redacted] of the maize chromosome (b) (4) [redacted] It also revealed that the insertion is located (b) (4) [redacted] of the annotated gene model (b) (4) [redacted] The predicted gene (b) (4) [redacted] and its corresponding protein have not been characterized and its function is not known.

The nucleotide sequence of 2101 bp of maize genomic DNA at the right border of the T-DNA of locus 3507 was determined. A BLASTN comparison of this sequence against the publicly available B73 maize genome sequence database demonstrated that it has 100% identity to a sequence on maize chromosome (b) (4) [redacted] This genomic region contains a (b) (4) [redacted] At the left border of the T-DNA at locus 3507, the nucleotide sequence of 2569 bp of the maize genome was determined. A BLASTN comparison of this sequence against the publicly available B73 maize genome sequence database revealed 99.96% sequence identity to a region of maize chromosome (b) (4) [redacted]. This genomic region does not contain annotated genes or defined genetic elements. Comparison of the maize genomic sequences flanking the T-DNA insertion of locus 3507 with the B73 maize genome sequence revealed that the insertion resulted in

(b) (4) the maize genomic DNA at the insertion site in maize (b) (4)

2.4.4. Genetic stability of the inserts over multiple generations

The genetic stability of the two insertion loci in the Phy02 phytase producing maize event PY203 were evaluated by two different methods in four different backcross (BC) generations in an inbred genetic background designated “E”. Genomic DNA was isolated from fresh leaf tissue of the successive BC generations BC1E, BC2E, BC3E and BC4E. A breeding diagram depicting the relationship of the four BC generations is shown in Figure 8. A PCR primer set consisting of one primer specific to the T-DNA Right Border (RB) element at the edge of the inserted T-DNA (Figure 3) and a second primer specific to maize genomic DNA sequence in the flanking region of locus 3923 or locus 3507 was developed and used in PCR reactions with genomic DNA from event PY203 as the template. Two separate PCR reactions were conducted with each primer set and the resulting amplified DNA fragments were sequenced. Alignments of the sequence of the corresponding region from the genome of event PY203 with the sequences of the PCR amplified fragments from each of the PY203 BC generations and primer set are shown for loci 3293 and 3507 in Figures 9 and 10, respectively. All four generations, BC1E-BC4E, had identical insertion site sequences for both loci indicating that the sequence of the maize flanking DNA adjacent to the RB of each insertion was stable across 4 generations. This result demonstrates that both loci that contain the *phy02* gene in event PY203 are stable and have not moved from their original genomic locations over the four BC generations studied.

The genomic stability of the two insertion loci was also demonstrated using Southern hybribization. Genomic DNA was isolated from plants from each of the above described PY203 BC generations (BC1E, BC2E, BC3E, and BC4E) and subjected to digestion with the restriction endonuclease HindIII. From the sequence of the maize genome flanking regions for loci 3293 and 3507 and of the inserted DNA at these loci it is predicted that digestion of genomic DNA from PY203 with HindIII will produce one HindIII restriction fragments from each of the insertion loci that each contain DNA from the corresponding maize genome flanking region and the T-DNA insertion. The predicted sizes of the HindIII restriction fragments from locus 3923 and locus 3507 of PY203 are 10,192 bp and 11,910 bp, respectively. HindIII restricted genomic DNA from each of the four PY203 BC generations was subjected to agarose gel electrophoresis, blotted to a membrane and hybridized with a DNA fragment corresponding to the right border region of the T-DNA in both insertion loci. Two hybridizing fragments of approximately 10,000 and 12,000 bp were observed in the DNA from each of the four PY203 BC generations (Figure 11, Table 2). These results confirm the results of analysis of DNA sequence of maize genomic DNA flanking the insertion loci and demonstrate that the maize genomic DNA adjacent to both loci in PY203 transformed maize from four successive backcross generations is unchanged and stable. Complete details of the two studies of multi-generation stability of the two insertion loci in PY203 Phy02 producing maize are presented in Appendices 3 and 4.

Figure 8. Diagram depicting the genetic relationship of four BC generations (BC1E, BC2E, BC3E, and BC4E) used in the study to demonstrate genetic stability of the insertions in event PY203 over multiple generations to each other and to the primary T0 event PY203.

(b) (4)

(b) (4)

[redacted]

Figure 9. Alignment of genomic DNA sequence from locus 3293 of event PY203 to sequences from PCR amplicons from 4 successive BC generations.

(b) (4)

[redacted]

Figure 10. Alignment of genomic DNA sequence from locus 3507 of event PY203 to sequences from PCR amplicons from 4 successive BC generations.

(b) (4)

Figure 11. Southern blot of four BC generations of the PY203 event hybridized with a T-DNA RB probe. The (b) (4) bp SalI-NotI restriction fragment derived from the transformation vecto (b) (4) that contains DNA of the hybridizing probe was loaded in two lanes at approximately 1 and ¼ genome equivalents as positive controls. DNA molecular weight markers are present in the left lane with sizes indicated in bp on the left.

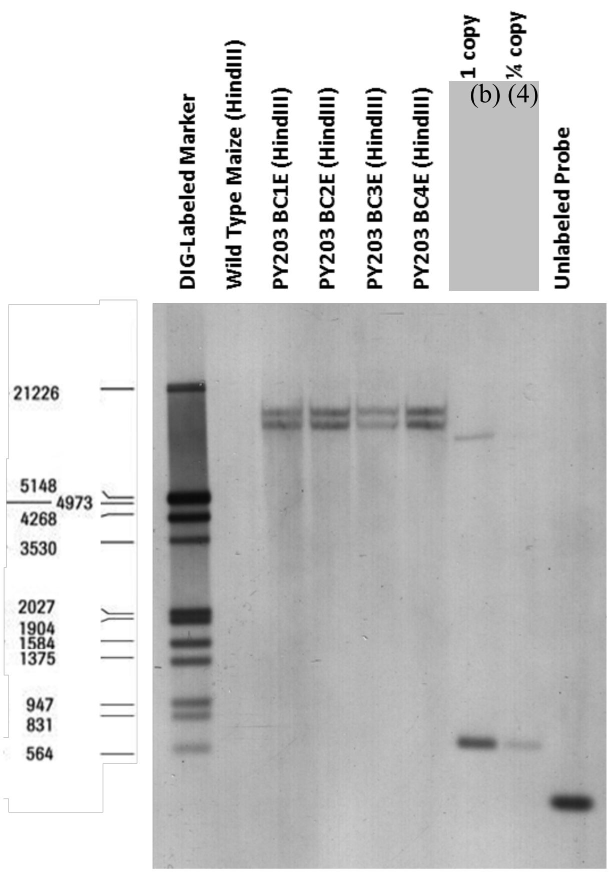


Table 2. The size of predicted and observed DNA restriction fragments from the genome of Phy02 event PY203 that hybridize to the T-DNA RB probe.

Sample	Locus	Predicted Fragment Size	Observed Fragment Size
PY203 (HindIII)	3293	10,192 bp	≈10,000 bp
PY203 (HindIII)	3507	11,910 bp	≈12,000 bp
(b) (4) (SalI+NotI), 1 & ¼ copy	--	9,680 bp & 662 bp	≈9,500 bp & ≈700 bp
Wild type maize control	--	--	--

3.0 Characterization of the Phy02 enzyme

The enzyme that is the subject of this submission is a phytase derived from the AppA phytase from *Escherichia coli* K12 strain MG1655 (CGSC, 1997). Phytases are a class of phosphomonoesterases that catalyze the stepwise release of orthophosphate from myo-inositol 1,2.3,4,5,6-hexakis dihydrogen phosphate (phytate). The Phy02 phytase in this submission is a 6-phytase (E.C. 3.1.3.26) that first releases the orthophosphate in the 6-position of phytate and subsequently releases the other orthophosphate groups in a prefered order (Griener, 2000). The intended site of activity for the Phy02 phytase is the feed/ingesta of poultry.

The protocol used to determine the phytase activity in Phy02 phytase product material for all results presented in this document is a modification of the standard method for the determination of phytase activity in feed (AOAC 2000.12). The standard protocol for the determination of phytase activity is appropriate for feed materials containing 200 – 400 FTU/kg feed and since the Phy02 product material has over 10 times more phytase activity than this range, the assay was modified to account for this difference. Prior to analysis, the product material is milled so that the particle sizes are less than or equal to 0.5 mm. 20 g of milled material is shaken for 1 hour at room temperature in 200 mL of (b) (4) 2 mL sample is taken and centrifuged at 12,000×g for 10 min. The product supernatants are diluted in phytase assay buffer (250 mM sodium acetate, pH 5.5, 1 mM calcium chloride, 0.01% Tween 20) so that the target absorbance at 415nm is between 0.3 and 1.1. To test protein extract activity, 75 µL of the diluted mixtures is dispensed into individual wells of a 2 mL 96-deep-well block. One hundred and fifty µL of freshly prepared phytic acid (9.1 mM dodecasodium salt from Biosynth International, Staad, Switzerland, prepared in assay buffer) is added to each well. Negative controls, which serve to correct sample background absorbance, have no protein extract in the wells before addition of the stop solution. Plates are sealed and incubated for 60 min at 37°C. One hundred and fifty µL of stop solution (20 mM ammonium molybdate, 5 mM ammonium vanadate, 4% nitric acid) is added to each well, mixed thoroughly via pipetting, and allowed to incubate at room temperature for 10 minutes. Seventy-five µL of the diluted protein extract is dispensed into negative control wells and mixed. Plates are centrifuged at 3000×g for 10 minutes, and 100 µL of the clarified supernatants are transferred to the wells of a flat-bottom 96-well plate. Absorbance at 415 nm from each sample is compared to that of negative controls and potassium phosphate standards. A standard curve is prepared by mixing 50 µL of potassium phosphate standards (0-1.44 mM, prepared in assay buffer) with 100 µL of freshly prepared phytic acid, followed by 100 µL of stop solution. The protocol used to determine phytase activity in in-feed mixtures is a modification of this protocol and it is described in Appendix 6.

For the purpose of characterizing the Phy02 phytase product, characteristics of the Phy02 phytase in protein extracts prepared from grain derived from three representative Phy02 phytase product batches (Lot numbers AV_Phy02_0043, AV_Phy02_0049, and AV_Phy02_0050) were assessed. The molecular weight, immunoreactivity, intactness and phytase activity of the Phy02 phytase protein in the three product batches were evaluated and the results are contained in a report presented in Appendix 5. In all three product batches the Phy02 protein was shown to have an approximate molecular weight of 46,000 kDa which is very close to the expected size of 45,684 kDa for the mature Phy02 phytase protein including the endoplasmic retention signal from maize. In addition, the Phy02 protein from each production batch reacted with a phytase specific rabbit polyclonal antibody to demonstrate the expected immunoreactivity of the Phy02 phytase protein. The phytase activities of the three product batches were determined to be:

(b) (4) [redacted]

3.1 Determination of specific activity of Phy02

The phytase activity and specific activity of the phytase relative to total soluble protein was determined in grain from three separate product batches of Phy02 phytase. The amount of total soluble protein in the aqueous protein extracts of flour produced from the grain was determined by two different methods, the Bradford method (Kruger, 1996) and the BCA method (Walker, 1996). Three grams of milled flour from each product batch was placed in 35 mL of [redacted] (b) (4) for 1 hr at room temperature. The samples were shaken on a tabletop shaker at maximum speed and 2 mL was centrifuged at 12,000×g for 10 min. Supernatants were transferred to phytase assay buffer (250 mM sodium acetate, pH 5.5, 1 mM calcium chloride, 0.01% Tween 20) prior to analysis for proteins by either method. Three separate determinations were performed for each extract using each of the two methods and all results for each extract were averaged. The specific activity for each test substance was calculated from the phytase activity determined for each batch (FTU/g) divided by the average amount of protein/g determined for each sample by the two protein quantitation methods. The specific phytase activities of the test substances from the three product batches analyzed expressed in FTU phytase activity/mg protein are:

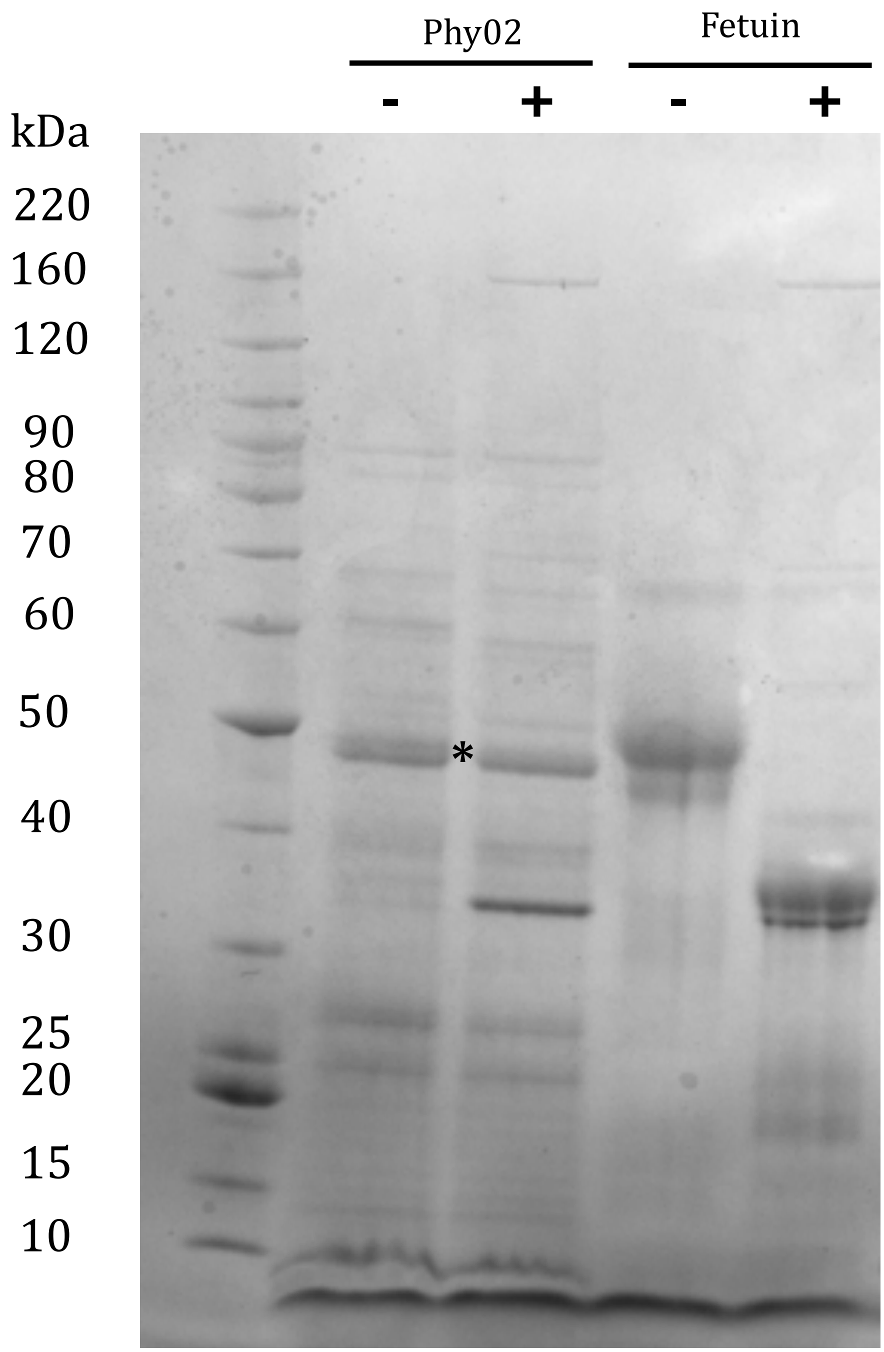
(b) (4) [redacted]

3.2 Glycosylation of maize-produced Phy02 phytase

The glycosylation status of the Phy02 phytase protein produced by maize was examined using a Protein Deglycosylation Kit obtained from New England BioLabs (Product Code P6039S) and the protocol supplied with the kit. Briefly, the Phy02 phytase protein in an extract produced from Phy02 product batch AV_Phy02_0049 (§4.4) was treated with the enzymes PNGase F and O-Glycosidase that remove N-linked and O-linked glycosyl groups, respectively. After treatment with these deglycosylating enzymes, treated and untreated protein extracts were examined by SDS-PAGE and the apparent size of the Phy02 protein in each was compared. In the case of glycosylated proteins, removal of the glycosyl moieties results in an apparent reduction in the size of the protein on SDS-

PAGE gels. SDS-PAGE gels containing total protein from enzyme treated and untreated extracts from Phy02 containing maize grain are shown in Figure 12 and show that there is no change in the apparent size of the Phy02 protein with and without enzyme treatment. This result demonstrates that the Phy02 phytase protein produced in the grain of maize is not glycosylated.

Figure 12. Comparison by SDS-PAGE of the apparent size of the Phy02 phytase protein (indicated by an asterisk) from grain extracts with (+) and without (-) treatment with deglycosylation enzymes. The control protein, fetuin, that contains sialylated N-linked and O-linked glycans, is shown before (+) and after (-) treatment in the right two lanes. The reduction in the apparent size of the fetuin protein after treatment with deglycosylating enzymes demonstrates that the deglycosylation reaction was functional. Protein molecular weight standards are included in the left lane and their sizes in kDa are indicated on the left of the gel.



3.3 Confirmation of the amino acid sequence of Phy02 phytase

(b) (4)

[redacted]

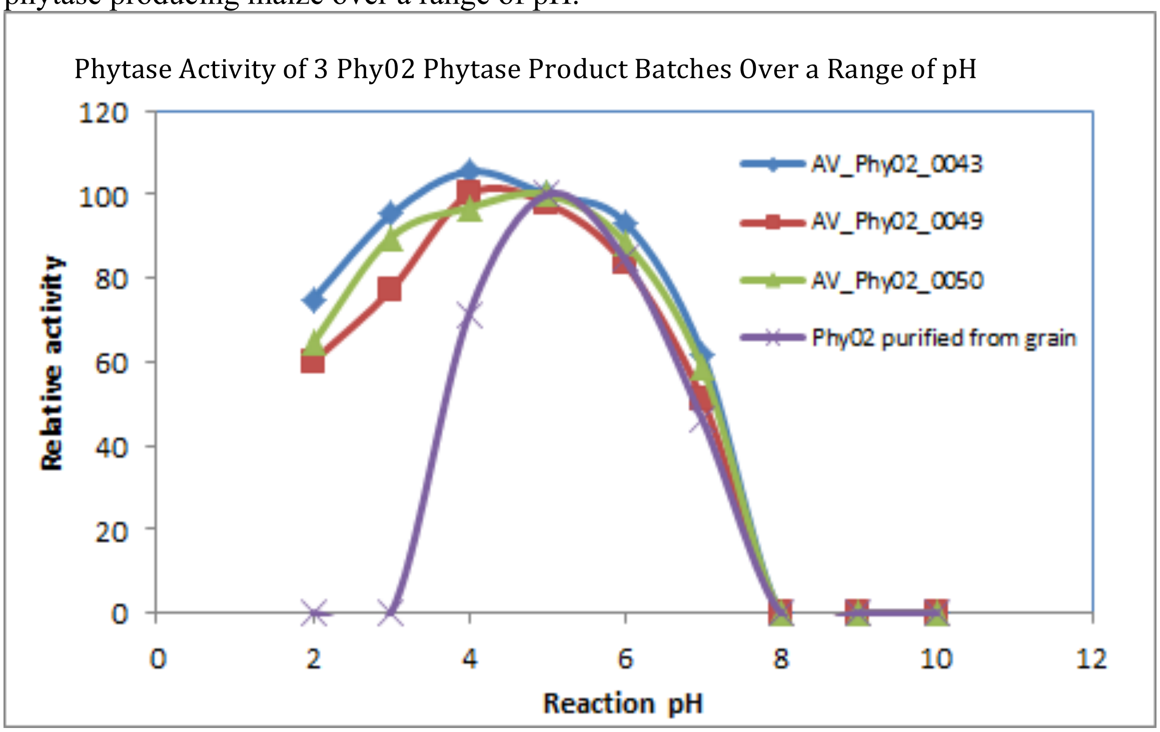
Protein from extracts of the representative Phy02 phytase product batch AV_PHY02_0049 (§3.0) were run on an SDS-PAGE gel and transferred to a PVDF membrane that was stained with Coomassie Blue without heating to visualize the protein bands. The band corresponding to the correct molecular weight of the Phy02 phytase was excised and the N-terminal amino acid sequence of the protein was determined by Edman degradation by Alphalyse, Inc. (Palo Alto, CA). [redacted]

(b) (4)

3.4 Optimal reaction pH for Phy02 phytase

The phytase activity in protein extracts from three independent Phy02 phytase product batches (Lot numbers AV_PHY02_0043, AV_PHY02_0049, and AV_PHY02_0050) and of maize purified Phy02 phytase was determined over a range of pH to determine the pH optimum for phytase activity. The phytase enzymatic reactions were performed in 10x CCH (42.8 g/L citric acid, 92.1 g/L CHES, 79.4 g/L HEPES, pH 3) buffer that was diluted to 1x CCH buffer using either 1N HCl or 1N NaOH to adjust the pH from 2 to 10. Extracts of flour from Phy02 producing maize grain were diluted 500-fold in each 1x CCH buffer. Phytic acid substrate was prepared at a concentration of 9.1 mM and was dissolved in each of the 1x CCH buffers with different pH to ensure that upon mixing enzyme solution with the substrate the reaction pH did not change. Prior to analyses the pH of the phytic acid substrate solution and each reaction buffer was verified with a standardized pH meter. Phytase reactions were initiated by adding diluted protein extract to the corresponding pH-adjusted substrate followed by incubation of the reaction mixtures for 60 minutes at 37°C. Reaction pH was monitored with colorpHast pH indicator strips (EM Science) following addition of enzyme**.** The results of the analyses of phytase activity are shown in Figure 13. The activities of the Phy02 phytase in the protein extracts from three Phy02 product batches and that of purified Phy02 phytase protein as a percent of activity of the Phy02 phytase at its pH optimum of pH 4.0 – 5.0 are presented. The results demonstrate that the phytase activity in the extracts from the three different product batches have nearly identical activity profiles over the range of pH tested with highest activity at pH 4.0 - 5.0. Above pH 6 the activity of the Phy02 phytase from the different test materials is lost rapidly and is absent at pH 8 (Figure 13). The activity of the purified Phy02 phytase is similar to that of the Phy02 phytases from the product extracts except that its activity is more sensitive to pH lower than pH 4. The phytase activity in the product extracts demonstrated 60 – 80% relative activity at pH 2 whereas the purified Phy02 phytase had no activity at pH 4. A comparison of the pH profile of maize produced Phy02 phytase from this study with that reported for the *E. coli* AppA phytase reveals many similarities between these related phytases (Lim *et al*., 2000). Both proteins exhibit a broad pH profile with maximum activity occurring at pH 4.5, and both retain significant activity in the acidic pH range. At pH above neutral, AppA and Phy02 phytases lose their enzymatic activity.

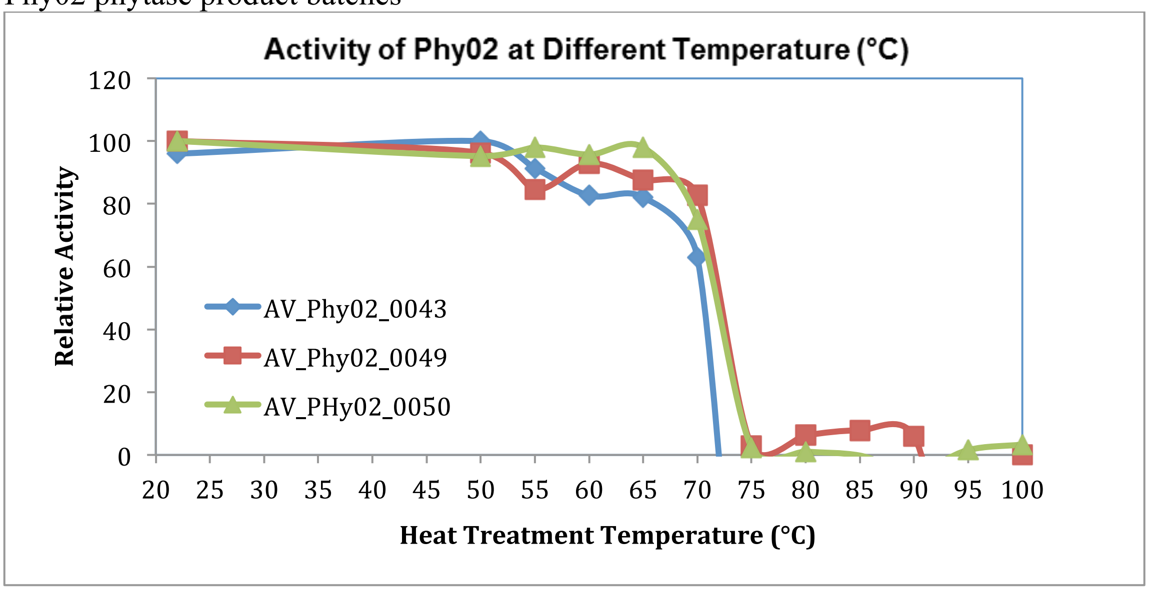
Figure 13. Relative phytase activity of protein extracts from three independent Phy02 phytase product batches and of a Phy02 phytase protein purified from the grain of Phy02 phytase producing maize over a range of pH.



3.5 Thermal optimum of Phy02 phytase

The phytase activity in protein extracts from three independent Phy02 phytase product batches (Lot numbers AV_PHY02_0043, AV_PHY02_0049, and AV_PHY02_0050) was determined over a range of temperatures to determine the temperature optimum for phytase activity. Protein extracts prepared from flour from each of the Phy02 phytase products were diluted 10-fold using phytase assay buffer. 400 µl of diluted protein was placed in a Thermo-Shaker MSC-100 at temperatures of 50, 55, 60, 65, 70, 75, 80, 85, 90, 95 and 100°C. Heat treatment at each temperature was carried out for 5 min with shaking at 1000 rpm. The temperature of sample wells was checked using a Dual Channel Digital Thermometer (Fisher Scientific). After heat treatment, the protein was further diluted in phytase assay buffer prior to analysis for phytase activity. The relative phytase activity of the Phy02 phytase in each of the Phy02 product batch extracts at the different temperatures is presented in Figure 14. Phy02 demonstrated 100% activity at temperatures from 50 to 55°C relative to its optimal temperature for activity of 22°C. Activity decreased only slightly at 60°C and 65°C and at 70°C the activity in the 3 samples tested ranged from 63 to 85%. At temperatures above 70°C the phytase activity of all samples was reduced drastically and at 75°C none retained significant phytase activity.

Figure 14. Relative phytase activities at different temperatures of three representative Phy02 phytase product batches



3.6 Enzymatic side activities of Phy02 phytase

Protein extracts from grain derived from Phy02 phytase product batch AV_Phy02_0049 and from conventional maize grain not engineered to produce the Phy02 phytase were tested for the presence of other significant enzymatic activities. The enzymatic activities that were tested included protease, α-amylase, xylanase, cellulase, and glucanase. The detectible enzymatic activities of the Phy02 and non-Phy02 producing grain were compared for each enzyme tested. The results presented in Table 3 show that in general there were low levels of activity for each of the enzymes tested but there were no differences between the activities present in the Phy02 and non-Phy02 phytase producing grains. The presence of low levels of endogenous enzymatic activity for these enzymes in normal maize grain is expected and therefore, the fact that there was not a significant difference in the activities of these enzymes in Phy02 producing and nonproducing grain indicates that the Phy02 phytase does not demonstrate significant levels of activity for the enzyme activities tested.

Table 3. Enzymatic side activities in protein extracts of Phy02 producing (Phy02) and Phy02 nonproducing grain (Control). In each case the activity values shown are standard activity units of the enzyme and are the average of three determinations. Control reactions with each enzyme that included its typical substrate were run to ensure that the enzyme and the reaction were functioning.

Enzyme	**Phy02**		**Control**	
	Activity	Std Dev	Activity	Std Dev
Amylase	0.014	0.007	0.026	0.010
Xylanase	0.025	0.037	0.120	0.002
Cellulase	0.041	0.037	0.015	0.011
Glucanase	0.052	0.003	0.017	0.000
Protease	0.025	0.023	0.039	0.008

4.0 Safety of the Phy02 Phytase

4.1 Safety of the maize production host

Maize is the largest cultivated crop in the world and is widely cultivated in most areas of the world. In 2014 the global production of maize grain was 1,275 million metric tons (MT), including the 381 million MT produced in the U.S. from planting over 90 million acres (USDA FAS, 2014). In the U.S., maize is grown in almost every state.

In industrialized countries maize has two major uses: (1) as animal feed in the form of grain, forage or silage; and (2) as a raw material for wet- or dry-milled processed products such as high fructose maize syrup, oil, starch, glucose, dextrose and ethanol. By-products of the wet- and dry- mill processes are also used as animal feed. These processed products are used as ingredients in many industrial applications and in human food products. Most maize produced is used as animal feed or for industrial purposes, but maize remains an important food staple in many developing regions, especially sub-Saharan Africa and Central America, where it is frequently the mainstay of human diets (Morris 1998).

Maize is a very familiar plant that has been rigorously studied due to its use as a staple food/feed and the economic opportunity it brings to growers. The domestication of maize likely occurred in southern Mexico between 7,000 and 10,000 years ago (Goodman, 1988). While the putative progenitor species of maize have not been recovered, it is likely that teosinte played an important role in contributing to the genetic background of maize. Although grown extensively throughout the world, maize is not considered a persistent weed or a plant that is difficult to control. Maize, as we know it today, cannot survive in the wild because the female inflorescence (the ear) is covered by a husk thereby restricting seed dispersal; it has no seed dormancy, and is a poor competitor in an unmanaged ecosystem. The transformation from a wild, weedy species to one dependent on humans for its survival most likely evolved over a long period of time through plant breeding by the indigenous inhabitants of the western hemisphere. Today, virtually all maize varieties grown in the U.S. are hybrids, a production practice that started in the 1930's (Wych, 1988). Maize hybrids are developed and used based on the positive yield increases and plant vigor associated with heterosis, also known as hybrid vigor (Duvick, 1999).

Conventional plant breeding results in desirable characteristics in a plant through the unique combination of genes already present in the plant. However, there is a limit to genetic diversity with conventional plant breeding. Biotechnology, as an additional tool to conventional breeding, offers access to greater genetic diversity than conventional breeding alone, resulting in expression of highly desirable traits that are profitable to growers.

Given the long history of the safe use of maize grain and its by-products and maize silage as food and feed ingredients, maize and its grain are considered to be generally recognized as safe (GRAS). Therefore, it is concluded that maize and grain produced by it are safe for consumption by humans and animals and that its cultivation does not present any threats to the environment. Pariza and Foster (1983) developed a decision tree to determine the safety of food and feed enzyme preparations that was updated by Pariza and Johnson (2001) and Pariza and Cook (2010). A key tenet of this decision tree is that since enzymes by themselves are not toxic, the primary consideration of the safety of a food enzyme preparation is the safety of the production organism. In the case where the production organism is a plant that has a long history of safe use as a food ingredient, the enzyme preparation from such a plant is considered to be safe and nontoxic. Based on the decision tree for establishing the safety of food enzyme preparations by Pariza and coauthors (Pariza and Foster, 1983; Pariza and Johnson; 2001; Pariza and Cook, 2010) and on the established long history of safe use of maize for food and feed, the Phy02 enzyme preparation that is the subject of this document is considered to be safe for its intended use in animal feed.

4.1.1 Source of the maize line

The *phy02* genes responsible for the production of Phy02 phytase in maize were intially transformed into a maize line named (b) (4) maintained by the U.S. National Plant Germplasm System (NPGS, 1995) that is also known by the name (b) (4) The resulting T0 plants containing the *phy02* genes were subsequently crossed with a second maize line, (b) (4)
Several other backcrosses with the *phy02* gene progeny were made to maize line (b) (4) in order to increase the percentage of the genome from this line in the Phy02 producing lines. A breeding diagram showing the recent breeding activity for the development of Phy02 phytase producing maize is shown in Figure 8 (§2.4.4).

4.1.2 Taxonomy of *Zea mays*

The taxonomy of maize is described by OECD (2003) as follows:

Family: Poaceae
Subfamily: Panicoideae
Tribe: Maydeae

Western Hemisphere:
Genus *Zea*[1]
Section *ZEA*
Zea mays L. (maize)
Zea mays subsp.*mays* (L.) Iltis (maize, 2n[2] =20)
Zea mays subsp. *mexicana* (Schrader) Iltis (teosinte, 2n = 20))
race Nobogame[3]
race Central Plateau[3]
race Durango[4]
race Chalco[3]
Zea mays subsp. *parviglumis* Iltis and Doebley (teosinte, 2n = 20)
var. *parviglumis* Iltis and Doebley (=race Balsas)
var. *huehuetenangensis* Doebley (=race Huehuetenango)

[1]Iltis and Doebley, 1980; Doebley, 1990. [2]diploidy number. [3]Wilkes, 1967.
[4]Sánchez-González et al., 1998.

4.1.3 History of safe use of *Zea mays*

There is a long history of safe use of maize for food and feed that is described in §2.1 and §4.1.

4.1.4 Absence of toxicity

Grain derived from maize has been used as food and feed for thousands of years without incident. The history of safe use of maize grain is described in sections §2.1 and §4.1 above. Based on the long history of safe use of maize, it is accepted to be GRAS and to be nutritious and nontoxic.

4.1.5 Summary

As a staple food and feed crop for thousands of years, maize is widely considered to be safe for food, feed, and the production of food feed ingredients.

4.2 Safety of *Escherichia coli* K12

4.2.1 Introduction

This discussion addresses the safety of *E. coli* K12 strain MG1655, which is the donor organism of the phytase gene (CGSC, 1997). It is worth noting that only a single gene (i.e. the *appA* phytase gene) was used from *E. coli* K12 strain to produce the *phy02* gene that was used to transform maize.

4.2.2 Taxonomy of *E. coli.*

Escherichia coli has been used extensively in studies of physiology, genetics, and biochemistry, making this species one of the most well studied bacterial species. *Escherichia coli* belongs to the family Enterobacteriaceae and is ubiquitous in water, soil, and the normal intestinal flora in humans and other animals (Bettelheim, 1992). Enterobacteriaceae are Gram-negative, oxidase-negative, straight, rod-shaped bacteria that do not produce spores. They are chemoorganotrophic and are capable of both respiratory and fermentative metabolism. Growth temperatures range from 22-39ºC. Currently, there are 29 recognized genera and over 100 named species (Brenner, 1992).

4.2.3 Laboratory use of *E. coli* K12.

E. coli strains have been used for the last 70 years in the study of bacterial physiology and genetics. Historically, wild-type strain K12 was used in early studies on conjugation and recombination (Swartz, 1996). The use and study of strain K12 continued to predominate due to its use in the study of recombination and the generation and mapping by conjugation of a large number of mutants in metabolic pathways that aided both the studies of bacterial genetics and physiology. Since *E. coli* K12 has been used extensively in research and in many laboratories for decades without causing any harm, *E. coli* K12 is generally recognized as safe.

4.2.4 Safety assessment of *E. coli* K12.

Although there has been no indication over the past 70 years of intensive laboratory study that strain K12 has the ability to cause disease or has toxigenic potential, it has been only recently that studies in regard to this issue have been carried out.

These studies have focused primarily on the determination of the presence or absence of known virulence factors, i.e., properties of an organism that may contribute to its pathogenic potential, since in recent years it has become apparent that certain *E. coli* strains clearly have the potential to cause disease.

In a study of *E. coli* strains including representatives of the K12 strain, polymerase chain reaction (PCR) amplification demonstrated the absence of defined virulence genes that are present in known pathogenic isolates of this genus (Kuhnert, 1997). The authors concluded that the K12 strains commonly used in the laboratory are devoid of virulent factors and should be considered nonpathogenic.

A more direct study of the pathogenic potential of K12 strains was conducted using both a BALB/c mouse and chick gut model. In this study, the strains were found to be unable to express long-chain lipopolysaccharide (O-antigen) and were serum-sensitive (i.e. susceptible to complement killing). In addition, they were unable to persist or survive in selected mouse tissues or the gut. In the chick model, the strains were unable to invade the spleen, which is a hallmark of *E. coli* strains able to cause systemic infections. The authors concluded that K12 strains do not possess the recognized pathogenic mechanisms and should be considered nonpathogenic (Chart, 2000).

As mentioned above, *E. coli* K12 was the predominant organism of choice for recombinant DNA research because of the large amount of information about recombination and biochemical genetics that was developed using this strain. This information resulted in the NIH Guidelines (prepared by the National Institute of Health) listing strain K12 as safe for recombinant use, as detailed in Appendix C-II of the NIH guidelines (NIH, 2013).

In summary, the following demonstrates that *E. coli* K12 is officially recognized as, and considered a safe organism with no demonstrated toxigenic or pathogenic properties, including:

- The long-term use of *E. coli* K12 in numerous laboratories with no reports of illness or disease as a result of its use;

- The absence of genes encoding defined virulence factors as determined by PCR and other molecular methods;

- The lack of pathogenic potential in both a mouse and chick animal model; and

- The inclusion of this strain in the RG1 classification by the NIH Office of Biotechnology Activities and the Recombinant DNA advisory committee.

4.3 Safety of Phy02 Phytase in Two Broiler Chicken Tolerance Studies

The safety of high doses of the Phy02 phytase in broiler chickens was demonstrated by feeding chickens a feed supplemented with 30,000 FTU/kg feed in one study (broiler chicken Study 3) and with 60,000 FTU/kg feed in a second study (broiler chicken Study 4). The details of these poultry studies are described in §5.3. At the conclusion of each study at day 42, blood was collected from three chickens in each pen of the positive control (PC) group that was fed a feed with adequate available phosphorus but no phytase and the 30,000 or 60,000 FTU/kg Phy02 phytase treatment groups in Study 3 and Study 4, respectively that were fed a diet with a low level of available phosphorus supplemented with either 30,000 or 60,000 FTU/kg Phy02 phytase. From each bird a minimum of 1 ml of whole blood was collected via the brachial vein into a tube containing EDTA. In a separate tube an additional 2 ml of whole blood was collected from each bird and this sample was allowed to coagulate. The serum from the latter tubes was decanted into fresh sample tubes and the non-clotted blood and serum samples were shipped on wet ice to Marshfield Labs (Marshfield, WI) where hemotological analyses were performed. The results of the hemotological analyses from these studies are presented in Tables 4 and 5. In the case of the 30,000 FTU/kg treatment, for all analyses conducted except one, there were no significant differences with a P value <0.05 between the positive control group (PC) that received no Phy02 phytase and the group that received 30,000 FTU Phy02/kg feed for the duration of the study. The sole analyte for which there was a significant difference between the PC and 30,000 FTU dose groups was blood phosphorus where the PC group had a significantly higher blood phosphorus level (6.79 mg/dL) compared to the 30,000 FTU/kg group (6.38 mg/dL). This difference in blood phosphorus is likely a direct result of the intentionally different levels of phosphorus in the feed of these two treatment groups and not to the presence of the Phy02 phytase in the diet of the 30,000 FTU/kg dose group.

Table 4. Results of hematological analysis of blood samples from the PC and 30,000 FTU/kg Phy02 phytase treatment groups in broiler chicken Study 3.

Analysis	Positive Control	30,000 FTU	SEM	Treatment P Value	Block P Value
Haemoglobin, g/dL	12.45	12.67	0.15	0.33	0.96
Hematocrit, %	34.70	35.19	0.41	0.42	0.99
Red Blood Cell $x10^6$ uL	2.86	2.91	0.03	0.23	0.95
Mean Corpuscular volume, fL	121.5	121.0	0.5	0.46	0.92
Mean Corpuscular Hemoglobin, pg	43.59	43.55	0.25	0.92	0.91
MCH concentration, g/dL	35.88	35.99	0.12	0.52	0.63
Red Cell Distribution Width, %	9.40	9.14	0.15	0.24	0.59
White Blood Cell $x10^3$ ul	13.95	13.73	1.35	0.91	0.87
Heterophils, %	33.69	31.64	1.89	0.46	0.60
Lymphocytes, %	53.17	58.69	2.03	0.08	0.36
Monocytes, %	4.29	4.65	0.51	0.63	0.19
Eosinophil, %	5.00	5.03	0.90	0.98	0.93
Basophil, %	2.88	3.38	0.29	0.25	0.40
Absolute Heterophils, $x10^3$ ul	4.40	4.38	0.39	0.97	0.88
Absolute Lymphocytes, $x10^3$ ul	7.74	8.00	0.91	0.85	0.72
Absolute Monocytes, $x10^3$ ul	0.564	0.667	0.103	0.49	0.42
Absolute Eosinophil, $x10^3$ ul	0.698	0.703	0.143	0.98	0.83
Absolute Basophil, $x10^3$ ul	0.410	0.502	0.082	0.44	0.58
Total Protein, g/dL	2.81	2.85	0.04	0.48	0.20
Albumin, g/dL	1.03	1.07	0.02	0.28	0.89
Globulin, g/dL	1.82	1.86	0.03	0.45	0.26
Albumin/Globulin	0.556	0.542	0.009	0.32	0.50
Creatine Kinase, U/L	Non-Est[1]	Non-Est[1]	-	-	-
Alanine Aminotransferase, U/L	<5[2]	<5	-	-	-
Phosphorus, mg/dL	6.79[a]	6.38[b]	0.12	0.028	0.56
Glucose, mg/dL	255.6	255.9	2.6	0.94	0.053

[1] Non-Estimable, many samples (54 of 72) above the the maximum analyzable limit >22500 U/L
[2] Below analyzable limits

Blood samples were collected in a similar manner in broiler Study 4 except that in addition to collecting blood from the PC and 60,000 FTU/kg Phy02 treatment groups, blood was also collected from birds of the negative control (NC) treatment group that were fed a diet low in inorganic phosphorus with no phytase. A review of the results from the hematological analyses of these samples (Table 5) indicates that there were no significant differences between the values for the PC and 60,000 FTU/kg Phy02 treatement groups for any of the hematological measurements except for albumin/globulin where the 60,000 FTU/kg Phy02 treatment group had a significantly higher value compared to the PC treatment group. However, the albumin/globulin values for the NC and 60,000 FTU/kg Phy02 treatment groups were not significantly different. In none of the analytes were the results from the 60,000 FTU/kg treatment significantly different from both the NC and PC treatments. The results from the hematological analyses of blood samples in Studies 3 and 4 demonstrate that high doses of the Phy02 phytase are well tolerated by broiler chickens and do not have an adverse impact on critical hematological indicators.

Each of the birds in broiler Studies 3 and 4 from whom blood samples were collected were euthanized and a post-mortem examination was conducted by a qualified veterinarian. During the post-mortem examination key tissues were examined in the high Phy02 dose groups and visually compared to those of the PC group for the presence of any indications of pathological or toxicological symptoms. No adverse effects or indications of toxicity were observed in the birds from the high dose groups relative to the PC groups in either study.

The absence of significant changes in key hematological parameters and of indicators of toxicity in the tissues of the birds in the 30,000 and 60,000 FTU/kg dose groups support a conclusion that high doses of the Phy02 phytase up to 60,000 FTU/kg feed are well tolerated by broiler chickens and are safe. This conclusion is further supported by the good performance of the chickens in the 30,000 and 60,000 FTU/kg dose groups as demonstrated by body weight gain and feed conversion rates that are summarized in §5.3 and §5.4. These results demonstrating the safety and tolerance of chickens to high doses of the Phy02 phytase are consistent with independent reports on the tolerance of broiler chickens to very high doses of the maize expressed NOV9X phytase that is nearly identical to the Phy02 phytase (§2.2). Two studies have demonstrated in broiler feeding trials that birds fed a diet containing 363,000 FTU/kg of the maize expressed NOV9X phytase demonstrated good performance in the absence of any observable adverse effects or signs of toxicity due to the high level of NOV9X phytase in the diets (Nyannor and Adeola, 2008; Nyannor et al., 2009).

Table 5. Results of hematological analysis of blood samples from the NC, PC and 60,000 FTU Phy02 phytase treatment groups in broiler chicken Study 4.

	Negative Control	Positive Control	60,000 FTU + NC	SEM	Trt P Value	Block P Value
Haemoglobin, g/dL	12.38	12.12	12.24	0.18	0.61	0.24
Hematocrit, %	35.25^{a}	33.53^{b}	33.78^{ab}	0.45	0.027	0.14
Red Blood Cell $x10^{6}$ uL	2.80	2.80	2.81	0.03	0.98	0.18
Mean Corpuscular volume, fL	126^{a}	120^{b}	120^{b}	0.5	0.0001	0.23
Mean Corpuscular Hemoglobin, pg	44.2^{A}	43.3^{B}	43.6^{AB}	0.3	0.09	0.30
MCH concentration, g/dL	35.1^{b}	36.1^{a}	36.2^{a}	0.2	0.0003	0.47
Red Cell Distribution Width, %	10.08^{a}	9.38^{b}	9.16^{b}	0.13	0.0001	0.27
White Blood Cell $x10^{3}$ ul	14.6	15.0	15.9	1.0	0.67	0.19
Heterophils, %	46.0	49.0	46.3	3.2	0.76	0.04
Lymphocytes, %	44.1	41.6	44.9	3.3	0.76	0.09
Monocytes, %	4.47	3.67	3.71	0.52	0.48	0.89
Eosinophil, %	2.42	3.38	3.74	0.47	0.17	0.93
Basophil, %	4.88^{a}	4.01^{ab}	2.86^{b}	0.37	0.003	0.31
Absolute Heterophils, $x10^{3}$ ul	5.85	6.48	6.52	0.33	0.29	0.11
Absolute Lymphocytes, $x10^{3}$ ul	7.35	7.12	7.99	0.94	0.79	0.23
Absolute Monocytes, $x10^{3}$ ul	0.613	0.534	0.583	0.079	0.78	0.41
Absolute Eosinophil, $x10^{3}$ ul	0.363	0.583	0.598	0.094	0.19	0.65
Absolute Basophil, $x10^{3}$ ul	0.658^{A}	0.558^{AB}	0.427^{B}	0.070	0.086	0.36
Total Protein, g/dL	2.93	3.00	3.01	0.05	0.51	0.61
Albumin, g/dL[1]	1.10	1.08	1.10	0.03	0.92	0.23
Globulin, g/dL	1.93	2.00	1.96	0.04	0.33	0.90
Albumin/Globulin	0.519^{ab}	0.508^{b}	0.553^{a}	0.012	0.037	0.38
Creatine Kinase, U/L[2]	11076	Non-Est[1]	Non-Est[1]	-	-	-
Alanine Aminotransferase, U/L[3]	5.64	6.35	7.19	-	-	-
Phosphorus, mg/dL	2.97^{b}	6.52^{a}	6.34^{a}	0.08	0.0001	0.003
Glucose, mg/dL	248^{a}	241^{b}	243^{ab}	1.7	0.014	0.015

[1] Average based on values which weren't below analyzable limits (<1.0 g/dL; Out of 36 samples/trt NC, n=12; PC, n=15; & 60,000FTU, n=8); Note from lab: 'Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.'
[2] Non-Estimable, most samples (34 or 31 out of 36/trt for PC and 60,000FTU, respectively) above the the maximum analyzable limit >22500 U/L; only 1 out of 36 above the limit in NC.
[3] Average based on values which weren't below analyzable limits (<5 U/L; Out of 36 samples/trt NC, n=19; PC, n=7; & 60,000FTU, n=4).

4.4 Summary of the safety of Phy02 phytase

The assessment of the safety of food and feed enzymes includes three main factors: 1) the safety of the organism that was the source of the gene encoding the enzyme, 2) the safety of the production organism, and 3) the safety of the enzyme itself. The safety of *E. coli* strain K12 that was the source of the gene encoding the Phy02 phytase is presented in §4.2. In addition, the *phy02* gene was synthesized and includes only the coding sequence of the phytase gene without any other genetic information derived from the genome of *E. coli*. The safety of *Zea mays*, the production organism, is presented in §4.1 and is well established. The safety of the Phy02 phytase enzyme is based on the following. (1)

Enzymes generally are known to be non-toxic and in cases of proteins that are toxic, toxicity is derived from the biological mode of action of the protein. (2) The history of safe use of phytases as animal feed additives and in human nutritional supplements is well established. (3) Phy02 phytase has 97% amino acid identity with the Nov9X phytase of the feed additive Quantum. Quantum has been used safely and effectively in poultry feeds since 2008. (4) A NOAEL (No Observed Adverse Effect Level) of 462,000 FTU/kg body weight/day based on an acute toxicity study in rat was reported for the Nov9X phytase (Quantum FDA submission, 2004) and no indications of toxicity were observed in a 90-day subchronic toxicity study in rats receiving 400 mg of purified Nov9X phytase/kg body weight/day (EFSA, 2008). It may be assumed that Phy02 would also have a high NOAEL and no safety concerns. (5) The safety of Phy02 is supported by the tolerance studies described in §4.3 where chickens were fed feed supplemented with 30,000 and 60,000 FTU Phy02 phytase/kg feed without any reported signs of toxicity. Similar studies were conducted with the Nov9X phytase in which chickens were fed feed supplemented with up to 360,000 FTU/kg of Nov9X phytase (Nyannor and Adeola, 2008; Nyannor et al., 2009). It may be concluded from the above that the Phy02 phytase is safe for its intended use as an additive in the feed of poultry.

5.0 Enzyme Functionality in Poultry

The functionality of the Phy02 phytase in poultry was demonstrated in four independent feeding trials with broiler chickens. The final reports including the study protocols and data from these four studies (Study 1, AGV-15-1; Study 2, AGV-15-3; Study 3, AGV-15-4; and Study 4, AGV-15-5) are presented in Appendices 6-9, respectively. All four trials were conducted by Colorado Quality Research (CQR) in Ft. Collins, CO. In each of the trials there were 8 treatment groups consisting of 12 pens each with 17 birds that were organized in a complete randomized block design for a total of 204 birds per treatment. All treatment groups were fed a corn/soybean diet that meets the NRC dietary requirements for broiler chickens except for available phosphorus in the negative control group. The diet of the negative control treatment groups contained 0.3% available phosphorus from day 0-21 of the trial which was reduced to 0.25% from day 21 to the end of the trials at day 42. The diet of the positive control groups contained 0.45% available phosphorus from day 0 to 21 and 0.40% from day 21 to 42. Each of the trials included treatment groups receiving the negative control basal diet with low available phosphorus that was supplemented with 250, 500, 750, 1,000 or 3,000 FTU/kg of GraINzyme Phy02 phytase. Two of the trials (Study 1 and 2) also included a treatment group that received the low available phosphorus basal diet of the negative control group that was supplemented with 500 FTU/kg of a commercial phytase product. In the Study 3 and Study 4 trials this treatment was replaced by a treatment group that received the low available phosphorus basal diet supplemented with 30,000 or 60,000 FTU/kg of the Phy02 phytase, respectively. The 30,000 and 60,000 FTU/kg doses were included to demonstrate the safety of the Phy02 phytase at high doses (§4.3). The Study 3 trial was conducted under Good Laboratory Practices (GLP) as described in 40 CFR 160.

After mixing, the diets were pelleted using a California Pellet Mill system at 65°C. The starter feed (0 – 14 days) was further processed into crumbles. For those diets supplemented with phytase, samples of the mash diets before pelleting and samples of the pelleted diets after pelleting were collected and the phytase activity of each sample was determined. The Phy02 phytase is stable under pelleting temperatures of 65°C and its activity was not significantly reduced by the pelleting process. The phytase activity before and after pelleting in the feeds from all four broiler feeding trials is presented in Appendix 6. In addition, a 500g sample of each prepared feed was collected and shipped to Minnesota Valley Testing Laboratories, Inc. (New Ulm, MN) where the feed samples were analyzed for proximate nutrients. The results of the proximate nutrient analyses are presented in Appendix 7.

The data collected from each study included the following:

- Bird weights by pen, on approximately Days 0, 14 (except Study 1), 21, and 42
- Feed amounts added and removed from each pen from day 0 to study end (day 42)
- Mortality: sex, weight and probable cause of death from day 0 to study end
- Removed birds: reason for culling, sex and weight from day 0 to study end
- Daily observation of facility and birds, daily facility temperature, daily facility humidity
- Feed conversion by pen and treatment group for days 0-14 (except Study 1), 0-21

and 22-42.
- % Phosphorus digestibility in ileal contents at days 21 and 42.
- bone ash weight of tibia at days 21 and 42.

In order to demonstrate the functionality of the Phy02 phytase in animals, ileal contents and tibia bone samples were collected to enable the determination of phosphorus digestibility in the ileum and bone ash weight of tibia bone samples. Beginning at day 14 of the studies titanium dioxide was added to all feeds at 0.3% as an indestible marker in order to determine percent phosphorus digestibility in the ileal content samples. At days 21 and 42 of the studies, three birds were collected at random from each pen and these birds were sacrificed. The ileal contents from the birds from each pen were pooled into one sample and all samples collected were sent to the Experimental Station Chemical Laboratories, University of Missouri (Columbia, MO) for determination of phosphorus digestibility. The left tibia was removed from each of the birds and cleaned and the three tibias from each pen were pooled and frozen prior to analysis. The tibia bone samples were sent to the Central Analytical Laboratories at the University of Arkansas (Fayetteville, AR) for determination of bone ash.

The experimental design for all studies was a randomized complete block design and pen location within the barn was used as the blocking criteria. Each of the 12 blocks had 8 pens to which the treatments were randomly distributed. The pen was used as the experimental unit for each analyzed variable. Data was analyzed using fit least squares of the JMP software (version 12, SAS Institute Inc., Cary, NC). The ANOVA model included treatment and block. Mean values were separated using Tukey's honesty significant difference procedure and P-values < 0.05 were considered significant in all comparisons.

5.1 Summary of the Results from Broiler Chicken Study 1

The performance data, including feed intake, body weight gain and adjusted feed conversion from Study 1 are presented in Tables 6 (0-21 day), 7 (21-42 day), and 8 (0-42 day). In each of the tables, the amount of phytase included in the feed of those treatments where it was added is presented in FTU/kg feed. The treatment labeled “500 U Std + NC” contained 500 FTU/kg of a commercial phytase product in the low phosphorus NC basal diet. Values listed within each category that share the same statistical letter designation are not significantly different at a P-value <0.05.

During all phases of the study (0-21, 21-42, and 0-42 day) the PC group and all treatment groups receiving feed supplemented with Phy02 phytase had significantly higher weight gain and significantly lower feed conversion rate (FCR) compared to the NC group. In general there was increasing body weight gain and decreasing FCR with increasing doses of the Phy02 phytase throughout the duration of the trial in the treatment groups receiving feed containing the Phy02 phytase, thereby demonstrating a dose response to increasing Phy02 phytase concentration in the feed. These results support a conclusion that supplementation of a diet low in available phosphorus with Phy02 phytase results in improved weight gain and FCR relative to the NC group and equal to or greater than that of the PC group.

Table 6. Performance of broiler chickens in Study 1 from day 0-21. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion[1]
Positive Control	0.904[a]	0.648[bc]	1.396[b]
Negative Control	0.799[c]	0.556[d]	1.438[a]
250 U + NC	0.860[b]	0.633[c]	1.358[c]
500 U + NC	0.896[a]	0.663[b]	1.351[cd]
750 U + NC	0.897[a]	0.673[ab]	1.333[cd]
1000 U + NC	0.896[a]	0.672[ab]	1.335[cd]
3000 U + NC	0.916[a]	0.696[a]	1.316[d]
500 U Std + NC	0.884[ab]	0.663[b]	1.334[cd]
SE	0.0081	0.0066	0.0086
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	0.051	0.20	0.31

Table 7. Performance of broiler chickens in Study 1 from day 21-42. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	3.379[ab]	2.141[ab]	1.580[b]
Negative Control	2.870[c]	1.752[c]	1.638[a]
250 U + NC	3.296[b]	2.073[b]	1.590[b]
500 U + NC	3.410[a]	2.168[a]	1.573[b]
750 U + NC	3.374[ab]	2.139[ab]	1.578[b]
1000 U + NC	3.403[ab]	2.171[a]	1.568[b]
3000 U + NC	3.452[a]	2.202[a]	1.568[b]
500 U Std + NC	3.398[ab]	2.178[a]	1.560[b]
SEM	0.026	0.019	0.0076
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	<0.0001	<0.0001	0.43

Table 8. Performance of broiler chickens in Study 1 from day 0-42. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	4.264^{a}	2.789^{bc}	1.529^{b}
Negative Control	3.648^{c}	2.308^{d}	1.581^{a}
250 U + NC	4.128^{b}	2.706^{c}	1.526^{b}
500 U + NC	4.278^{a}	2.831^{ab}	1.511^{bc}
750 U + NC	4.240^{ab}	2.812^{ab}	1.508^{bc}
1,000 U + NC	4.269^{a}	2.843^{ab}	1.502^{c}
3,000 U + NC	4.339^{a}	2.898^{a}	1.498^{c}
500 U Std + NC	4.252^{ab}	2.841^{ab}	1.497^{c}
SEM	0.029	0.021	0.0054
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	<0.0001	<0.0001	0.35

The percent phosphorus digestibility and tibia bone ash weights in broiler Study 1 also support and demonstrate the functionality of the Phy02 phytase. The percent phosphorus digestibility of the PC group at 21 days was slightly higher than that of the NC group while all groups receiving the Phy02 phytase in the diet demonstrated phosphorus digestibility higher than that of the PC group although much of the differences were not statistically significant (Table 9). Similar results were generated for percent phosphorus digestiblity at 42 days where the percent phosphorus digestibility was numerically higher, though not statistically different, for all Phy02 phytase containing diets compared to the PC and NC groups (Table 9). The weight of tibia bone ash at 21 days and at 42 days was significantly greater in the PC group compared to the NC group (Table 10) and all groups receiving the Phy02 phytase in the diet also had bone ash weights that were significantly greater than that of the NC group and equal to that of the PC group (Table 10).

Table 9. Ileal phosphorus and percent phosphorus digestibility in broiler Study 1 at 21 and 42 days.

Treatment	21d Ileal P (mg/g)	21d % P digestibility	42d Ileal P (mg/g)	42d % P digestibility
Positive Control	0.261^{A}	46.42^{ab}	0.256^{a}	50.78
Negative Control	0.245^{AB}	45.70^{b}	0.184^{b}	49.93
250 U + NC	0.209^{C}	54.56^{ab}	0.188^{b}	55.93
500 U + NC	0.248^{AB}	49.43^{ab}	0.171^{b}	56.82
750 U + NC	0.217^{BC}	55.72^{a}	0.185^{b}	56.96
1000 U + NC	0.218^{BC}	53.42^{ab}	0.183^{b}	56.93
3000 U + NC	0.214^{BC}	55.86^{a}	0.178^{b}	56.21
500 U Std + NC	0.234^{ABC}	51.53^{ab}	0.187^{b}	57.84
SEM	0.012	2.22	0.014	2.32
TRT P Value	0.027	0.004	0.0011	0.119
Block P Value	0.0004	0.0007	0.073	0.051

^{ab} Values within columns with no common superscript are statistically different (P < 0.05).
^{ABC} Values within columns with no common superscript are statistically different (P < 0.05; Student's T test was used because Tukey's test did not assign superscripts)

Table 10. Weight of tibia bone ash at day 21 and 42 of broiler Study 1.

Treatment	21d Tibia Ash		42d Tibia Ash	
	Grams[1]	%	Grams[1]	%
Positive Control	2.49^{ab}	25.66^{a}	10.92^{ab}	29.28^{ab}
Negative Control	1.79^{c}	22.30^{b}	8.19^{c}	26.82^{b}
250 U + NC	2.31^{b}	25.12^{a}	10.42^{b}	29.30^{ab}
500 U + NC	2.55^{ab}	25.01^{a}	11.11^{ab}	28.94^{ab}
750 U + NC	2.60^{a}	23.83^{ab}	11.35^{a}	30.72^{a}
1000 U + NC	2.61^{a}	25.29^{a}	11.05^{ab}	29.17^{ab}
3000 U + NC	2.66^{a}	25.41^{a}	11.41^{a}	30.84^{a}
500 U Std + NC	2.52^{ab}	25.59^{a}	11.31^{a}	31.07^{a}
SEM	0.06	0.55	0.18	0.80
TRT P Value	<0.0001	0.0004	<0.0001	0.0079
Block P Value	0.198	0.97	0.18	0.72

^{ab} Values within columns with no common superscript are statistically different (P < 0.05).
[1]Tibia ash weight; n = 3 tibia per pen

In summary, the performance data from broiler Study 1, including body weight gain and feed conversion, support the functionality of the Phy02 phytase. Inclusion of the Phy02 phytase in a low phosphorus basal diet demonstrated a dose response with improved weight gain and feed conversion with increasing doses of Phy02. In addition, the functionality of the Phy02 phytase was demonstrated by improved percent phosphorus digestibility in the ileum and higher amounts of bone ash in tibia. Altogether, the results of broiler Study 1 clearly demonstrate the functionality of the Phy02 phytase in improving phosphorus availability and nutrition in broiler chickens.

5.2 Summary of the Results from Broiler Chicken Study 2

The performance data, including feed intake, body weight gain and adjusted feed conversion from Study 2 are presented in Tables 11 (0-21 day), 12 (0-42 day), 13 (0-14 day) 14 (14-21 day), and 15 (21-42 day). In each of the tables, the amount of Phy02 phytase included in the feed of those treatments where it was added is presented in FTU phytase/kg feed. The treatment labeled "500 U Std + NC" contained 500 FTU/kg of a commercial phytase product in the low phosphorus NC basal diet. Values listed within each category that share the same statistical letter designation are not significantly different at a P value <0.05.

In the first half of the study from day 0 – 21 the body weight gain of the birds in the PC group was significantly greater than that demonstrated by the NC group (Table 11). All treatment groups that received the low phosphorus basal diet of the NC group but that were supplemented with Phy02 phytase had body weight gain that was also significantly greater than that of the NC group. Although the body weight gain of the Phy02 phytase treatment groups were not statistically different from that of the PC group there was a clear trend where body weight gain increased relative to the dose of Phy02 phytase in the feed.

In the case of adjusted FCR in the 0 – 21 day period, the PC group and all Phy02 phytase treatment groups had a significantly lower FCR compared to the NC group (Table 11). In addition, all Phy02 phytase treatment groups, except the lowest dose group (250 FTU/kg), had significantly lower FCRs relative to the PC group. There was also a strong trend of lower FCRs with increasing dose of Phy02 phytase. These results demonstrate that the addition of Phy02 phytase to the low phosphorus basal diet of the NC treatment group improved animal performance as demonstrated in higher body weight gain and lower FCR.

For the duration of the full study from day 0 – 42, the PC group and all phytase treatment groups had statistically greater body weight gain compared to the NC group (Table 12). All treatment groups that included phytase in the feed had body weight gain that was statistically equivalent to that demonstrated by the PC group. In the case of FCR from day 0 – 42, there was no significant difference between the NC and PC groups. However, FCR in all phytase treatment groups were lower at a statistically significant level compared to the PC group. These results are similar to those produced in broiler Study 1 and demonstrate the improvement in animal performance as measured by body weight gain and adjusted FCR in animals receiving the low phosphate diet supplemented with Phy02 phytase compared to those in the NC group that were fed the low phosphate diet without Phy02 phytase.

Table 11. Performance of broiler chickens in Study 2 from day 0-21. Values within columns with no common superscript are statistically different ($P < 0.05$).

Treatment	Feed Intake[1], kg	Body Wt Gain, kg	Adj. Feed Conversion[2]
Positive Control	1.030[a]	0.766[abc]	1.344[b]
Negative Control	0.867[c]	0.629[d]	1.378[a]
250 U + NC	0.967[b]	0.730[c]	1.325[bc]
500 U + NC	0.976[ab]	0.741[bc]	1.317[c]
750 U + NC	0.987[ab]	0.750[abc]	1.318[c]
1000 U + NC	1.009[ab]	0.770[ab]	1.311[c]
3000 U + NC	1.024[a]	0.785[a]	1.305[c]
500 U Std + NC	1.019[ab]	0.776[ab]	1.314[c]
SEM	0.0128	0.0089	0.0060
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	<0.0001	<0.0001	0.16

[1]Calculated by adjusting feed intake for mortality using final number of birds per pen.
[2]Calculated by summing feed intake and BWG using 0-21 plus 21-42 data to calculate mortality adjusted FCR.

Table 12. Performance of broiler chickens in Study 2 from day 0-42. Values within columns with no common superscript are statistically different ($P < 0.05$).

Treatment	Feed Intake[1], kg	Body Wt Gain, kg	Adj. Feed Conversion[2]
Positive Control	4.541[a]	2.905[ab]	1.578[a]
Negative Control	3.756[c]	2.409[c]	1.571[ab]
250 U + NC	4.297[b]	2.803[b]	1.546[bc]
500 U + NC	4.392[ab]	2.879[ab]	1.537[c]
750 U + NC	4.406[ab]	2.881[ab]	1.543[c]
1000 U + NC	4.415[ab]	2.892[ab]	1.540[c]
3000 U + NC	4.456[a]	2.911[a]	1.546[bc]
2500 U Std + NC	4.448[ab]	2.903[ab]	1.546[bc]
SEM	0.036	0.024	0.0058
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	<0.0001	<0.0001	0.74

[1]Calculated by adjusting feed intake for mortality using final number of birds per pen.
[2]Calculated by summing feed intake and BWG using 0-21 plus 21-42 data to calculate mortality adjusted FCR.

Table 13. Performance of broiler chickens in Study 2 from day 0-14. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	0.456[a]	0.351[ab]	1.299[b]
Negative Control	0.411[b]	0.298[d]	1.378[a]
250 U + NC	0.428[ab]	0.331[bc]	1.293[bc]
500 U + NC	0.427[ab]	0.328[c]	1.303[b]
750 U + NC	0.428[ab]	0.334[abc]	1.281[bc]
1000 U + NC	0.438[ab]	0.343[abc]	1.275[bc]
3000 U + NC	0.444[a]	0.355[a]	1.252[c]
2500 U Std + NC	0.440[ab]	0.346[abc]	1.275[bc]
SEM	0.0072	0.0048	0.0102
TRT P Value	0.0017	<0.0001	<0.0001
Block P Value	<0.0001	<0.0001	0.027

Table 14. Performance of broiler chickens in Study 2 from day 14 - 21. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	0.573[a]	0.415[ab]	1.383[a]
Negative Control	0.456[c]	0.331[c]	1.378[ab]
250 U + NC	0.540[b]	0.399[b]	1.352[abc]
500 U + NC	0.549[ab]	0.414[ab]	1.328[c]
750 U + NC	0.560[ab]	0.416[ab]	1.347[bc]
1000 U + NC	0.572[ab]	0.426[a]	1.340[c]
3000 U + NC	0.580[a]	0.430[a]	1.349[bc]
2500 U Std + NC	0.579[a]	0.430[a]	1.346[bc]
SEM	0.0074	0.0053	0.0073
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	<0.0001	<0.0001	0.58

Table 15. Performance of broiler chickens in Study 2 from day 21 - 42. Values within columns with no common superscript are statistically different ($P < 0.05$).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	3.553^{a}	2.139^{a}	1.662^{a}
Negative Control	2.921^{c}	1.780^{b}	1.639^{ab}
250 U + NC	3.366^{b}	2.073^{a}	1.624^{b}
500 U + NC	3.450^{ab}	2.138^{a}	1.614^{b}
750 U + NC	3.459^{ab}	2.132^{a}	1.623^{b}
1000 U + NC	3.445^{ab}	2.123^{a}	1.623^{b}
3000 U + NC	3.475^{ab}	2.127^{a}	1.635^{ab}
2500 U Std + NC	3.468^{ab}	2.127^{a}	1.631^{ab}
SEM	0.030	0.021	0.0085
TRT P Value	<0.0001	<0.0001	0.008
Block P Value	<0.0001	<0.0001	0.86

The percent phosphorus digestibility and tibia bone ash weights in broiler Study 2 also support and demonstrate the functionality of the Phy02 phytase. The percent phosphorus digestibility of the PC group at 21 days was artificially higher than that of the NC group due to higher P and lower Ti in the analyzed feed sample. As a result, the P digestibility of the 250 FTU Phy02 phytase treatment group at 21 days was significantly lower than that of the PC group but there were no significant differences among all other treatment groups. However, the P digestibility in all Phy02 treatment groups with greater than 250 FTU/kg feed were numerically greater at 21 days than that of the NC group (Table 16). The phosphorus digestibility results at 42 days for all Phy02 treatment groups were numerically greater than the NC group but were not statistically significant (Table 16). The weight of the bone ash in tibia at 21 days and at 42 days was significantly greater in the PC group compared to the NC group and all groups receiving the Phy02 phytase in the diet also had percent bone ash that was significantly greater than that of the NC group and statistically equivalent to that of the PC group with the exception of the 250 FTU Phy02 treatment group at 21 days where the bone ash weight was significantly greater than that of the NC group but significantly lower than that of the PC group (Table 17). The bone ash weights generally increased with increasing dose of Phy02 phytase and the highest bone ash weights among the Phy02 treatment groups were in the highest Phy02 dose group of 3,000 FTU/kg (Table 17).

In summary, the performance data from broiler Study 2, including body weight gain and feed conversion, support the functionality of the Phy02 phytase. Inclusion of the Phy02 phytase in a low phosphorus basal diet demonstrated a dose response with improved weight gain and feed conversion with increasing doses of Phy02. In addition, the functionality of the Phy02 phytase was demonstrated by improved phosphorus digestibility in the ileum and higher amounts of bone ash in tibia. Altogether, the results of broiler Study 2 clearly demonstrate the functionality of the Phy02 phytase in improving phosphorus availability and nutrition in broiler chickens.

Table 16. Ileal phosphorus and percent phosphorus digestibility in broiler Study 2 at 21 and 42 days.

Treatment	21d Ileal P digestibility (%)	21d Ileal P (mg/100g)	42d Ileal P digestibility (%)	42d Ileal P (mg/100g)
Positive Control	73.29^{a}*	38.0^{a}	55.25	42.2
Negative Control	64.26^{ab}	31.0^{ab}	44.00	35.5
250 U + NC	63.47^{b}	30.5^{ab}	46.28	33.6
500 U + NC	66.20^{ab}	28.7^{ab}	53.20	31.3
750 U + NC	66.36^{ab}	27.2^{b}	49.60	36.1
1,000 U + NC	66.01^{ab}	29.5^{ab}	52.08	31.1
3,000 U + NC	69.80^{ab}	24.0^{b}	50.74	33.4
500 U Std + NC	66.88^{ab}	26.5^{b}	51.66	37.0
SEM	2.11	2.1	3.56	3.0
TRT P Value	0.042	0.0013	0.46	0.18
Block P Value	0.84	0.019	0.12	0.25

^{ab} Values within columns with no common superscript are statistically different ($P < 0.05$).
* 21d Positive control appears to be artificially high (vs. NC treatments) due to higher P and lower Ti in analyzed feed sample.

Table 17. Weight of tibia bone ash at day 21 and 42 of broiler Study 2.

Treatment	21d Tibia Ash		42d Tibia Ash	
	Grams[1]	%	Grams[1]	%
Positive Control	2.98^{a}	25.84^{ab}	12.10^{ab}	31.03^{ab}
Negative Control	2.18^{c}	22.90^{c}	9.02^{c}	29.01^{b}
250 U + NC	2.66^{b}	24.92^{b}	11.45^{b}	30.02^{ab}
500 U + NC	2.94^{a}	26.08^{ab}	11.58^{b}	31.15^{ab}
750 U + NC	2.93^{a}	26.15^{ab}	11.93^{ab}	30.73^{ab}
1,000 U + NC	3.03^{a}	26.04^{ab}	12.06^{ab}	31.32^{ab}
3,000 U + NC	3.11^{a}	26.34^{a}	12.34^{a}	31.84^{a}
500 U Std + NC	3.15^{a}	26.70^{a}	12.42^{a}	30.95^{ab}
SEM	0.06	0.29	0.17	0.63
TRT P Value	<0.0001	<0.0001	<0.0001	0.081
Block P Value	0.0016	<0.0001	<0.0001	0.33

$^{a-c}$ Values within columns with no common superscript are statistically different ($P < 0.05$).
[1]Tibia ash weight; n = 3 tibia per pen

5.3 Summary of the Results from Broiler Chicken Study 3

The performance data, including feed intake, body weight gain and adjusted feed conversion from Study 3 are presented in Tables 18 (0 – 21 day), 19 (0 – 42 day), 20 (0 – 14 day), 21 (14 – 21 day), and 22 (21 – 42 day). A key difference in the study design of Study 3 compared to Study 1 and Study 2 is that the treatment in Studies 1 and 2 that included the NC low phosphate basal diet supplemented with a commercial phytase enzyme product at 500 FTU/kg of feed ("500 U Std + NC") was replaced by a treatment group that was fed the low phosphate basal diet supplemented with 30,000 FTU Phy02 phytase/kg feed. This treatment with a high dose of Phy02 phytase is considered a tolerance dose and was included to demonstrate the safety of Phy02 if it were included at a high dose equal to ten times the highest anticipated commercial dose of Phy02. Since this study was designed to demonstrate the safety of Phy02 phytase, this study was conducted under GLP. In each of the tables, the amount of Phy02 phytase included in the feed is presented in FTU phytase/kg feed. Values listed within each category that share the same statistical letter designation are not significantly different at a P value <0.05.

In the first half of the study from day 0 – 21 the body weight gain of the birds in the PC group was significantly greater than that demonstrated by the NC (Table 18). In addition, all treatment groups that received the NC low phosphate basal diet supplemented with Phy02 phytase also demonstrated a significantly greater body weight gain compared to the NC group. There was a clear dose response in body weight gain with increasing Phy02 doses in the feed from 250 to 30,000 FTU/kg and the body weight gain for the two highest dose levels of 3,000 and 30,000 FTU/kg feed were significantly greater than that of the PC group. In FCR, the PC group demonstrated a lower FCR, although not at a statistically significant level, compared to the NC group (Table 18). However, there was a steady decrease in FCR with increasing doses of Phy02 phytase in the feed. The FCR of the lower dose treatment groups of 250 and 500 FTU/kg were lower, but not at a statistically significant level, compared to the PC group. However, all Phy02 dose groups above 500 FTU/kg produced FCRs that were significantly lower than that of the PC group.

Table 18. Performance of broiler chickens in Study 3 from day 0 - 21. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake[1], kg	Body Wt Gain, kg	Adj. Feed Conversion[2]
Positive Control	0.910^{b}	0.682^{cd}	1.334^{ab}
Negative Control	0.777^{d}	0.572^{f}	1.358^{a}
250 U + NC	0.872^{c}	0.654^{e}	1.333^{abc}
500 U + NC	0.875^{c}	0.669^{de}	1.309^{bcd}
750 U + NC	0.899^{bc}	0.690^{cd}	1.303^{cde}
1000 U + NC	0.903^{bc}	0.700^{bc}	1.290^{de}
3000 U + NC	0.928^{ab}	0.721^{b}	1.288^{de}
30,000 U + NC	0.958^{a}	0.752^{a}	1.276^{e}
SEM	0.0073	0.0061	0.0068
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	<0.0001	0.012	0.118

[1]Calculated by adjusting feed intake for mortality using final number of birds per pen.
[2]Calculated by summing feed intake and BWG using 0-21 plus 21-42 data to calculate mortality adjusted FCR.

Body weight gain of the PC group and all Phy02 treatment groups over the entire study (0 – 42 days) were significantly greater than that of the NC group during the same period

(Table 19). In general the body weight gain was directly related to the dose of Phy02 in the feed of the different phytase treatment groups. Although there was no difference in FCR between the NC and PC treatments in this study, all of the Phy02 treatment groups had lower FCR than the NC and PC treatments with those from the 500, 1,000, and 3,000 FTU/kg groups being lower at a statistically significant level.

Table 19. Performance of broiler chickens in Study 3 from day 0 - 42. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake[1], kg	Body Wt Gain, kg	Adj. Feed Conversion[2]
Positive Control	4.387^{a}	2.851^{ab}	1.551^{a}
Negative Control	3.668^{d}	2.381^{d}	1.551^{a}
250 U + NC	4.192^{c}	2.733^{c}	1.547^{ab}
500 U + NC	4.250^{bc}	2.822^{bc}	1.518^{c}
750 U + NC	4.356^{ab}	2.880^{ab}	1.526^{abc}
1000 U + NC	4.319^{abc}	2.863^{ab}	1.523^{bc}
3000 U + NC	4.402^{a}	2.927^{a}	1.517^{c}
30,000 U + NC	4.448^{a}	2.944^{a}	1.529^{abc}
SEM	0.031	0.022	0.006
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	<0.0001	<0.0001	0.49

[1]Calculated by adjusting feed intake for mortality using final number of birds per pen.
[2]Calculated by summing feed intake and BWG using 0-21 plus 21-42 data to calculate mortality adjusted FCR.

Table 20. Performance of broiler chickens in Study 3 from day 0 - 14. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	0.372^{ab}	0.289^{cde}	1.287^{a}
Negative Control	0.330^{e}	0.250^{f}	1.319^{a}
250 U + NC	0.357^{cd}	0.277^{e}	1.289^{a}
500 U + NC	0.354^{d}	0.285^{de}	1.244^{b}
750 U + NC	0.364^{bcd}	0.293^{bcd}	1.242^{bc}
1000 U + NC	0.370^{bc}	0.299^{bc}	1.238^{bc}
3000 U + NC	0.374^{ab}	0.304^{b}	1.229^{bc}
30,000 U + NC	0.384^{a}	0.319^{a}	1.204^{c}
SEM	0.0029	0.0028	0.0091
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	0.0002	0.043	0.18

Table 21. Performance of broiler chickens in Study 3 from day 14 - 21. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	0.538^{bc}	0.393^{cd}	1.369^{ab}
Negative Control	0.447^{d}	0.322^{e}	1.388^{a}
250 U + NC	0.514^{c}	0.377^{d}	1.365^{ab}
500 U + NC	0.521^{c}	0.384^{cd}	1.357^{ab}
750 U + NC	0.535^{bc}	0.397^{c}	1.348^{ab}
1000 U + NC	0.534^{bc}	0.402^{bc}	1.329^{b}
3000 U + NC	0.555^{ab}	0.416^{ab}	1.332^{b}
30,000 U + NC	0.575^{a}	0.433^{a}	1.329^{b}
SEM	0.0055	0.0043	0.0093
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	0.0003	0.0103	0.033

Table 22. Performance of broiler chickens in Study 3 from day 21 - 42.

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	3.512^{ab}	2.169^{ab}	1.619^{A}
Negative Control	2.917^{d}	1.809^{c}	1.612^{AB}
250 U + NC	3.355^{c}	2.079^{b}	1.615^{AB}
500 U + NC	3.409^{bc}	2.153^{ab}	1.583^{C}
750 U + NC	3.497^{ab}	2.190^{a}	1.597^{ABC}
1000 U + NC	3.456^{abc}	2.163^{ab}	1.599^{ABC}
3000 U + NC	3.512^{ab}	2.206^{a}	1.593^{BC}
30,000 U + NC	3.541^{a}	2.192^{a}	1.617^{A}
SEM	0.029	0.021	0.0085
TRT P Value	<0.0001	<0.0001	0.025
Block P Value	<0.0001	<0.0001	0.52

^{abc} Values within columns with no common superscript are statistically different (P < 0.05).
^{ABC}Means compare by Student's T test

The data generated from analyses of ileal phosphorus digestibility and tibia bone ash in broiler Study 3 clearly demonstrates the direct activity of Phy02 when included in the diet of broiler chickens. At 21 days, the phosphorus digestibility of the treatment groups containing Phy02 phytase were all numerically higher than that of the NC group (Table 23). In addition, there was a clear trend of increasing phosphorus digestibility with increasing phytase dose from 500 FTU/kg to 30,000 FTU/kg feed with the highest dose groups of 3,000 and 30,000 FTU/kg demonstrating phosphorus digestibility significantly greater than that of the NC group (Table 23). Similar results were demonstrated for ileal phosphorus digestibility at 42 days. All doses of Phy02 treatment except the lowest dose group of 250 FTU/kg feed demonstrated phosphorus digestibility levels higher than that of the NC group. Once again there is a trend toward increased digestibility with increasing dose of Phy02 phytase with the highest digestibility demonstrated by the highest dose groups (Table 23).

Table 23. Ileal phoshporus and percent phosphorus digestibility in broiler Study 3 at 21 and 42 days. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	21d Ileal P digestibility (%)	21d Ileal P (mg/100g)	42d Ileal P digestibility (%)	42d Ileal P (mg/100g)
Positive Control	82.73[a]*	24.9[ab]	63.98[abc]	37.0[a]
Negative Control	61.83[c]	30.1[a]	56.18[bc]	30.0[abc]
250 U + NC	68.50[bc]	24.0[ab]	51.04[c]	30.9[ab]
500 U + NC	67.71[bc]	23.0[ab]	63.39[abc]	23.8[bc]
750 U + NC	68.32[bc]	21.3[b]	60.86[abc]	26.5[abc]
1,000 U + NC	68.92[bc]	22.4[ab]	60.33[abc]	27.2[abc]
3,000 U + NC	69.98[b]	20.8[b]	66.18[ab]	23.0[bc]
30,000 U + NC	75.80[ab]	21.3[b]	71.28[a]	19.5[c]
SEM	1.84	2.0	3.02	2.5
TRT P Value	<0.0001	0.032	0.0006	0.0002
Block P Value	0.54	0.80	0.84	0.29

* 21d Positive control is artificially high (vs. NC treatments) due to higher P and lower Ti in analyzed feed sample.

In broiler Study 3 the functionality of the Phy02 phytase was also supported by the tibia bone ash data. The weight of bone ash in the tibias collected at 21 days and at 42 days was significantly greater in the PC group compared to the NC group and all treatment groups receiving Phy02 phytase were also significantly greater than that of the NC group and not significantly different from the bone weights of the PC group (Table 24). Comparison of the bone ash among the treatments receiving the Phy02 phytase also demonstrates a clear dose response with increasing bone ash as the phytase dose increased (Table 24). The highest bone ash weights at both 21 and 42 days was the 30,000 FTU Phy02 treatment group (Table 24).

In summary, the performance data from broiler Study 3, incuding body weight gain and feed converion, support the functionality of the Phy02 phytase. Inclusion of the Phy02 phytase in a low phosphorus basal diet demonstrated a dose response with improved weight gain and feed conversion with increasing doses of Phy02. In addition, the functionality of the Phy02 phytase was demonstrated by improved phosphorus digestibility in the ileum and higher amounts of bone ash in tibia. Altogether, the results of broiler Study 3 clearly demonstrate the functionality of the Phy02 phytase in improving phosphorus availability and nutrition in broiler chickens.

Table 24. Weight of bone ash in tibia at day 21 and 42 of broiler Study 3.

Treatment	21d Tibia Ash		42d Tibia Ash	
	Grams[1]	%	Grams[1]	%
Positive Control	2.56^{b}	24.87^{a}	10.91^{ab}	37.59^{a}
Negative Control	1.91^{c}	21.30^{b}	8.18^{c}	34.99^{b}
250 U + NC	2.59^{b}	23.90^{a}	10.05^{b}	38.29^{a}
500 U + NC	2.59^{b}	24.76^{a}	10.62^{ab}	38.98^{a}
750 U + NC	2.65^{b}	24.54^{a}	10.66^{ab}	37.15^{ab}
1000 U + NC	2.73^{b}	24.86^{a}	10.48^{ab}	39.23^{a}
3000 U + NC	2.73^{b}	25.41^{a}	10.93^{ab}	39.12^{a}
30,000 U + NC	3.02^{a}	25.58^{a}	11.09^{a}	39.00^{a}
SEM	0.06	0.40	0.23	0.53
TRT P Value	<0.0001	<0.0001	<0.0001	<0.0001
Block P Value	0.39	0.008	0.13	0.0029

^{ab} Values within columns with no common superscript are statistically different ($P < 0.05$).

[1]Tibia ash weight; n = 3 tibia per pen

5. 4 Summary of the Results from Broiler Chicken Study 4

The performance data, including feed intake, body weight gain and adjusted feed conversion from Study 4 are presented in Tables 25 (0 – 21 day), 26 (0 – 42 day), 27 (0 – 14 day), 28 (14 – 21 day), and 29 (21 – 42 day). The study design of Study 4 was similar to that of the other studies but the treatment groups receiving the Phy02 phytase in their diets included doses of 250, 500, 1000, 3,000, 6,000, and 60,000 FTU Phy02 phytase/kg feed. The treatment consisting of a low phosphate basal diet supplemented with a commercial phytase enzyme product at 500 FTU/kg of feed ("500 U Std + NC") was not included in this study. The treatment with the high dose of 60,000 FTU Phy02 phytase/kg is considered a tolerance dose and was included to demonstrate the safety of Phy02 if it were included at a high dose equal to ten times the highest anticipated commercial dose of Phy02. In each of the tables, the amount of Phy02 phytase included in the feed is presented in FTU phytase/kg feed. Values listed within each category that share the same statistical letter designation are not significantly different at a P value <0.05.

In the first half of the study from day 0 – 21 the body weight gain of the birds in the PC group was significantly greater than that demonstrated by the NC group (Table 25). In addition, all treatment groups that received the low phosphate basal diet supplemented with Phy02 phytase also demonstrated a significantly greater body weight gain compared to the NC group. There was a clear dose response in body weight gain with increasing Phy02 doses in the feed from 250 to 60,000 FTU/kg and the body weight gain for the dose levels of 1,000 FTU/kg feed and above were significantly greater than that of the PC group. In FCR, the PC group demonstrated a significantly lower FCR compared to the NC group (Table 25). There was a steady decrease in FCR with increasing doses of Phy02 phytase in the feed. The FCR of the 250 FTU/kg treatment group was lower, but not at a statistically significant level, compared to the PC group. However, all Phy02 dose groups above 250 FTU/kg produced FCRs that were significantly lower than that of the PC group.

Table 25. Performance of broiler chickens in Study 4 from day 0-21. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	0.971^{cd}	0.719^{d}	1.351^{b}
Negative Control	0.817^{e}	0.588^{f}	1.390^{a}
250 U + NC	0.934^{d}	0.692^{e}	1.350^{bc}
500 U + NC	0.938^{d}	0.706^{de}	1.327^{cd}
1,000 U + NC	0.990^{bc}	0.755^{c}	1.312^{d}
3,000 U + NC	1.023^{ab}	0.778^{ab}	1.314^{d}
6,000 U + NC	1.000^{bc}	0.766^{bc}	1.304^{d}
60,000 U + NC	1.050^{a}	0.799^{a}	1.314^{d}
SEM	0.009	0.005	0.005
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	0.0007	0.0008	0.0003

Body weight gain of the PC group and all Phy02 treatment groups over the entire study (0 – 42 days) were significantly greater than that of the NC group during the same period (Table 26). In general the body weight gain was directly related to the dose of Phy02 in the feed of the different phytase treatment groups. The FCR for the PC group and all Phy02 treatment dose levels was significantly lower than that of the NC treatment group.

Table 26. Performance of broiler chickens in Study 4 from Day 0-42. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	4.501^{ab}	2.889^{bc}	1.558^{bc}
Negative Control	3.597^{d}	2.228^{e}	1.615^{a}
250 U + NC	4.334^{c}	2.757^{d}	1.572^{b}
500 U + NC	4.372^{bc}	2.815^{cd}	1.553^{bc}
1,000 U + NC	4.522^{a}	2.921^{ab}	1.548^{c}
3,000 U + NC	4.588^{a}	2.967^{ab}	1.546^{c}
6,000 U + NC	4.546^{a}	2.942^{ab}	1.546^{c}
60,000 U + NC	4.617^{a}	2.988^{a}	1.545^{c}
SEM	0.033	0.022	0.005
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	0.0045	0.0033	0.072

Table 27. Performance of broiler chickens in Study 4 from Day 0-14. Values within columns with no common superscript are statistically different ($P < 0.05$).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	0.410^{bc}	0.307^{c}	1.335^{ab}
Negative Control	0.360^{d}	0.265^{d}	1.360^{a}
250 U + NC	0.394^{c}	0.299^{c}	1.320^{b}
500 U + NC	0.396^{c}	0.307^{c}	1.289^{c}
1,000 U + NC	0.411^{bc}	0.325^{b}	1.263^{cd}
3,000 U + NC	0.423^{ab}	0.337^{ab}	1.258^{d}
6,000 U + NC	0.414^{ab}	0.330^{b}	1.256^{d}
60,000 U + NC	0.430^{a}	0.343^{a}	1.254^{d}
SEM	0.004	0.003	0.006
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	0.0003	0.0056	0.0016

Table 28. Performance of broiler chickens in Study 4 from Day 14-21. Values within columns with no common superscript are statistically different ($P < 0.05$).

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	0.561^{cd}	0.412^{c}	1.363^{b}
Negative Control	0.457^{e}	0.323^{e}	1.415^{a}
250 U + NC	0.540^{d}	0.394^{d}	1.373^{b}
500 U + NC	0.542^{d}	0.399^{cd}	1.357^{b}
1,000 U + NC	0.579^{bc}	0.429^{b}	1.349^{b}
3,000 U + NC	0.600^{ab}	0.442^{ab}	1.358^{b}
6,000 U + NC	0.586^{b}	0.437^{b}	1.342^{b}
60,000 U + NC	0.619^{a}	0.455^{a}	1.360^{b}
SEM	0.005	0.003	0.008
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	0.0003	<0.0001	0.0021

Table 29. Performance of broiler chickens in Study 4 from Day 21-42. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	Feed Intake, kg	Body Wt Gn, kg	Adj. Feed Conversion
Positive Control	3.567[abc]	2.170[a]	1.644[b]
Negative Control	2.814[d]	1.640[c]	1.716[a]
250 U + NC	3.440[c]	2.065[b]	1.666[b]
500 U + NC	3.474[bc]	2.109[ab]	1.648[b]
1,000 U + NC	3.574[ab]	2.167[a]	1.650[b]
3,000 U + NC	3.610[a]	2.189[a]	1.650[b]
6,000 U + NC	3.588[ab]	2.175[a]	1.650[b]
60,000 U + NC	3.618[a]	2.190[a]	1.653[b]
SEM	0.030	0.020	0.008
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	0.0096	0.0061	0.048

The data generated from analyses of ileal phosphorus digestibility and tibia bone ash in broiler Study 4 supports the direct activity of Phy02 when included in the diet of broiler chickens. At 21 and 42 days, the phosphorus digestibility of the treatment groups containing Phy02 phytase were all numerically higher than that of the NC group with the exception of the 500 FTU/kg group (Table 30). In addition, excepting the 500 FTU/kg group, there was a clear trend of increasing phosphorus digestibility with increasing phytase dose from 250 FTU/kg to 60,000 FTU/kg feed with the highest dose groups of 6,000 and 60,000 FTU/kg demonstrating the highest phosphorus digestibility (Table 30).

Table 30. Ileal phoshporus and percent phosphorus digestibility in broiler Study 4 at 21 and 42 days. Values within columns with no common superscript are statistically different (P < 0.05).

Treatment	21d Ileal P digestibility (%)	21d Ileal P (mg/100g)	42d Ileal P digestibility (%)	42d Ileal P (mg/100g)
Positive Control	65.74[ab]	37.6[ab]	57.67[ab]	37.5
Negative Control	63.73[ab]	36.0[ab]	50.05[b]	32.6
250 U + NC	66.02[ab]	28.9[b]	51.96[b]	30.8
500 U + NC	60.29[b]	41.8[a]	49.64[b]	34.9
1000 U + NC	63.54[ab]	33.1[ab]	52.19[b]	32.1
3000 U + NC	65.20[ab]	33.4[ab]	55.93[ab]	30.0
6000 U + NC	66.69[ab]	33.7[ab]	59.74[ab]	28.0
60,000 U + NC	71.07[a]	25.6[b]	64.66[a]	25.7
SEM	2.25	0.003	2.39	2.8
TRT P Value	0.084	0.0054	0.0002	0.12
Block P Value	0.86	0.85	0.038	0.14

In broiler Study 4 the functionality of the Phy02 phytase was also supported by the tibia bone ash data. The weight of bone ash in the tibias collected at 21 days and at 42 days was significantly greater in the PC group compared to the NC group and all treatment groups receiving Phy02 phytase had significantly greater amounts of bone ash compared to the NC group (Table 31). In addition, at 21 days the Phy02 dose groups of 3,000 FTU Phy02 phytase/kg feed and above had significantly greater amounts of bone ash compared to the PC group while at 42 days this was true for the highest dose group of 60,000 FTU/kg (Table 31). In general, similar results are seen when the data is presented as percent bone ash with a significantly greater percent of bone ash in the PC group compared to the NC group and statistical equivalence between the PC and Phy02 treatment groups (Table 31). Comparison of the bone ash data among the treatments receiving the Phy02 phytase also demonstrates a clear dose response with increasing bone ash as the phytase dose increased (Table 31). The highest bone ash weights at both 21 and 42 days was the 60,000 FTU Phy02 treatment group (Table 31).

Table 31. Weight and percent of bone ash in tibia at day 21 and 42 of broiler Study 4.

Treatment	21d Tibia Ash		42d Tibia Ash	
	Grams[1]	%	Grams[1]	%
Positive Control	2.68[cd]	27.51[abc]	11.44[bc]	28.52[ab]
Negative Control	1.91[e]	22.86[d]	8.30[d]	25.01[d]
250 U + NC	2.61[d]	26.07[c]	10.78[c]	26.55[c]
500 U + NC	2.66[cd]	26.26[bc]	11.15[bc]	27.39[bc]
1000 U + NC	2.90[bc]	27.34[abc]	11.70[ab]	27.59[abc]
3000 U + NC	3.02[ab]	27.65[ab]	12.01[ab]	28.13[ab]
6000 U + NC	2.85[bc]	27.28[abc]	11.99[ab]	27.94[abc]
60,000 U + NC	3.14[a]	27.86[a]	12.46[a]	28.96[a]
SEM	0.05	0.33	0.20	0.32
TRT P Value	<0.0001	<0.0001	<0.0001	<0.0001
Block P Value	0.060	0.0016	0.95	0.44

[a-e] Values within columns with no common superscript are statistically different ($P < 0.05$).
[1]Tibia ash weight; n = 3 tibia per pen

5.5. Summary of the Results of Four Broiler Chicken Trials

In each of the four broiler feeding studies, the performance of birds fed a diet low in available phosphorus but supplemented with increasing doses of Phy02 phytase was compared to that of a group of birds receiving a diet with adequate available phosphorus (positive control, PC) and to another group that received a diet low in available phosphorus without phytase supplementation (negative control, NC). Graphic comparisons of the body weight and FCR results of the four studies for day 0 – 42 are presented in Figures 15 and 16, respectively. In all studies the treatment groups that received feed with Phy02 phytase had body weight gain and FCR that were improved compared to the NC. In addition, the Phy02 treatment groups demonstrated weight gain and FCR that were either equal to or better than the PC group. The phosphorus digestibility in ileal contents and the amount of bone ash in tibia in all four trials were also clearly improved by the supplementation of the low phosphorus basal diet with the Phy02 phytase. These results demonstrate that inclusion of Phy02 phytase in a diet low in available phosphorus improves the performance of broilers as measured by body weight gain and FCR, such that it equals or exceeds that of the PC group receiving a diet with adequate available phosphorus. Clear improvements in phosphorous digestibility and amount of bone ash were also realized by inclusion of the Phy02 phytase in the low phosphorus basal diets in all four feeding studies.

Figure 15. Comparison of the body weight gain of broiler chickens in four separate studies from day 0 – 42. The results from the four studies are color coded as shown in the legend and the NC (0 phytase) and PC groups (numbered according to Study number) are compared to groups receiving increasing amounts of Phy02 phytase (FTU/kg feed). A commercial phytase standard at 500 FTU/kg was included in Studies 1 and 2 for comparison (CC1 and CC2 in Studies 1 and 2, respectively). In Study 3 and 4 this group was replaced by a group receiving 30,000 or 60,000 FTU/kg Phy02 phytase, respectively.

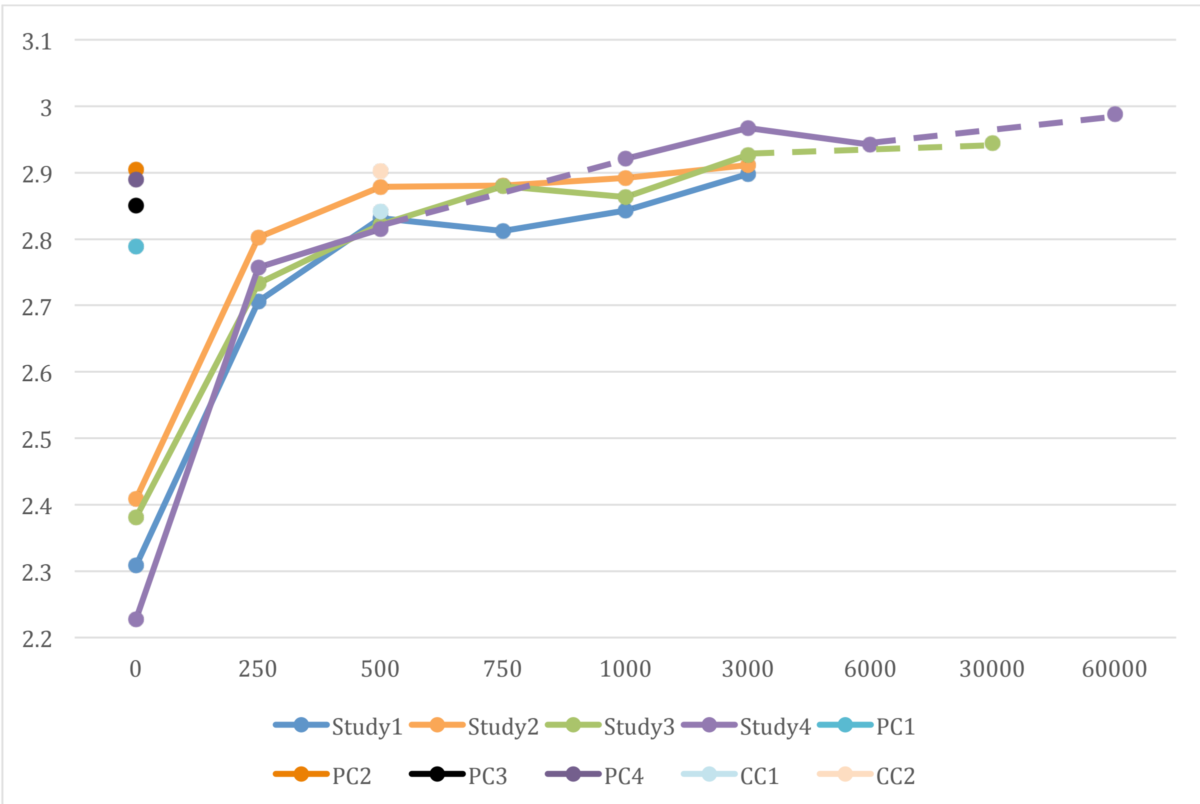
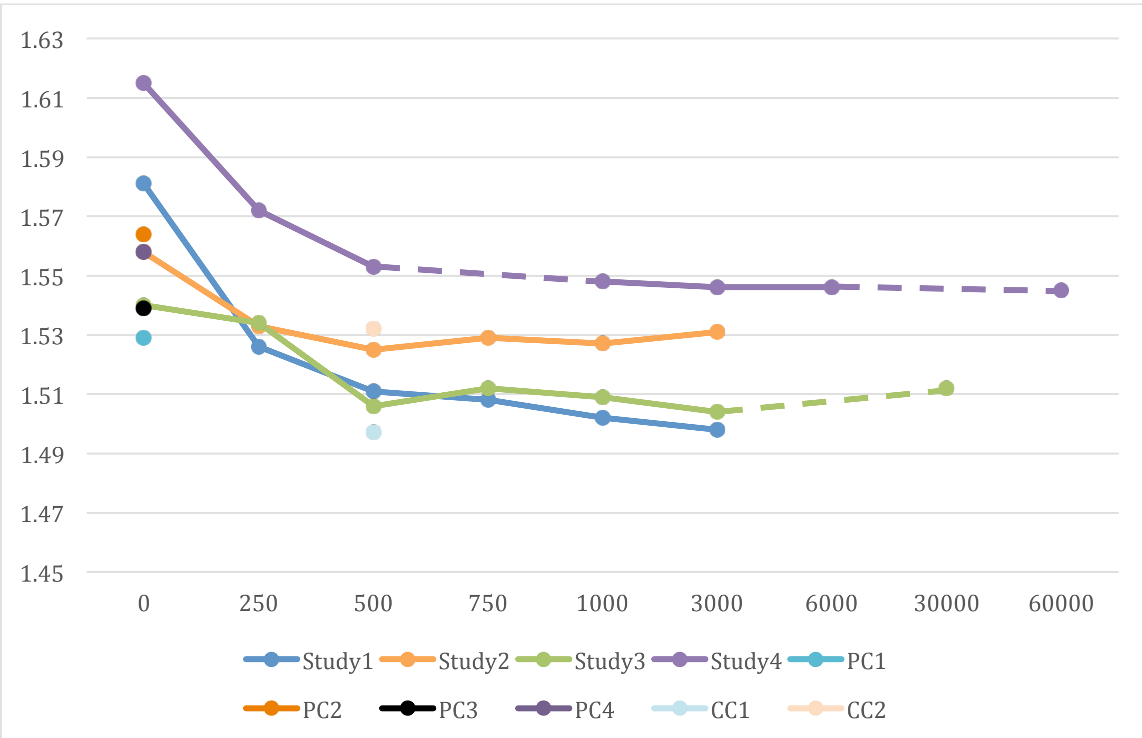


Figure 16. Comparison of the adjusted FCR of broiler chickens in three separate studies from day 0 – 42. The results from the four studies are color coded as shown in the legend and the NC (0 phytase) and PC groups (numbered according to Study number) are compared to groups receiving increasing amounts of Phy02 phytase (FTU/kg feed). A commercial phytase standard at 500 FTU/kg was included in Studies 1 and 2 for comparison (CC1 and CC2 in Studies 1 and 2 respectively). In Study 3 and 4 this group was replaced by a group receiving 30000 or 60000 FTU/kg Phy02 phytase, respectively.



Evaluation of the percent mortality of birds in all treatments in all four broiler studies showed that overall there was low mortality in all trials and that there were no significant differences among the treatments within trials (Table 32). These results confirm and support the conclusion derived from the safety assessment of the Phy02 phytase presented in §4.0 and from examination of birds treated with high doses of the Phy02 phytase, including 30,000 and 60,000 FTU/kg feed, that the Phy02 phytase is safe for poultry when included in feed at levels up to 60,000 FTU/kg.

Table 32. Comparison of Mortality in the Phy02 Phytase Broiler Feeding Trials

Treatment	Overall Mortality, % (0 to 42 d)			
	Study 1	Study 2	Study 3	Study 4
LP Control	5.39	5.86	2.94	3.92
HP Control	1.47	3.92	4.90	5.88
LP + 250 FTU	3.92	5.39	5.39	5.39
LP + 500 FTU	4.90	3.92	3.84	2.94
LP + 750 FTU	4.41	5.39	4.41	-
LP + 1000 FTU	8.33	4.41	5.88	2.45
LP + 3000 FTU	2.45	5.88	4.90	2.94
LP + 6000 FTU	-	-	-	1.96
LP + 30000 FTU	-	-	7.84	-
LP + 60000 FTU	-	-	-	6.37
LP + 500 FTU Comm. Phytase	4.41	3.92	-	-
SEM	1.47	1.42	1.53	1.52
Treatment P-value	0.09*	0.90*	0.64*	0.41*
Block P-value	0.50*	0.70*	0.20*	0.50*

*Statistical analysis was done on Square Root, ArcSin transformed values.

6.0 Product Characterization

Three separate representative product batches of the Phy02 phytase were produced from grain of the PY203_F1ES2 generation (see Figure 9) of Phy02 expressing maize. The product batch numbers, location of planting and dates of planting and harvest are shown in Table 33. Planting the seed and harvest of the grain were performed using commonly used agronomic practices for maize. Cultivation of the Phy02 producing maize also utilized common agronomic practices for maize including the use of fertilizers, herbicides and pesticides approved for use on maize. After harvest, the grain was dried on the cob for three days until the grain moisture was below 15% at which time it was shelled and placed in labeled containers. The grain was shipped to Agrivida, Inc. (Medford, MA) and stored in separate storage bins prior to being milled in a CPM series 650 three stage roller mill with a 1.5:1 differential. Grain particles were sieved through a series of steel mesh sieves (No. 6 and No. 12) to produce grain particles between 1.7 and 3.3 mm in diameter.

Table 33. Planting locations and dates for the production of three representative Phy02 phytase product batches.

	Phy02 Product Batches		
Product Batch No.	AV Phy02 0043	AV Phy02 0049	AV Phy02 0050
Planting Location	Field; (b) (4)	Field; (b) (4)	Greenhouse, (b) (4)
Planting Date	12 June 2015	12 June 2015	25 May 2015
Harvest Date	1 October 2015	14 October 2015	21 September 2015

Each of the three representative Phy02 phytase product batches were analyzed to demonstrate that they meet the purity, chemical and microbial specifications established for enzyme preparations, as outlined in the Food Chemical Codex (FCC 2001), and the specifications established for enzymes used in food processing, as proposed by the Joint FAO/WHO Expert Committee on Food Additives (FAO/WHO 2001). Physical, chemical, and microbial characteristics were determined for each of the Phy02 phytase product batches by Eurofins Nutritional Analysis Center (Des Moines, IA). The results of these analyses are presented in Table 34.

Examination of the results of the analysis of key product characteristics as presented in Table 34 demonstrate that all three Phy02 phytase product batches meet or exceed all JECFA specifications established for enzyme preparations that are used in food and/or feed with the exception of total bacterial count and the number of coliform colony forming units (cfu). All three product batches had no detectible presence of either *Salmonella* or *E. coli* bacteria. Coliform bacteria are defined as rod-shaped Gram negative, non-spore forming and motile or non-motile bacteria that can ferment lactose with the production of acid and gas when incubated at 35–37°C (Brenner, 1992; Bettelheim, 1992). While coliforms themselves are not normally causes of serious illness, their presence has been used to indicate that other pathogenic organisms of fecal origin may be present (Krentz et al., 2013). Typical genera in the coliform group include: *Citrobacter*, *Enterobacter*, *Hafnia*, *Klebsiella*, and *Escherichia* (Brenner, 1992; Bettelheim, 1992).

The JECFA specifications for food enzyme preparations have been traditionally applied to enzyme products that are produced by sterile fermentation followed by purification of the enzyme in a sanitary laboratory environment. Under these conditions it is feasible to produce a purified enzyme product that meets the JECFA specifications for the presence of microbes in the product. However, the Phy02 phytase product is produced in the same manner as the production of maize grain that is widely used as a major component of human food and animal feed. It is produced in agricultural fields in the environment where bacteria are present in the soil, air and water and on the surfaces of plants, including the maize that produces the Phy02 phytase containing grain. Therefore it is reasonable to expect that the Phy02 phytase product would contain levels of bacterial presence that is typical for maize grain produced by typical agricultural practices. Two of the three Phy02 phytase product batches exceeded the JECFA specification of 30 cfu/g product for coliform bacteria with coliform numbers of 300 and 6,700/g (Table 34). However, these numbers are consistent with studies of microbial presence in maize grain and in animal feed. Tabib et al. (1981) surveyed feeds and feed ingredients, including maize, in the feed of broilers, layers and turkeys and found that the numbers of coliform bacteria ranged from 450 – 910,000 cfu/g. Similar studies have also reported equivalent levels of coliform bacterial in cattle feed (Sanderson *et al*., 2005) and tortillas made from corn meal (Gomez-Aldapa *et al*., 2013). From these reports it is evident that the level of coliform bacteria in two of the three Phy02 product batches is similar to those reported as normal for maize grain and other commonly used feed ingredients. Since the numbers of coliform bacteria found to be present in two of the three Phy02 phytase product batches are typical for those found in maize grain and other animal feed ingredients and since known pathogenic bacteria such as *Salmonella* and *E. coli* were absent from the product batches, the higher level of coliforms in the Phy02 product compared to the JECFA specifications for food enzyme products is considered to be safe.

Table 34. Physical, chemical, and microbial characteristics of three independent Phy02 phytase product batches compared to JECFA specifications for enzyme preparations used in food and feed.

			Phytase Phy02 Product Batch			
	Method	**Unit**	**AV Phy02 0043**	**AV Phy02 0049**	**AV Phy02 0050**	**JECFA Specification Limit**
Physical Characteristics						
Phytase Activity	Agrivida, Inc. SOP	FTU/g	(b) (4)	(b) (4)	(b) (4)	NA
	Agrivida, Inc. SOP	FTU/mg protein				NA
Density	USP 616	g/ml	0.6	0.6	0.6	NA
Micron particle size	MF-2051 Evaluating Particle Size, KSU 2002	micron	2,704.00	2,705.00	2,690.00	NA
Chemical Characteristics						
Cadmium	J. AOAC vol. 90 (2007) 844-856 (Mod)	mg/kg	<0.010	<0.010	<0.010	30 max
Mercury	J. AOAC vol. 90 (2007) 844-856 (Mod)	mg/kg	<0.010	<0.010	<0.010	30 max
Lead	J. AOAC vol. 90 (2007) 844-856 (Mod)	mg/kg	<0.010	<0.010	<0.010	5 max
Arsenic	J. AOAC vol. 90 (2007) 844-856 (Mod)	mg/kg	<0.010	<0.010	<0.010	3 max
Microbial Characteristics						
Coliforms	AOAC 991.14	cfu/g	6,700	300	10	30 max
Salmonella	AOAC 2003.09	#/25g	negative	negative	negative	Absent
Aerobic Plate Count	BAM Chapter 3	cfu/g	97,000	6,300	86,000	50,000 max
E. coli	U.S. Pharmacopeia Chapter 62	#/10g	negative	negative	negative	Absent
Aflatoxin	Commercial Test Kit (ELISA)	ppb	<5	<5	<5	Nondetectible
T-2 Toxin	Commercial Test Kit (ELISA)	ppb	<25	<25	<25	Nondetectible
Ochratoxin	Commercial Test Kit (ELISA)	ppb	<2	<2	<2	Nondetectible
Sterigmatocystin	Eurofins Internal method	ug/kg	<10	<10	<10	Nondetectible

7.0 Product Stability

7.1. Stability of the Phy02 phytase product.

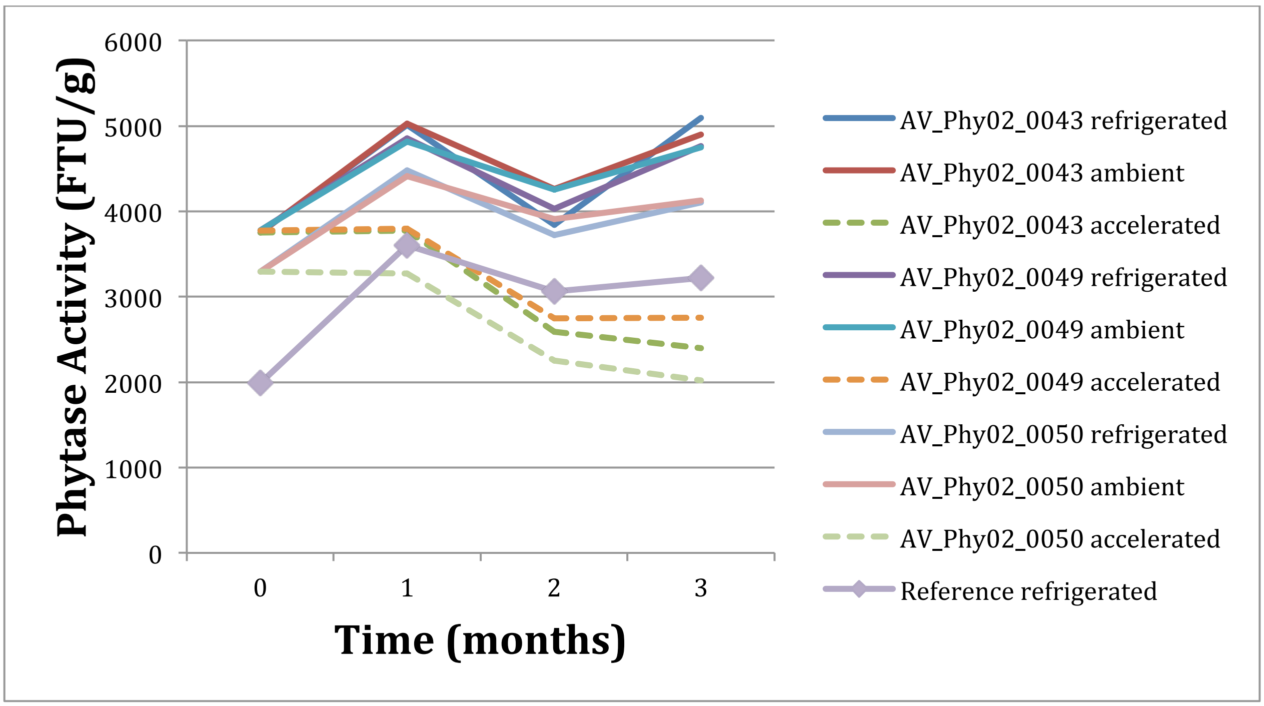
The stability of the phytase activity in three representative Phy02 product batches over time and at different storage temperatures was examined. Three representative Phy02 phytase product batches were produced as described in §6.0 (batches AV_PHY02_0043, AV_PHY02_0049, and AV_PHY02_0050). Four gram aliquots of the product batches were packaged in double paper envelopes that were folded closed and sewn shut. At the initiation of the study four sample packages were opened and the contents of each were milled in a Cyclotech grinder to a particle size of less than 0.5 mm. Two 0.5g aliquots from the milled material of each sample were extracted in phytase assay buffer and analyzed in triplicate for phytase activity. The results of these 24 analyses set the baseline for the phytase activity in the samples and was used as the starting activity for the storage stability study. The remaining product sample packages were separated into three groups and placed in storage under refrigerated (4°C), ambient (22°C), and accelerated (40°C) conditions. As a phytase control, a commercial phytase feed product was obtained and packaged as described for the Phy02 product samples and these were stored only under refrigerated conditions. At each sampling time, four product samples were removed from each of the three storage conditions at 1, 2, and 3 months after initiation of the study and were analyzed for phytase activity as described above for the initial samples at time zero of the study to generate 24 analyses at each time point. The averages of the 24 analyses for each sample are presented in Table 35 and Figure 17. The product stability study was conducted by Eurofins Nutrition Analysis Center (Des Moines, IA).

Table 35. Results of the Phy02 product stability study after 3 months of storage under refrigerated, ambient, and accelerated storage conditions. The results presented are FTU phytase activity/g Phy02 phytase product and are averages of 24 phytase determinations. The commercial phytase used as a control is listed as Reference sample.

Sample		Months			
		T_0	1	2	3
AV_Phy02_0043	refrigerated				(b) (4)
	ambient				
	accelerated				
AV_Phy02_0049	refrigerated				
	ambient				
	accelerated				
AV_Phy02_0050	refrigerated				
	ambient				
	accelerated				
Reference	refrigerated				

The results of the product stability study that investigated the phytase activity of three Phy02 phytase product batches are presented in Table 35 and graphically in Figure 17. These results demonstrate that the phytase activity of all three Phy02 phytase product batches stored under refrigerated or ambient conditions maintained their original phytase activity. Likewise, the commercial reference phytase product stored under refrigerated conditions maintained phytase activity for the duration of the 3 month period. The Phy02 phytase product samples stored under accelerated conditions demonstrated a reduction of phytase activity over the three month incubation period retaining from 61 to 73% of their initial activity after 3 months of storage. These results demonstrate that the phytase activity in the Phy02 phytase product is stable for up to 3 months under either refrigerated or ambient storage conditions.

Figure 17. Graphic presentation of phytase activity in samples of Phy02 phytase product at monthly intervals after up to 3 months of storage under three different temperatures.



7.2 Homogeneity of Phy02 phytase in feed mixtures.

The ability to produce homogeneous mixtures of different powdered ingredients is affected by several factors, including particle size, density and cohesiveness, the order of ingredient addition, mixer design and speed, and mixing time. The last four of these factors are not under the control of the feed ingredient manufacturer. The impact of particle size on the homogeneity of such mixtures has been well studied as it affects a wide range of products in food, feed, pharmaceutical and other industries (Bridgewater, 1976; Chowhan and Linn, 1979). It has been recommended by the ISA (2010), an organization that breeds different species of livestock that in order to achieve the best digestibility and mixability of feed ingredients, 75% of the feed particles should be in the size range of 500 – 3200 microns with no more than 15% below 500 microns. The particle size of the Phy02 phytase product is within this size range (§6.0, Table 34). Based on this information it is expected that the Phy02 phytase product will mix homogeneously when added to prepared feeds and mixed well. In order to confirm this, two studies to demonstrate homogenous mixtures of the Phy02 phytase product in typical feeds were conducted.

A feed mixture based on a corn/soy diet (Table 36) and containing the Phy02 phytase at a target level of 1,000 FTU/kg was produced at the Animal Nutrition Center and Feed Mill at Auburn University (Auburn, AL). The feed components that together weighed 2,000 lbs and (b) (4) of Phy02 phytase product with an activity of (b) (4) were mixed in a counterpoise mixer. Ten 500g samples of the feed were collected randomly from the mixed feed and were sent to Eurofins Nutrition Analysis Center (Des Moines, IA) for phytase analysis.

Table 36. Composition of feed used in a study of homogeneity of Phy02 phytase after mixing in a corn/soy diet.

Ingredient Name	%	(lb)
Corn	60.03	1200.56
Soybean Meal	33.66	673.13
Poultry Fat	2.74	54.81
Defluorinated P	1.67	33.32
Calcium Carbonate, Limestone	0.74	14.79
DL-Met, 99%	0.30	5.96
Sodium Bicarbonate	0.25	5.00
Salt, NaCl	0.22	4.35
L-Lys-HCl, 78% Feed Grade	0.12	2.42
AU Trace Mineral Premix	0.10	2.00
AU Vitamin Premix	0.10	2.00
L-Thr, 98.5% Feed Grade	0.08	1.66
Phy02 Phytase	0.04	(b) (4)
Ingredient Total:	100.05	

The results of phytase activity analyses of the 10 samples of mixed feed are presented in Table 37. They demostrate that the average phytase activity from all samples was 1169.4 FTU/kg which is close to the target dose of 1000 FTU/kg with a CV of approximately 20%. These results demonstrate that the Phy02 phytase product can be homogenously mixed in typical feed preparations.

Table 37. Results of phytase analyses of 10 randomly collected samples of feed produced with a target dose of 1,000 FTU/kg Phy02 phytase.

Replicate	FTU/kg
1	(b) (4) [redacted]
2	
3	
4	
5	
6	
7	
8	
9	
10	
Average	1169.4
stdev	235.21
CV	20%

In a second study of the homogeneity of the Phy02 phytase product in in-feed mixtures, poultry diets made with corn and soybean were prepared by CQR (Ft. Collins, CO) and Phy02 phytase product was added to a target rate of 3,000 FTU/kg prior to mixing. Two separate batches of feed were prepared and the mash feeds were pelleted at 65°C. Ten 500g samples of pelleted feed were collected at random from each of the two feed batches and these were shipped to Eurofins Nutrition Analysis Center (Des Moines, IA) for measurement of phytase activity. The results of the analyses presented in Table 38 demonstrate that the Phy02 phytase was homogeneously mixed in both feed batches with low coefficients of variance of 5.3 and 8.3%. In summary, examination of the Phy02 phytase product in three independent feed batches prepared with Phy02 phytase has demonstrated that the Phy02 phytase product is homogeneously distributed in typical corn/soybean based feeds.

Table 38. Results of phytase analyses of 10 randomly collected samples of feed from two separately produced feed batches with a target dose of 3,000 FTU/kg Phy02 phytase.

	Feed Batch 1	Feed Batch 2
Replicate	**FTU/kg**	**FTU/kg**
1	[redacted]	(b) (4)
2		
3		
4		
5		
6		
7		
8		
9		
10		
Average	2737.00	2929.00
stdev	144.07	242.74
CV	5.3%	8.3%

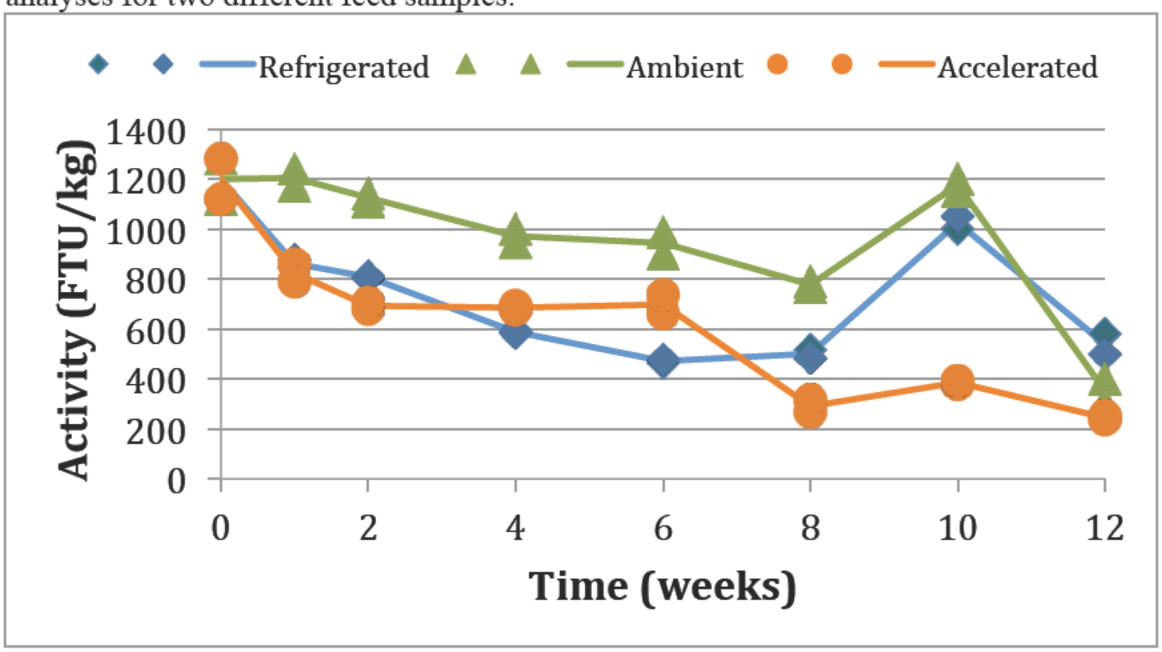
7.3 Stability of the Phy02 phytase in feed mixtures.

In order to investigate the stability of the Phy02 phytase in feed mixtures at different storage temperatures two studies of in-feed stability have been conducted. In study 1 a typical corn/soybean meal based poultry feed was prepared and mixed with a target dose of 1,000 FTU Phy02 phytase/kg feed at the Animal Nutrition Center and Feed Mill at Auburn University (Auburn, AL). The mixed mash feed containing Phy02 phytase product was pelleted at 70°C and 2 kg aliquots were prepared in sewn, double paper bags as described for the Phy02 product samples used in the Phy02 phytase product stability study (§7.1) and these were shipped to Eurofins Nutrition Analytic Center (Des Moines, IA). The Phy02 phytase in-feed samples were divided into three groups that were stored under refrigerated, ambient, or accelerated conditions in the same manner as described in the Phy02 phytase product stability study (§7.1). At various time points during the study one package of the feed mixture from each storage condition was removed and 500g of the feed mixture from each sample was ground to a fine powder. Two aliquots of the feed sample from each package were extracted with buffer and three aliquots of extract were analyzed for phytase activity for six phytase activity determinations per sample. The average phytase activity values from the six determinations from samples stored up to 12 weeks are shown in Table 39 and Figure 18. All feed samples contained approximately 1200 FTU/kg phytase activity at the start of the study. After 10 weeks of storage the samples stored under refrigerated and ambient conditions retained 85 and 98%, respectively, of the original activity. The phytase activity of these samples after 12 weeks of storage had declined to 45 and 29%, respectively. These results demonstrate that the Phy02 phytase in feed mixtures retains its activity when stored for up to 10 weeks under refrigerated or ambient conditions. The Phy02 phytase activity in feed mixtures stored under accelerated conditions demonstrated a steady decline and retained approximately 32% and 20% of the original activity after 10 and 12 weeks of storage, respectively. These results are similar to those of the Phy02 phytase product stability study described in §7.1.

Table 39. Phytase activity in feed mixtures containing Phy02 phytase in Study 1 after 10 weeks of storage under different temperatures. Phytase activity is presented in FTU/kg. The data represent the average of 3 phytase analyses for two different feed samples.

	Storage Condition		
Time (weeks)	**Refrigerated**	**Ambient**	**Accelerated**
0	1200	1200	1200
1	861.5	1205	823
2	807	1125	693.5
4	589	972.5	685.5
6	471.5	942.5	699
8	500	778	291.5
10	1025	1175	386
12	540	353	245

Figure 18. The phytase activity of feed mixtures containing Phy02 phytase stored at different temperatures in Study 1. The data points represent the average of 3 phytase analyses for two different feed samples.

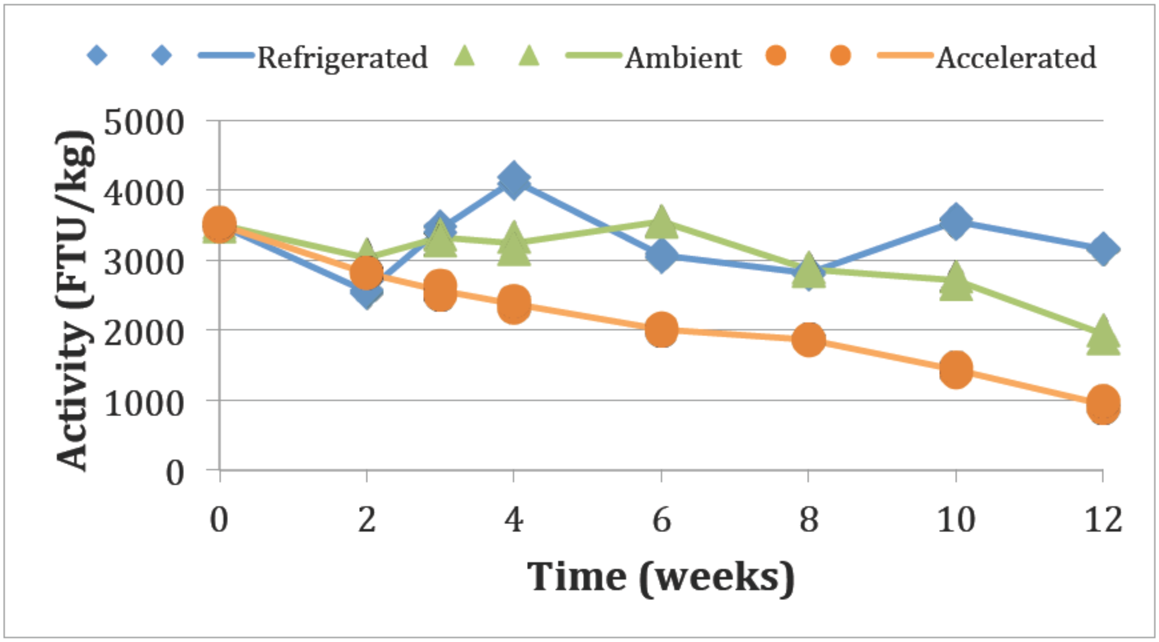


In a second study of the stability of the Phy02 phytase in feed mixtures, a corn/soybean meal based poultry diet was prepared by CQR (Ft. Collins, CO) with a target dose of 3,000 FTU/kg Phy02 phytase. The feed was well mixed and pelleted at 65°C. A portion of this feed mixture was packaged in the same manner as described for the in-feed Phy02 phytase stability study 1 above except that each feed bag contained 1.5kg of feed. The packages of Phy02 containing feed were shipped to Eurofins Nutrition Analytic Center (Des Moines, IA) where they were divided into three storage conditions as described for the Phy02 phytase product stability study (§7.1). At different time points in the study a sample package from each storage condition was removed and analyzed for phytase activity as described in the Phy02 phytase in-feed stability study 1. The results of these analyses are presented in Table 40 and Figure 19. All feed samples contained approximately 3505 FTU/kg phytase activity at the start of the study. After 10 and 12 weeks of storage the samples stored under refrigerated condition retained 101 and 90%, respectively, of the original activity. After the same storage times under ambient conditions the samples retained 77 and 55%, respectively, of the original activity. These results demonstrate that the Phy02 phytase in feed mixtures retains significant phytase activity when stored for up to 12 weeks under refrigerated and for up to 10 weeks under ambient conditions. The Phy02 phytase activity in feed mixtures in Study 2 that were stored under accelerated conditions demonstrated a steady decline and retained approximately 27% of the original activity after 12 weeks of storage. These results are similar to those of the Phy02 phytase in-feed stability Study 1 described above.

Table 40. Phytase activity in feed mixtures containing Phy02 phytase in Study 2 after 10 weeks of storage under different temperatures. Phytase activity is presented in FTU/kg. The data represent the average of 3 phytase analyses for two different feed samples.

	Storage Condition		
Time (weeks)	**Refrigerated**	**Ambient**	**Accelerated**
0	3505	3505	3505
2	2550	3035	2815
3	3440	3325	2570
4	4135	3245	2370
6	3070	3550	2010
8	2810	2865	1860
10	3555	2715	1435
12	3160	1940	936

Figure 19. The phytase activity of feed mixtures containing Phy02 phytase stored at different temperatures in Study 2. The data points represent the average of 3 phytase analyses for two different feed samples.



7.4 Stability of the Phy02 phytase during pelleting.

7.4.1 Pelleting stability study 1.

A pelleting stability study was conducted with Phy02 phytase by (b) (4) [redacted] Phy02 phytase was mixed into a typical corn/soybean based poultry diet whose ingredients and nutrient composition are presented in Table 41. The feed was prepared to include Phy02 phytase at 4,500 FTU/kg and 50 kg batches were pelleted at either 70, 80, or 85°C in a KHAL model 14-175 pelletizer with a flow rate of 0.1 ton/hr and steam pressure of 2.5-3.0 bar. Feed conditioning was for 7 minutes and pellet temperature was measured upon exit from the conditioner. Pellets with a diameter of 3.5 mm were extruded and were cooled and dried prior to bagging. Four 500g samples of the mash feed prior to pelleting and of the pelleted feeds were collected for phytase activity analysis.

The average phytase activity measured in four samples of the mash diet prior to pelleting and in the pelleted feed samples that were pelleted at either 70, 80, or 85°C are presented in Table 42 and Figure 20. The results demonstrate that the Phy02 phytase retains over 90% of its activity after pelleting at 80°C. However, exposure to a pelleting temperature of 85°C resulted in a decrease of phytase activity to 38.5% of its original activity.

Table 41. Nutrient ingredients (A) and nutrient composition (B) in the feed prepared for the study of pelleting stability of Phy02 phytase conducted by (b) (4)

A.

Primary Ingredients	%
Standard corn	60
Soybean meal 48	24.9
Extruded soybean	6
Palm Oil	5
Calcium carbonate	1.3
Dicalcium Phosphate	1.5
Salt	0.3
Vit/Min Premix	1
DL Met NP99 content	*0.24*
TOTAL	100

B.

Nutrient	%
Protein	18.04
Fat	8.93
Cellulose	2.66
Ash	5.62
Lys dig	0.84
Met dig	0.52
Met+Cys dig	0.86
Thr dig	0.6
Calcium	1
Total P	0.61
Av P	0.32
Sodium (g/kg)	1.33
Chlorine (g/kg)	2.27

Table 42. Phy02 phytase activity in feed before (mash) and after pelleting at different temperatures.

Treatment	Activity (FTU/kg)	Recovery (% Mash)
Mash	(b) (4)	(b) (4)
70°C		
80°C		
85°C		

Figure 20. Graphic presentation of the Phy02 phytase activity in feed before (mash) and after pelleting at different temperatures.

(b) (4)

7.4.2. Pelleting stability study 2.

A second pelleting stability study was conducted by (b) (4) that was designed to compare the pelleting stability of Phy02 phytase with other commercial phytases that are currently on the market. In this study mash diets identical to those described in §7.4.1 were prepared. Different commercial phytase enzyme products including (b) (4) (b) (4) (b) (4) were mixed into different batches of mash diet. The amount of each of the phytase products sufficient to achieve the dose recommended by the manufacturer based on the phytase activity described on the product labels was added to the mash feed. The calculated amount of phytase activity in each mash feed was as follows: (b) (4) Due to the common practice by feed enzyme manufacturers of marketing products with a minimum activity level that typically contains higher amounts of enzyme, i.e., an overage, the prepared feeds with the commercial phytase products contained higher actual amounts of phytase activity than the target levels. Each of the different feeds were pelleted at 60, 70, 80, and 90°C as described in §7.4.1. Four 500g aliquots of the mash feeds prior to pelleting and the pelleted feed samples collected after pelleting at the different temperatures were analyzed for phytase activity and the average of the four determinations for each are presented in Table 43. The phytase activities after pelleting at the different temperatures for each phytase product are presented in Figure 21 as a percentage of the original activity in the respective mash diets.

Table 43. Comparison of the pelleting stability of Phy02 phytase and three commercial phytase feed enzyme products. The phytase activity in mash diets prior to pelleting and in feeds pelleted at 60, 70, 80, or 90°C are presented in FTU/kg and as a percentage of the phytase activity determined in the respective mash diets.

	Phyzyme		Quantum		Quantum Blue		Phy02	
	FTU/kg	% Mash	FTU/kg	% Mash	FTU/kg	% Mash	FTU/kg	% Mash
Mash	[redacted]							
Pelleted 60°C								
Pelleted 70°C								
Pelleted 80°C								
Pelleted 90°C								

(b) (4)

Figure 21. Comparison of the relative pelleting stability of Phy02 phytase with three commercial phytase products.

[redacted]

(b) (4)

The results of this study demonstrate that the Phy02 phytase retains significant activity in feeds pelleted at temperatures up to 90°C. The feeds containing Phy02 phytase that were pelleted at 90°C retained 76% of the original phytase activity present in the mash feed prior to pelleting. Phy02 phytase demonstrated the highest level of relative phytase activity in feed pelleted at this temperature compared to the three commercial phytase products in the study.

The results of two independent pelleting stability studies with Phy02 phytase in corn/soybean feed mixtures has demonstrated that the Phy02 phytase retains a significant amount of its activity after pelleting at temperatures up to 90°C. In the first study the feed pelleted at 80°C retained over 90% of the original Phy02 phytase activity while in the second study it retained 76% of the activity after pelleting at 90°C. Furthermore, the Phy02 phytase was demonstrated to be more stable to pelleting at 90°C compared to three commercial phytase feed enzyme products that are currently on the market.

8.0 Product Labels

An appropriate label for the Phy02 phytase product is presented in Appendix 12.

9.0 Manufacturing Process

The Phy02 phytase is produced by maize genetically engineered to contain copies of the *phy02* phytase gene under the regulation of monocot derived, seed specific promoters. This results in the production of the Phy02 phytase protein in the grain of maize with little or no production in the leaves, stalks, or other tissues. Therefore, the method of production of the commercial Phy02 phytase product employs the same agronomic practices as is typically used for the production of maize grain. These include planting maize seed containing the Phy02 gene into soil once the soil temperature has reached the appropriate temperature for maize planting, management of the crop using common agricultural practices for the cultivation of maize that may include the application of chemical fertilizers and crop protection chemicals such as herbicides and insecticides that are approved for use on maize, and harvesting by mechanical maize harvesters with a sheller to produce whole maize grain. Alternatively, the Phy02 producing maize can be grown in a greenhouse with controlled temperature using common practices for the cultivation of maize in a greenhouse. It is well recognized that using these practices it is possible to produce maize grain in a greenhouse that is nutritionally equivalent to that produced in a field environment.

The whole grain containing the Phy02 phytase is dried to a moisture content of less than 15% and is stored in dry, secure grain storage bins prior to being milled to a course maize meal (~ 2 – 3 mm diameter). Once the Phy02 grain is milled it is packaged into a secure, labeled container that is either a double paper bag with sewn seams containing approximately 20 kg of product or a large heavy plastic tote containing 1 ton of product. The amount of Phy02 phytase produced in the grain is in the range of [redacted] (b) (4) (b) (4). It is expected that 100g to 1kg of the Phy02 phytase product is sufficient to treat one ton of animal feed in order to deliver an effective dose of phytase to improve phosphorus digestibility.

Since the Phy02 phytase product consists of milled maize grain containing the Phy02 phytase protein, its nutrient composition is the same as that of typical maize grain. The addition of relatively small quantities of the Phy02 phytase product to typical corn/soy based diets will replace an equally small amount of the maize that is normally a component of the diet and this substitution will not alter the nutrient composition of the feeds.

10.0 Expert Panel Consensus Statement Concerning the Generally Recognized as Safe (GRAS) Status of the Proposed Poultry Feed Use of Agrivida's Phy02 Phytase Product (Milled Course Meal Prepared From *Zea mays* expressing a Phytase Gene Derived from *Escherichia coli* K12)

Agrivida convened a panel of independent scientists (the "Expert Panel"), qualified by their scientific training and relevant national and international experience to evaluate the safety of food and animal feed additives and ingredients, to conduct a critical and comprehensive evaluation of the available pertinent data and information on the Agrivida Phy02 Phytase product (milled course meal prepared from *Zea mays* that expresses a phytase gene derived from *Escherichia coli* K12) and to determine whether the proposed use in poultry feeds would be *Generally Recognized as Safe* (GRAS) based on scientific procedures. The Expert Panel consisted of the below-signed qualified scientific experts: Michael W. Pariza, Ph.D. (University of Wisconsin-Madison) (Chair); Joseph F. Borzelleca, Ph.D. (Virginia Commonwealth University School of Medicine); and Mark E. Cook, Ph.D. (University of Wisconsin-Madison).

The Expert Panel, independently and collectively, critically evaluated a comprehensive package of scientific information and data compiled from the literature. The information was presented in a dossier provided by Agrivida entitled, "Phy02 Phytase; A phytase feed enzyme produced by *Zea mays* expressing a phytase gene derived from *Escherichia coli* K12." The dossier included a comprehensive evaluation of available scientific data, favorable and unfavorable, relevant to the safety of the intended animal feed use. The Expert Panel also evaluated other information that the panel members deemed to be appropriate or necessary.

Based on its review of the information appended to this Consensus Statement, the panel members unanimously concluded that Agrivida Phy02 Phytase product (milled course meal prepared from *Zea mays* that expresses a phytase gene derived from *Escherichia coli* K12), manufactured consistent with cGMP and meeting animal feed grade specifications, is *Generally Recognized As Safe* (GRAS) based on scientific procedures for use as an additive in poultry feed at a rate of 75 g to 1.7 kg of product per ton of feed (effective dose 250 units/kg feed - 6,000 units/kg feed).

It is our opinion that other qualified and competent scientists reviewing the same publicly available information would reach the same conclusion.

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May 10, 2016
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Appendix 1.

Complete nucleotide sequence of the T-DNA and maize genomic flanking DNA of locus 3293. The sequence of the maize genomic DNA is presented in lower case letters while the sequence of the T-DNA insert is presented in upper case.

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

(b) (4)

[redacted]

(b) (4)

(b) (4)

[redacted]

Appendix 2

Complete nucleotide sequence of the T-DNA and maize genomic flanking DNA of locus 3507. The sequence of the maize genomic DNA is presented in lower case letters while the sequence of the T-DNA insert is presented in upper case

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

[redacted]

Appendix 3

Multi-generational stability of insertion loci 3923 and 3507 in PY203 Phy02 producing maize by DNA sequence analysis

Kit Bonin, James McGann, Andries Smigel

PCR and sequencing was performed on multiple generations of the PY203 event to evaluate the stability of the two PY203 T-DNA insertion sites. Genomic DNA was isolated from leaf material of PY203 from four backcross (BC) generations in an inbred background designated "E" (BC1E, BC2E, BC3E, and BC4E; see breeding diagram Figure 1). DNA sequences spanning the T-DNA right border (RB) into the maize genomic flanking regions of both PY203 loci, 3293 and 3507, were PCR amplified and sequenced from four generations (BC1E-BC4E) to confirm the stability of the maize flanking genomic region across multiple generations. Maps and sequences of PY203 loci 3293 and 3507 along with primers used for PCR are shown in Figures 2 and 3, respectively.

Figure 1. Breeding diagram for event PY203.

(b) (4)

Figure 2. PY203 3293 locus map and sequence of a 163 bp fragment amplified from the T-DNA into the flanking genomic region.

(b) (4)

[redacted]

Figure 3. PY203 3507 locus map and sequence of a 113 bp fragment amplified from the T-DNA into the flanking genomic region.

(b) (4)

[redacted]

Two separate PCR reactions were conducted with each primer set and the resulting amplified DNA fragments were sequenced. DNA sequence chromatograms were compared to automatic calls and inaccurate calls were removed or corrected. Alignments of target sequence to representative sequences from each generation and primer are shown for loci 3293 and 3507 in Figures 4 and 5, respectively. All four generations, BC1E-BC4E, had identical insertion site sequences for both loci indicating that the sequence of the maize flanking DNA adjacent to the RB of each insertion was stable across 4 generations.

Figure 4. Alignment of 3293 T-DNA genomic DNA sequence to sequence from 4 backcross generations using each primer (504 and 696).

(b) (4)

Figure 5. Alignment of 3507 T-DNA genomic DNA sequence to sequence from 4 backcross generations using each primer (504 and 747).

(b) (4)

Materials and Methods

Plant Material

PY203 BC1E, BC2E, BC3E, and BC4E plants were grown under controlled conditions and leaf tissue was harvested for DNA extractions.

DNA Extraction

Tips of leaves (approximately 1 cm long) were harvested with forceps and placed into individual 1 ml wells of a 96-well block on ice. After sampling, metal beads were added to each well. The blocks were then frozen at -80^{o}C for at least 30 min., ground for 45 sec. in a Kleco Pulverizer, and centrifuged at 4,000 RPM for 3 min. in a table top centrifuge. After centrifugation, 300 µl of 10X TE with sarkosyl (0.1 M Tris/HCl, pH 8.0, 10 mM EDTA, 1% sarkosyl) was added, the lid was replaced, and the blocks were mixed on a rocker for at least 10 minutes. After extraction, blocks were centrifuged at 4,000 RPM for 3 min. in a table top centrifuge. Approximately 165 µl of supernatant was transferred to a 96-well PCR plate, sealed with a foil lid, and heated at 95^{o}C for 30 min in a thermocycler. Following heating, 20 µl of extract was added to a 96-well plate with 180 ul of deionized water and mixed. This mixture was used for all PCR reactions.

PCR and Gel Electrophoresis

PCR was performed in 30 µl reactions that included 15 µl 2X GoTaq Green PCR Reaction Mix (Promega, Madison, WI), 400 mM of each primer, and 2 µl of each DNA prep. PCR conditions were as follows: 95°C, 2 min; 33 cycles (95°C, 30 sec; 55°C, 30 sec; 72°C, 45 sec); 72°C, 8 min. PCR products were separated on 3% agarose gels (Bio-Rad, Hercules, CA) and visualized on a Bio-Rad Chemi Doc system (Bio-Rad, Hercules, CA).

Backcross segregating populations were initially genotyped using the primers described above (Figures 2 and 3) to identify plants that carried both loci, 3293 and 3507. Two 2-locus plants were selected for PCR and amplified individually for each locus.

DNA Sequencing and Analysis

DNA (Sanger) sequencing was performed on locus-positive PCR reactions using each primer (Figures 2 and 3) by Beckman Genomics (Danvers, MA). DNA sequences were analyzed using Vector NTI software (Invitrogen, Carlsbad, CA).

Appendix 4

Confirming PY203 Generational Stability with a Southern Blot

Kit Bonin, Andries Smigel, James McGann

The stabilities of the two grain phytase PY203 transgenes were determined using a Southern blot of hybridizing bands over multiple generations. Genomic DNA from four backcross (BC) inbred (E) generations of the PY203 event (BC1E, BC2E, BC3E, and BC4E; see breeding diagram Figure 1) were analyzed. Hybridization of a T-DNA right border (RB) probe showed expected and consistent banding patterns in all four generations confirming the generational stabilities of the two PY203 T-DNA insertions (Table 1, Figure 2, Figure 3, and Figure 4).

Figure 6. Breeding diagram for event PY203.

(b) (4)

Figure 7. DNA maps of PY203 3293 and 3507 T-DNA loci. EcoRI and HindIII restriction sites, hybridization region of the T-DNA RB probe, and expected Southern band (pattern filled boxes) are indicated.

(b) (4)

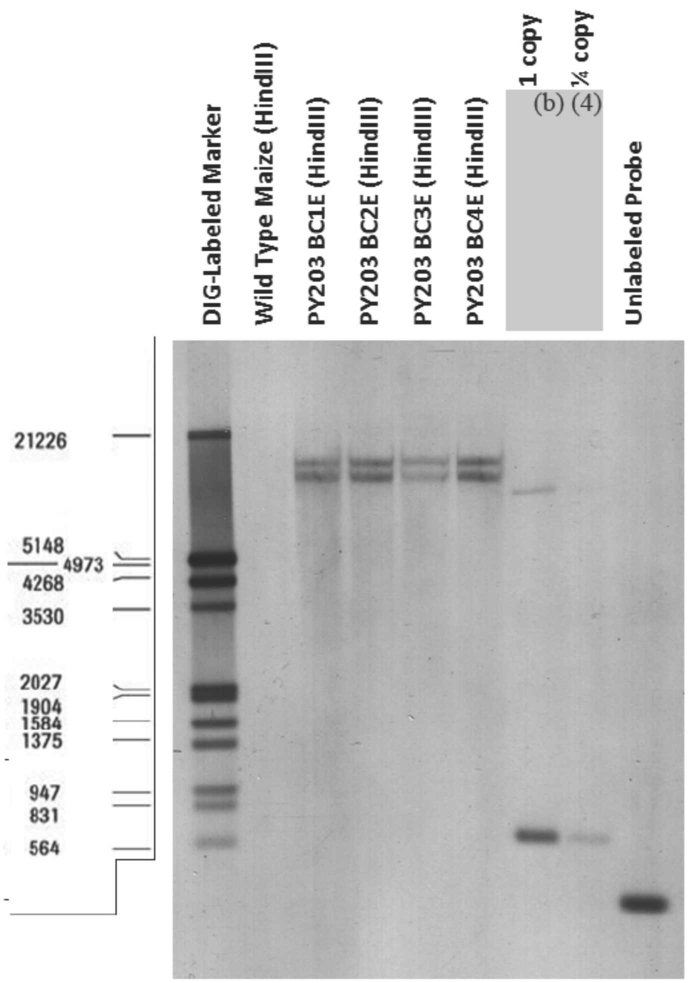
Figure 8. (b) (4) vector with location of SalI and NotI restriction sites and the T-DNA RB probe.

(b) (4)

Table 1. Predicted and observed DNA fragment sizes for a Southern blot with the T-DNA RB probe.

Probe	Sample	Locus	Predicted Fragment Size	Observed Fragment Size
T-DNA RB	PY203 (HindIII)	3293	10,192 bp	≈10,000 bp
T-DNA RB	PY203 (HindIII)	3507	11,910 bp	≈12,000 bp
T-DNA RB	(b) (4) (SalI+NotI), 1 & ¼ copy	--	9,680 bp & 662 bp	≈9,500 bp & ≈700 bp
T-DNA RB	Wild type maize control	--	--	--

Figure 4. Southern blot of four BC generations of the PY203 event hybridized with a T-DNA RB probe.



Materials and Methods

Plant Material

Leaf material from backcrossed PY203 (BC1E-BC4E) and wild type maize was used for DNA extractions. PY203 event-positive plants were identified by PCR. Young leaf tissue samples from 10 or more greenhouse-grown plants were harvested separately at approximately V3 stage and frozen in liquid nitrogen. Tissue was stored at -80°C until DNA extraction was performed.

Plasmid Control DNA

Plasmid DNA from plant transformation vector (b) (4) was used as a positive hybridization control for all Southern blots. Restriction-digested (b) (4) DNA was diluted to 1-copy and 1/4-copy equivalents (relative to expected amount of target from 10 µg of genomic DNA) to provide a probe hybridization signal control and to display the sensitivity of the assay, respectively.

Plant DNA Extraction and Quantitation

Frozen leaf tissue samples from at least 10 plants per sample were ground separately in liquid nitrogen with a mortar and pestle prior to extraction. Genomic DNA was extracted using a CTAB method. Approximately 4 g of frozen leaf tissue was extracted per prep with 16 mL of CTAB Buffer (2% CTAB, 1.4 M NaCl, 20 mM EDTA, 100 mM Tris/HCl [pH 8.0], and 0.2% β-mercaptoethanol) at 55°C while shaking for 60 minutes. Samples were cooled for 5-10 min and then 16 mL of phenol, chloroform, isoamyl alcohol (25:24:1) was added and mixed well. Tubes were centrifuged at 4,000 RPM for 20 min at room temperature. The upper aqueous phase was transferred to a new tube and the phenol, chloroform, isoamyl alcohol extraction was repeated.

DNA was then precipitated with 1/10 volume of 3M NaAc, pH 5.2 and 2 volumes of 100% ethanol and resuspended in 600 µl of TE. RNA digestion was then performed with RNAse A (100 µg/mL final concentration) at 37°C for 60 min. DNA was then extracted once with phenol, chloroform, isoamyl alcohol, followed by 1 volume of chloroform alone, and then precipitated with 2 volumes of 100% ethanol. The DNA pellet was washed twice with 70% ethanol, dried for 5-10 min, and then resuspended in 200 µl of TE.

DNA concentration was determined using a Quant-iT PicoGreen dsDNA kit (Life Technologies, Carlsbad, CA) and a Tecan Infinite M1000 fluorescent plate reader (Tecan Group Ltd., Männedorf, Switzerland) using the manufacturer's protocol. DNA quality was confirmed by separating and visualizing 50-100 ng of genomic DNA on a 1% agarose gel with ethidium bromide.

Southern Blot Analysis

Southern blot analysis was performed using standard molecular biology techniques (Southern, 1975; Sambrook et al., 1989), in addition to specific recommendations in the Roche DIG Application Manual (Roche Diagnostics GmbH, Mannheim, Germany). Genomic DNA samples (10 µg) were digested using individual or combinations of restriction enzymes 4 hours to overnight according the manufacturer's recommendations (New England Biolabs, Beverly, MA). Digested DNA samples (including positive vector control and wild type maize control), unlabeled probe PCR products, and DIG-Labelled Molecular Weight Marker III (Roche Diagnostics GmbH, Mannheim, Germany) were mixed with 6X Orange G loading Dye (New England Biolabs, Beverly, MA) and loaded onto 0.8% agarose TAE gels and electrophoretically separated in TAE buffer at approximately 100 volts for 4.5 hours. After separation, gels were stained with ethidium bromide and imaged to confirm separation and then depurinated for 15 minutes. The remaining gel preparation steps were performed as described in the Roche DIG Application Manual and the gel was then blotted onto positively charged nylon membrane (Roche Diagnostics GmbH, Mannheim, Germany). After blotting, the DNA was crosslinked to the membrane using a Stratalinker UV Crosslinker (Stratagene, La Jolla, CA).

DIG-labeled DNA hybridization probes were synthesized using element-specific primers and the PCR DIG Probe Synthesis Kit (Roche Diagnostics GmbH, Mannheim, Germany).

Probe length and specificity was confirmed by gel electrophoresis and ethidium bromide staining.

Hybridizations were performed using DIG Easy Hyb (Roche Diagnostics GmbH, Mannheim, Germany) at high stringency temperatures calculated for each probe or probe combination. Prehybridzation was performed without a probe for 1 hour and then in fresh DIG Easy Hyb with denatured DIG-labeled probe overnight (≥16 hours) at high stringency temperatures. High stringency washes and development steps were performed according to the manufacturer's protocol (Roche Diagnostics GmbH, Mannheim, Germany). Filters were exposed to X-Ray film and developed using standard equipment. The unlabeled RB probe was included on the Southern at a one-copy equivalent to confirm hybridization of the DIG-labeled probe. Molecular weight sizes of hybridizing bands were estimated from the DIG-labeled marker and an unlabeled 1 kb marker (2Log DNA Ladder, NEB, Beverly, MA) that was visualized on the gel with ethidium bromide staining prior to blotting.

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Appendix 5

Certificate of analysis of three representative Phy02 product batches

STUDY TITLE:

CHARACTERIZATION OF PHYTASE TEST SUBSTANCES AV_PHY02_0043, AV_PHY02_0049, AND AV_PHY02_0050

AUTHOR:
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STUDY COMPLETED ON: 18 JANUARY 2016

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PAGE 1 OF 14

STATEMENT OF NO DATA CONFIDENTIALITY CLAIMS

No claim of confidentiality is made for any information contained in this study on the basis of its falling within the scope of FIFRA §10(d) (1) (A), (B), or (C).

Company: Agrivida, Inc.

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Title: Vice President, Regulatory Affairs and Stewardship

Signature: J.M. Ligon

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STATEMENT CONCERNING GOOD LABORATORY PRACTICES

The study described in this volume was conducted according to the principles of applicable Good Laboratory Practices as described in 40 CFR 160.

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CHARACTERIZATION OF PHYTASE TEST SUBSTANCES AV_PHY02_0043, AV_PHY02_0049, AND AV_PHY02_0050

TEST SUBSTANCE CHARACTERIZATION REPORT AND CERTIFICATE OF ANALYSIS

Test Substance: Ground grain from maize producing the Phy02 phytase enzyme. Test substances are derived from three separate and representative Phy02 phytase product batches.

Sample Lot Nos.: AV_PHY02_0043
AV_PHY02_0049
AV_PHY02_0050

SUMMARY

The Phy02 phytase is produced in the grain of maize through the application of recombinant DNA technologies. Three separate and representative Phy02 phytase product batches designated AV_PHY02_0043, AV_PHY02_0049, and AV_PHY02_0050 were produced using standard agronomic practices for the production of corn. The grain was dried and ground to a course meal. The phytase activity and characteristics of the Phy02 phytase produced in the three representative batches were determined. The Phy02 phytase protein was demonstrated to be a prominent protein in the total protein of all three product batches. Western blot analysis of all three samples revealed a single band of immunoreactive material of the predicted molecular weight of approximately 46,000 kDa.

INTRODUCTION

The purpose of this study was to characterize test substances, AV_PHY02_0043, AV_PHY02_0049, and AV_PHY02_0050, containing the Phy02 phytase that is produced in the grain of maize. Phytase is an enzyme that catalyzes the dephosphorylation of phytate, and, when incorporated into animal feed, increases the amount of nutritionally available phosphate for the animal and also decreases the phosphate content of the animal waste. The test substances were prepared from the grain of recombinant maize and are intended for use in animal safety and functionality studies with the Phy02 phytase product. Various biochemical parameters were evaluated to confirm the identity of the phytase in the test substance, as well as its activity and integrity.

MATERIALS AND METHODS

Production of test substances. Three separate representative product batches of the Phy02 phytase were produced from Phy02 expressing maize. The product batch numbers, location of planting and dates of planting and harvest are shown in Table 1. Planting the seed and harvest of the grain were performed using commonly used agronomic practices for maize. Cultivation of the Phy02 producing maize utilized commonly used agronomic practices for maize including the use of fertilizers, herbicides and pesticides approved for use on maize. After harvest, the grain was dried on the cob for three days until the grain moisture was below 15% at which time it was shelled and placed in labeled containers. The grain was shipped to Agrivida, Inc. (Medford, MA) and stored in separate storage bins prior to being milled in a CPM series 650 three-stage roller mill with a 1.5:1 differential. Grain particles were sieved through a series of steel mesh sieves (No. 8 and No. 12) to produce grain particles between 2 and 3 mm in diameter.

Table 1. Planting locations and dates for the production of three representative Phy02 phytase product batches.

	Phy02 Product Batches		
Product Batch No.	AV_Phy02_0043	AV_Phy02_0049	AV_Phy02_0050
Planting Location	Field; (b) (4) (b) (4)	Field; (b) (4)	Greenhouse, (b) (4)
Planting Date	12 June 2015	12 June 2015	25 May 2015
Harvest Date	1 October 2015	14 October 2015	21 September 2015

Preparation of extracts. Test substance from each of the three product batches was milled to a flour. Aqueous extracts were prepared from three grams of flour from each batch and were added to 30 mL of (b) (4) in 50 mL Falcon tubes. Samples were shaken at room temperature for 1 hour and then centrifuged at 4000xg for 30 minutes. The supernatants were decanted, and 5 mL of 1 M MES, pH 6.3 was added to neutralize each sample. The extracts were then filtered through 0.45 µm filters and stored at 4°C.

Molecular weight determination. SDS-PAGE of the sample extracts was performed as follows. 30 µL of each extract was added to 10 µL of Novex NuPAGE 4X LDS sample loading buffer and heated for 10 minutes at 70°C. Aliquots of 20 µL and 2 µL were loaded onto a Novex NuPAGE 4-12% Bis-Tris gel and run in NuPAGE MOPS buffer for 45 minutes at 200V. In order to visualize the protein bands in the extracts, the gel was placed into 100 mL of 0.1% Coomassie Blue in 10% acetic acid/ 10% methanol, heated in a microwave oven for 30 seconds, and then shaken for 20 minutes. The gel was rinsed with water and then destained with 10% acetic acid/ 10% methanol.

Immunoreactivity. To assess the integrity (intactness) of the phytase protein in the three Phy02 phytase product batches, western blot analysis was performed. Samples were treated with LDS sample buffer as described above and 2 µL aliquots were loaded onto a gel and electrophoresed as described above. The gel was rinsed in 10 mM CAPS/ 10% methanol transfer buffer for 10 minutes, and then transferred to a PVDF membrane by electrophoretic transfer for 1 hour at 15 V. The membrane was blocked for 1 hour at room temperature with 5% nonfat milk in TBST (tris-buffered saline with Tween 20). The membrane was then shaken in primary antibody (a rabbit polycolonal antibody raised against Phy02 phytase and two similar phytases by New England Peptide; 25 mL of a 1:5000 dilution in TBST/5% nonfat milk) for one hour, followed by three 5 minute washes in TBST. The secondary antibody (25 mL of goat anti-rabbit/HRP, Thermo Scientific catalog # 31460, lot # PI208014 ; 1:5000 dilution in TBST) was applied with shaking for one hour, followed by three 5 minute washes in TBST. The blot was developed with Invitrogen Novex HRP substrate (catalog # 100002903, lot # 12345141).

Enzymatic activity. The phytase activity in each of the Phy02 phytase product batches was assayed according to Agrivida, Inc. SOP. Phytase catalyzes the dephosphorylation of phytate. The released inorganic phosphate complexes with vanadate and molybdate that facilitates the colorimetric measurement of phytase activity at 415 nm. Each of the Phy02 phytase product batches was assayed in triplicate with 4 analyses/replicate for a total of 12 analyses per product batch. One unit (FTU) of phytase activity is defined as the liberation of one mmole of inorganic phosphate per min from sodium phytate at 37°C and pH 5.5.

Specific activity. The specific activity of the phytase relative to total protein in the test substance material from each product batch was determined. The amount of total protein in the aqueous protein extracts was determined by two different methods, the Bradford method (Kruger, 1996) and the BCA method (Walker, 1996). Three grams of milled flour from each product batch was placed in 35 mL of [redacted] (b) (4) for 1 hr at RT. The samples were shaken on a tabletop shaker at maximum speed and 2mL was centrifuged at 16000 rpm for 10 min. Supernatants were transferred to a buffer consisting of Na acetate, pH5.5, 1 mM $CaCl_2$, 0.01% Tween 20 prior to analysis for proteins by either method. Three separate determinations were performed for each extract using each of the two methods and all results for each extract were averaged. The specific activity for each test substance was calculated from the phytase activity determined for each batch (FTU/g) divided by the average amount of protein/g determined for each sample by the two protein quantitation methods.

RESULTS

<u>Molecular weight determination</u>. An SDS-PAGE gel containing protein extracts of each of the three test substances, protein extracts of corn flour derived from a conventional maize variety not engineered to produce phytase, and purified Phy02 phytase produced in culture by a microbial production host were stained with Coomassie-blue to enable visualization of the proteins. Examination of the gel and comparison of the samples demonstrated that there is a prominent protein band in the extracts from all three test substances that is absent in the extract from the conventional corn flour and that has the same molecular weight as the Phy02 phytase protein that was produced and purified from a microbial production host (Figure 1.). Comparison of the position of these protein bands in the gel relative to the protein molecular weight markers also run on the gel show that the prominent protein band in the extracts of the test substances and the purified Phy02 phytase protein are approximately 46,000 kDa in size. This estimation of the size of the protein bands compares well with the predicted size of 45,684 kDa for the mature Phy02 phytase protein including the endoplasmic retention signal from maize.

<u>Immunoreactivity</u>. Western blot analysis of the proteins in extracts from the three test substances was performed using a rabbit polyclonal antibody generated to the Phy02 phytase and two related phytase proteins. The results revealed the presence of one immunoreactive protein corresponding to the predicted molecular weight of the Phy02 phytase protein (*ca.* 45,684 kDa; Fig. 2). Similarly, the antibody also reacted with the purified Phy02 protein control. These results confirm the intactness and identity of the prominent protein species that are present in each of the three test substances but absent in conventional corn as Phy02 phytase and confirm its expected molecular weight of approximately 46,000 kDa.

<u>Enzymatic activity.</u> The phytase activity of each of the test substance materials and of corn flour from a conventional phytase nonproducing variety was determined (Figure 3). The control material derived from conventional corn that is not engineered to produce phytase had no detectible phytase activity. The phytase activities determined for each test substance were:

(b) (4)

AV_PHY02_0043
AV_PHY02_0049
AV_PHY02_0050

<u>Specific activity.</u> The quantity of total protein in each of the test substances was determined in triplicate by two different methods and all the test substances and the results were averaged to generate an accurate measurement of protein in each test substance. This information was used together with the phytase activity determinations for each test substance to calculate the specific phytase activity. The specific phytase activities of each test substance expressed in FTU phytase activity/mg protein are:

(b) (4)

AV_PHY02_0043
AV_PHY02_0049
AV_PHY02_0050

RECORDS RETENTION: Raw data, the original copy of this report, and other relevant records are archived at Agrivida, Inc., 200 Boston Avenue, Medford, MA, USA 02155.

STUDY PERSONNEL: Analytical work reported herein was conducted by Matthew Parker, Ph.D. and Xuemei Li, Ph.D., Agrivida, Inc., 200 Boston Avenue, Medford, MA, USA 02155.

REFERENCES

Federal Register, Part IV, 40 CFR, Part 160, 17 August 1989 and subsequent revisions.

Kruger, N.J. (1996). The Bradford method for protein quantitation. *In,* Protein Protocols Handbook, pp. 15-20, J.M. Walker, ed., Humana Press, Totowana, NJ.

Walker, J.M. (1996). The bicinchoninic acid (BCA) method for protein quantitation. *In,* Protein Protocols Handbook, pp. 11-14, J.M. Walker, ed., Humana Press, Totowana, NJ.

Figure 1. Coomassie-blue stained SDS-PAGE gel containing protein extracts from each of three Phy02 phytase product batches (AV_Phy02_0043, #43; AV_Phy02_0049, #49; and AV_Phy02_0050, #50) as well as and extract from grain of a conventional non-phytase engineered maize variety (Wild-type) and purified Phy02 phytase protein produced by a microbial production host (Microbial). Protein size markers were run in the left lane and their sizes in kDa are indicated on the left side of the gel.

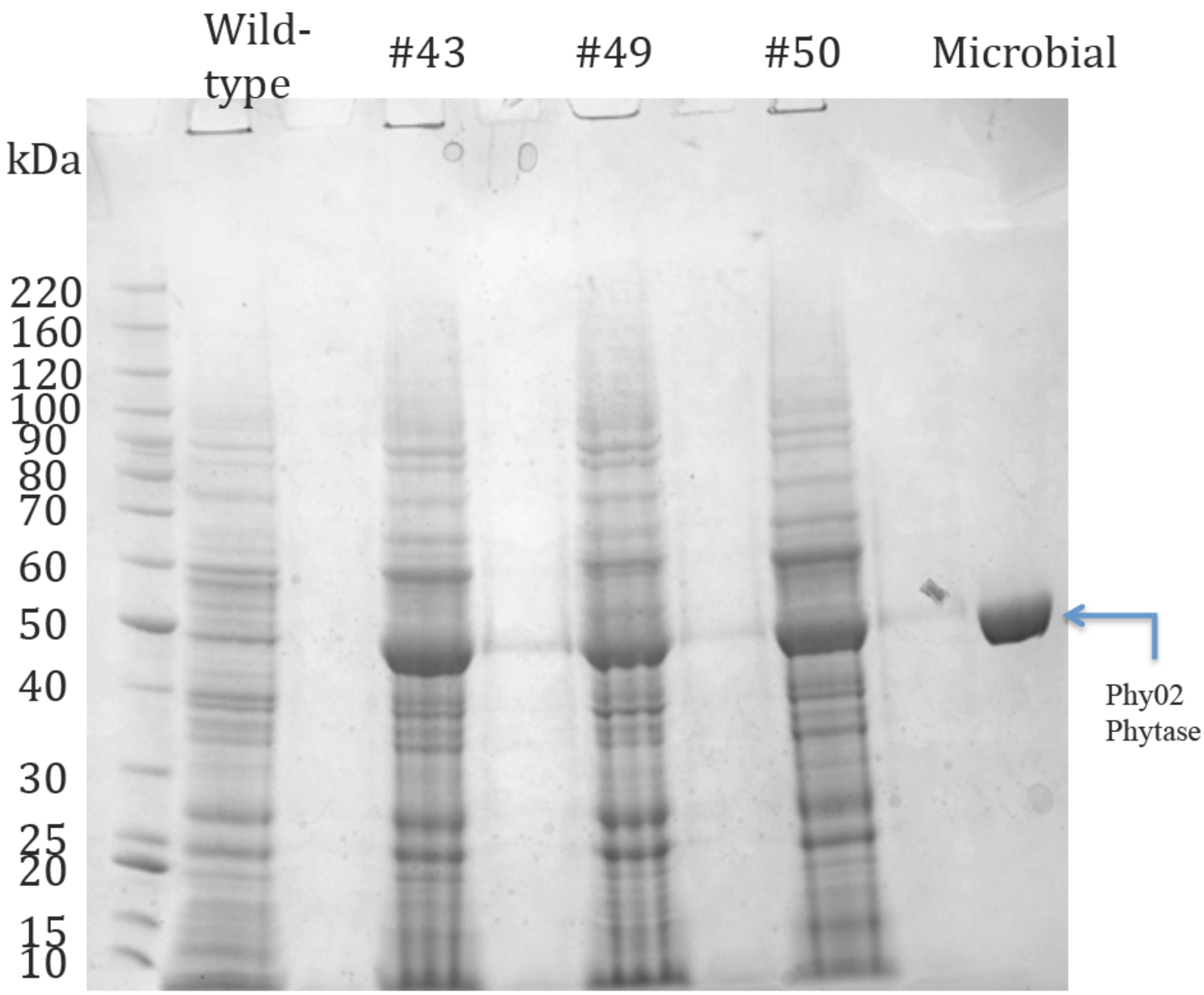

Figure 2. Western blot of a similar gel as depicted in Figure 2 that was reacted with a phytase specific antibody. In addition to protein extracts of three independent Phy02 phytase production batches (AV_Phy02_0043, #43; AV_Phy02_0049, #49; and AV_Phy02_0050, #50), an extract from grain of a conventional non-phytase engineered maize variety (Wild-type) and purified Phy02 phytase protein produced by a microbial production host (Microbial) are included in the gel. Protein size markers were run in the left lane and their sizes in kDa are indicated on the left side of the gel.

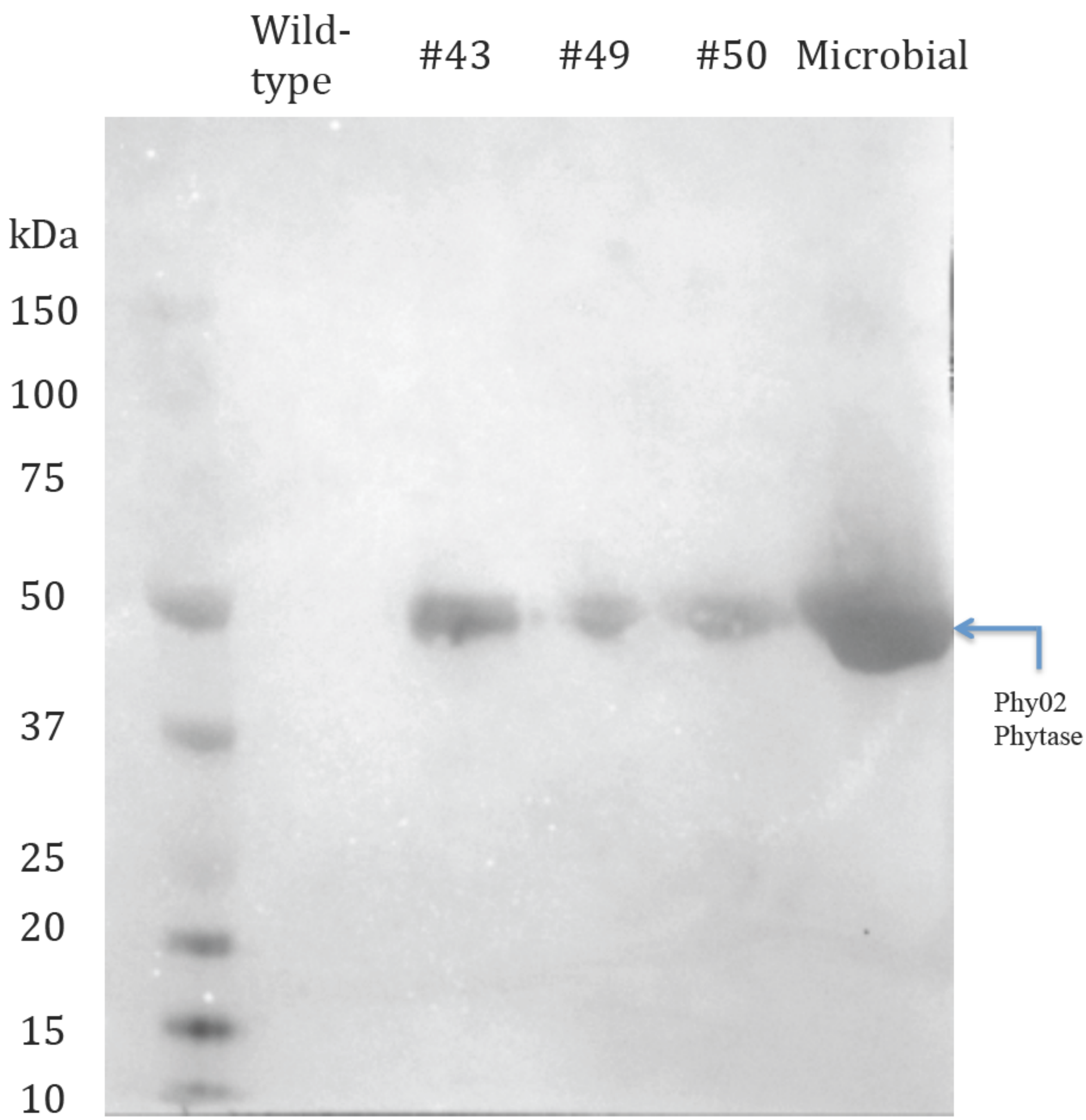

Figure 3. Phytase activity (FTU/g) of three representative Phy02 phytase product batches compared to that of a grain from a conventional phytase non-expressing maize variety (BxA).

(b) (4)

[redacted]

Appendix 6

Phytase activity before and after pelleting in the feed of broiler functionality studies.

Four broiler feeding studies (Study 1, 2, 3, and 4) days were conducted to demonstrate the functionality of the Phy02 phytase in broiler chickens. The studies were conducted by, and all feeds used in the studies were prepared by, Colorado Quality Research, Ft. Collins, CO. After mixing of the diets, a 500g sample of each of the diets in the mash form was collected. Subsequently, the mash diets were pelleted in a California Pellet Mill at 65°C and a 500g sample of each of the diets after pelleting was collected. All feed samples were shipped to the Agrivida, Inc. laboratory in Medford, MA where the phytase activity of each sample was determined.

The feed samples were milled in a knife mill and sieved with a 1mm screen. Two 20 g samples of each milled feed sample were extracted at room temperature with 100ml of prewarmed (65°C) extraction buffer (30 mM Sodium Carbonate/Bicarbonate pH 10.8). Each extract diluted 25- to 100-fold in assay buffer (250 mM sodium acetate, pH5.5, 1mM calcium chloride, 0.01% Tween 20) and 75 µL of the diluted extracts or 75µl of buffer-only controls were dispensed into individual wells of a round-bottom 96-well plate. 150 µL of freshly prepared, prewarmed (65°C), phytic acid (9.1 mM dodecasodium salt from Biosynth International, Staad, Switzerland, prepared in assay buffer) was added to each well. Plates were sealed and incubated for 60 min at 65°C. 150 µL of stop solution (20 mM ammonium molybdate, 5 mM ammonium vanadate, 4% nitric acid) was added to each well, mixed thoroughly via pipetting, and allowed to incubate at room temperature for 10 min. Plates were centrifuged at 3000×G for 10 minutes, and 100 µL of the clarified supernatants were transferred to the wells of a flat-bottom 96-well plate. Absorbance at 415 nm from each sample was compared to that of negative controls (buffer-only, no enzyme) and potassium phosphate standards. The standard curve is prepared by mixing 50 µl of potassium phosphate standards (0-1.44 mM, prepared in assay buffer) with 100 µL of freshly prepared phytic acid, followed by 100 µL of stop solution.

The tables below present the average phytase activity from the duplicate analyses of each feed sample, before (mash) and after pelleting, from each trial. The different feeds used during the studies included starter (Day 0-14), grower (Day 14-21) and finisher (Day 21-42) diets. It should be noted that corn and soybean that are the major components of the feeds contain low amounts of phytase activity that is sometimes detected in the NC and PC diets where no other phytase was added.

Table 1. Phytase activity in the feeds from broiler Study 1 before and after pelleting.

Starter Feed (crumbles, 0-14 day)		Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	42	30	36	35	-
Trt 2	PC	0	0	0	156	220	-
Trt 3	NC+Phy02	250	183	73	246	97	134
Trt 4	NC+Phy02	500	425	85	355	32	84
Trt 5	NC+Phy02	750	682	91	530	37	78
Trt 6	NC+Phy02	1000	749	75	788	26	105
Trt 7	NC+Phy02	3000	2521	84	2224	383	88
Trt 8	Commercial Phytase	500	815	163	408	19	50

Grower Feed (Pellets, 14–21 day)		Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	0	0	0	0	-
Trt 2	PC	0	0	0	0	0	-
Trt 3	NC+Phy02	250	199	216	72	10	36
Trt 4	NC+Phy02	500	367	40	313	152	85
Trt 5	NC+Phy02	750	625	129	521	134	83
Trt 6	NC+Phy02	1000	782	132	660	163	84
Trt 7	NC+Phy02	3000	2362	437	2184	329	92
Trt 8	Commercial Phytase	500	694	169	665	31	96

Finisher Feed (Pellets, 21–42 day)		Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	0	0	0	0	-
Trt 2	PC	0	0	0	13	156	-
Trt 3	NC+Phy02	250	192	113	55	24	29
Trt 4	NC+Phy02	500	279	30	236	34	85
Trt 5	NC+Phy02	750	615	120	450	59	73
Trt 6	NC+Phy02	1000	667	75	664	117	100
Trt 7	NC+Phy02	3000	1951	302	1982	143	102
Trt 8	Commercial Phytase	500	697	410	751	96	108

Table 2. Phytase activity in the feeds from broiler Study 2 before and after pelleting.

Starter Feed (crumbles, 0-14 day)		Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	39	0	0	0	-
Trt 2	PC	0	47	0	91	22	-
Trt 3	NC+Phy02	250	302	58	199	84	66
Trt 4	NC+Phy02	500	463	105	479	39	103
Trt 5	NC+Phy02	750	686	154	271	66	40
Trt 6	NC+Phy02	1000	858	168	622	83	72
Trt 7	NC+Phy02	3000	2526	222	2805	610	111
Trt 8	Commercial Phytase	500	1168	67	428	122	37

Grower Feed (pellets, 0-14 day)		Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	0	0	0	0	-
Trt 2	PC	0	0	0	0	0	-
Trt 3	NC+Phy02	250	194	84	142	0	73
Trt 4	NC+Phy02	500	380	82	406	29	107
Trt 5	NC+Phy02	750	492	25	797	132	162
Trt 6	NC+Phy02	1000	848	125	748	100	88
Trt 7	NC+Phy02	3000	2245	113	2245	337	100
Trt 8	Commercial Phytase	500	900	112	322	197	36

Finisher Feed (pellets, 21-42 day)		Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	0	0	42	4	-
Trt 2	PC	0	38	12	12	13	-
Trt 3	NC+Phy02	250	265	0	276	86	104
Trt 4	NC+Phy02	500	488	130	483	45	99
Trt 5	NC+Phy02	750	591	143	643	47	109
Trt 6	NC+Phy02	1000	803	67	843	69	105
Trt 7	NC+Phy02	3000	2188	278	2498	65	114
Trt 8	Commercial Phytase	500	1371	484	1074	575	78

Table 3. Phytase activity in the feeds from broiler Study 3 before and after pelleting.

Starter Feed (crumbles, 0-14 day)		Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	0	0	0	0	-
Trt 2	PC	0	0	0	0	0	-
Trt 3	NC+Phy02	250	166	50	150	49	90
Trt 4	NC+Phy02	500	288	34	421	134	146
Trt 5	NC+Phy02	750	552	111	306	73	55
Trt 6	NC+Phy02	1000	869	20	625	172	72
Trt 7	NC+Phy02	3000	2378	442	2178	32	92
Trt 8	NC+Phy02	30000	27376	703	22706	1340	83

Grower Feed (pellets, 14-21 day)		Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	0	0	0	0	-
Trt 2	PC	0	0	0	0	0	-
Trt 3	NC+Phy02	250	164	73	182	80	111
Trt 4	NC+Phy02	500	263	31	299	85	114
Trt 5	NC+Phy02	750	561	175	361	156	64
Trt 6	NC+Phy02	1000	766	90	394	141	51
Trt 7	NC+Phy02	3000	2393	164	2432	492	102
Trt 8	NC+Phy02	30000	26252	1341	23480	762	89

Finisher Feed (pellets, 21-42 day)		Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	0	0	0	0	-
Trt 2	PC	0	0	0	0	0	-
Trt 3	NC+Phy02	250	276	100	306	107	111
Trt 4	NC+Phy02	500	407	39	389	73	96
Trt 5	NC+Phy02	750	575	94	691	47	120
Trt 6	NC+Phy02	1000	837	85	696	78	83
Trt 7	NC+Phy02	3000	2326	86	2183	141	94
Trt 8	NC+Phy02	30000	24407	2455	23983	1164	98

Table 4. Phytase activity in the feeds from broiler Study 4 before and after pelleting.

Starter Feed (crumbles, 0-14 day)		Target Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	114	18	84	0	-
Trt 2	PC	0	38	6	21	0	-
Trt 3	NC+Phy02	250	310	6	434	411	140
Trt 4	NC+Phy02	500	479	52	605	23	126
Trt 5	NC+Phy02	1000	1386	377	886	107	64
Trt 6	NC+Phy02	3000	3403	807	3005	495	88
Trt 7	NC+Phy02	6000	5324	398	5639	790	106
Trt 8	NC+Phy02	60000	58903	6246	58307	4885	99

Grower Feed (pellets, 14-21 day)		Target Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	0	0	52	41	-
Trt 2	PC	0	0	0	115	5	-
Trt 3	NC+Phy02	250	236	133	230	111	98
Trt 4	NC+Phy02	500	527	192	612	98	116
Trt 5	NC+Phy02	1000	932	96	886	256	95
Trt 6	NC+Phy02	3000	2231	255	2992	707	134
Trt 7	NC+Phy02	6000	6059	708	5723	570	94
Trt 8	NC+Phy02	60000	58939	7851	57697	11578	98

Finisher Feed (pellets, 21–42 day)		Target Phytase Dose	Pre-pelleting		Post-pelleting		% Survival
			FTU/kg	stdev	FTU/kg	stdev	
Trt 1	NC	0	4	12	0	0	-
Trt 2	PC	0	0	0	42	14	-
Trt 3	NC+Phy02	250	217	86	205	77	95
Trt 4	NC+Phy02	500	427	81	654	143	153
Trt 5	NC+Phy02	1000	903	111	1142	19	126
Trt 6	NC+Phy02	3000	3070	506	2578	287	84
Trt 7	NC+Phy02	6000	5731	563	6395	1031	112
Trt 8	NC+Phy02	60000	54748	10595	57110	12834	104

Appendix 7

Results of proximate analysis of all basal feeds used in four broiler feeding studies to demonstrate the functionality of Phy02 phytase. Low phosphate and high phosphate diets are designated LP and HP, respectively.

	Study 1		Study 2		Study 3		Study 4	
Starter Diets (D0 - D14)								
Analyte	LP	HP	LP	HP	LP	HP	LP	HP
Moisture	12.92%	12.75%	12.20%	12.14%	12.56%	12.35%	12.50%	12.91%
Methionine	ND	ND	0.57%	0.58%	0.57%	0.58%	ND	ND
Lysine	ND	ND	1.22%	1.18%	1.23%	1.24%	ND	ND
Ash	6.91%	7.62%	ND	ND	7.12%	6.84%	6.63%	7.05%
Calcium	0.97%	1.07%	0.96%	1.00%	1.06%	1.10%	0.97%	1.06%
Fat, Ethyl Ether	4.43%	4.12%	4.45%	3.99%	3.75%	3.63%	3.90%	3.89%
Fiber, Crude	2.48%	2.49%	2.65%	2.69%	2.18%	2.08%	2.18%	2.28%
Phosphorus	0.62%	0.77%	0.61%	0.86%	0.60%	0.82%	ND	ND
Protein N x 6.25	20.80%	21.20%	20.30%	20.60%	19.50%	21.50%	21.40%	21.30%
Starter Diets (D14 - D21)								
Moisture	12.99%	ND	11.84%	11.96%	12.17%	12.31%	12.52%	12.79%
Methionine	ND	ND	0.61%	0.61%	0.55%	0.57%	ND	ND
Lysine	ND	ND	1.18%	1.13%	1.22%	1.22%	ND	ND
Ash	6.96%	6.81%	ND	ND	7.20%	7.69%	7.35%	7.10%
Calcium	0.99%	0.86%	1.12%	1.04%	1.10%	1.08%	0.92%	0.99%
Fat, Ethyl Ether	4.23%	4.29%	3.71%	3.96%	3.69%	3.73%	3.91%	4.04%
Fiber, Crude	2.25%	2.57%	2.24%	2.41%	2.12%	1.97%	2.33%	2.33%
Phosphorus	0.66%	0.76%	0.66%	0.75%	0.61%	0.88%	ND	ND
Protein N x 6.25	20.50%	20.60%	19.00%	21.50%	19.60%	20.20%	21.00%	20.50%

Grower/Finisher Diets (D21 - D42)

	Study 1		**Study 2**		**Study 3**		**Study 4**	
Analyte	LP	HP	LP	HP	LP	HP	LP	HP
Moisture	ND	ND	12.35%	11.60%	11.25%	11.42%	12.99%	13.01%
Methionine	ND	ND	0.50%	0.49%	0.46%	0.49%	ND	ND
Lysine	ND	ND	1.05%	1.01%	0.96%	1.09%	ND	ND
Ash	5.65%	5.28%	ND	ND	ND	ND	5.61%	5.28%
Calcium	0.92%	0.77%	0.95%	0.83%	0.82%	0.86%	0.94%	0.81%
Fat, Ethyl Ether	4.40%	4.50%	4.14%	4.52%	4.54%	4.04%	4.37%	4.07%
Fiber, Crude	1.95%	2.43%	2.49%	2.99%	2.32%	2.08%	2.54%	2.29%
Phosphorus	0.53%	0.65%	0.56%	0.63%	0.49%	0.64%	ND	ND
Protein N x 6.25	19.10%	19.20%	18.70%	19.10%	20.00%	20.00%	18.80%	19.40%

ND, Not Determined.
Methods used in the above analyses include AOAC 930.15 (Moisture), AOAC 994.12 (Methionine and Lysine), AOAC 942.05 (Ash), AOAC 985.01 (Calcium), AOAC 2003.05 (Fat, Ethyl Ether), AOCS BA6A-05 (Fiber, Crude), AOAC 985.01 (Phosphorus), and AOAC 990.03 (Protein N x 6.25)

Appendix 8

GraINzyme Phytase Phy02 Dose Response in Poultry

Project No. AGV-15-1

Conducted by Colorado Quality Research, Ft. Collins, CO

Final Study Report Pages 1 - 89

COLORADO QUALITY RESEARCH FINAL REPORT

GraINzyme Phytase Phy02 Dose Response in Poultry

Project No. AGV-15-1

SPONSOR

Agrivida Inc.
200 Boston Ave, Suite 2975
Medford, MA 02155

TEST FACILITY

COLORADO QUALITY RESEARCH, INC.
400 East County Road 72
Wellington, Colorado 80549

July 2015

CQR RESEARCH PROTOCOL
Project No. AVG-15-2

I. GraINzyme Phytase Phy02 Dose Response with Tolerance in Poultry

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Email: dan@coloradoqualityresearch.com

STUDY EVENT SCHEDULE:

Event	Study Day	Calendar Date
Received, weighed birds by pen, vaccinated for NCB, and placed 17 chicks/pen. Administered Starter 1 diets	0	29MAY15 FRI
Weighed back Starter 1 diets; Administered Starter 2 diets	14	12JUN15 FRI
Weighed birds by pen; Weighed back Starter 2 diets and changed to Grower/Finisher diets; Removed 3 birds/pen; collected ileal and tibia samples	21	19JUN15 FRI
Weighed birds by pen; Weighed back Grower/Finisher diets; Collected tibia and fecal samples from 3 birds/pen; Ended live phase	42	10JUL15 FRI

OBJECTIVE

The objective of this study was to demonstrate the effectiveness over a range of doses of Phy02, a phytase enzyme product that is being developed by Agrivida, Inc. as a feed additive for poultry diets.

III. MATERIALS AND METHODS

A. TESTING/SUPPORT FACILITIES

Facility	***Purpose***
Colorado Quality Research, Inc. 400 East County Road 72 Wellington, Colorado 80549	Investigator's office, test article storage, archives, feed preparation, test animal housing
Agrivida Inc. 200 Boston Ave., Ste. 2975 Medford, MA 02155	Test article source, feed analysis, statistical anlaysis
Simmons Foods Hatchery Siloam Springs, AR	Chick Source
MVTL Laboratories 2 N. German St. New Ulm, MN 56073	Proximate analysis of basal feed

B. TEST ARTICLES, CONTROL ARTICLES, AND FEED ADDITIVES

Test Articles

GraINzyme Phytase Phy02	Lot No. AVPHY02_0013 Expiration 28JUL15
Concentration	(b) FTU/g
Dosage Form	Via complete feed
Level	250 Units Phytase (Treatment Group 3) 500 Units Phytase (Treatment Group 4) 750 Units Phytase (Treatment Group 5) 1000 Units Phytase (Treatment Group 6) 3000 Units Phytase (Treatment Group 7)
Duration	*Ad libitum* Day 0 – Study End
Source	Agrivida, Inc.

Control Articles

Phytase 2500 TPT Premix	Lot No. 11184002 Expiration November 2016
Concentration	2,500 FTU/g
Dosage Form	Via complete feed
Level	0.02% of Finished Feed (Treatment Group 8)
Duration	*Ad libitum* Day 0 – Study End

Feed Additives

Biocox 60	Lot No. HSK20483
(Salinomycin)	Expiration October 2015
Concentration	60 g/lb
Dosage Form	Via Complete Feed
Level	50 g/ton
Duration	*Ad libitum* in Starter 1 and Starter 2 diets
Source	Alpharma, Inc.

Titanium Dioxide (Titanium dioxide USP FCC – Hombitan AFDC)	Lot No. TIOKFP40050PBGN
Dosage Form	Via Complete Feed
Level	0.3% in Complete Feed
Duration	*Ad libitum* in Starter 2 and Grower/Finisher diets
Source	American International Chemical, Inc.

Storage:	Secured, temperature monitored, dry area
Method of administration:	Oral via complete feed
Accounting:	All quantities of the test articles, control articles, and feed additives received and used in this study were documented

C. BASAL AND EXPERIMENTAL DIETS

Diets were formulated by CQR. Diets met and conformed with the commercial standards for feed based on breed and age range of broilers. Copies of the diet formulations were included in the study records and Final Report.

There were two different basal diet formulations. Low Phosphate (LP) diets contained ~0.3% AvP in the Starter 1 and Starter 2 diets and ~0.25% AvP in the Grower/Finisher diets. The High Phosphate (HP) diets contained ~0.45% AvP in the Starter 1 and Starter 2 diets and ~0.4% AvP in the Grower/Finisher diets.

Basal diets were manufactured at CQR and stored in bulk mash form. The treatment diets were mixed at the CQR feed mill. A 500 pound capacity vertical mixer, a 4000 pound capacity vertical mixer, and/or a 14,000 lb horizontal mixer and a California Pellet Mill system were used to prepare the Starter and Grower/Finisher diets. Feed was pelleted using a ~5-mm die and the Starter 1 diet was further processed into crumbles. The pelleting temperature was ~65 ºC. Mixed feed was stored in bulk storage bins labeled with study number, treatment letter code, and diet type. Complete records of diet mixing were included in the study records.

Approximate Feeding Program:

Diet	Form	Period	~Lbs Feed Mixed per Trt
Starter 1	Crumbled	0 – 14 Days	300
Starter 2	Pelleted	14 – 21 Days	390
Grower/Finisher	Pelleted	21 – 42 Days	1680

D. SAMPLES AND ASSAYS

Prior to the pelleting process, a ~500g sample was taken of all treatment diets.

Following pelleting, treatment feeds were sampled (~500 g sample size) in duplicate according to CQR standard operating procedures. One sample was submitted to Agrivida for enzyme (phytase) analysis. The second sample of the treatment feeds was retained by CQR until notification from the Sponsor was received that the back-up samples were no longer needed. All samples were labeled with the CQR project number, sample description, and date of collection.

Basal feeds were sampled (~500 g sample size) in triplicate according to CQR standard operating procedures. One sample was submitted to MVTL for proximate analysis, one sample was submitted to Agrivida for enzyme (phytase) analysis, and the third sample was retained by CQR until notification from the Sponsor was received that the back-up sample was no longer needed. All samples were labeled with the CQR project number, sample description, and date of collection.

E. TEST SYSTEM

Species	Commercial Broiler Chickens
Strain	Cobb 500
Supplier	Simmons Foods Hatchery Siloam Springs, AR
Sex	Males
Age	~1 day of age upon receipt (Day 0) ~42 days at final weights
Identification	Pen cards
Number of birds/pen	17
Number of treatments	8
Number of pens/treatment	12
Number of birds/treatment	204
Total number of pens	96
Total number of birds	1632

IV. EXPERIMENTAL DESIGN

A. TEST GROUPS

The test facility (Building #7) was divided into 12 blocks of 8 pens each block. Treatments were assigned to the pens using a complete randomized block design. Birds were assigned to the pens randomly according to CQR SOP B-10. Specific treatment groups were as follows:

Low Phosphate diets contained:
Starter: ~0.3% AvP
Grower/Finisher: ~0.25% AvP

High Phosphate diets contained:
Starter: ~0.45% AvP
Grower/Finisher: ~0.4% AvP

Trt Group	Description	No. Pens	No. Birds/Pen	No. Birds/Trt
1	Low Phosphate (LP)	12	17	204
2	High Phosphate (HP)	12	17	204
3	250 Units Phytase (LP)	12	17	204
4	500 Units Phytase (LP)	12	17	204
5	750 Units Phytase (LP)	12	17	204
6	1000 Units Phytase (LP)	12	17	204
7	3000 Units Phytase (LP)	12	17	204
8	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)	12	17	204
Totals		**96**	**NA**	**1632**

B. HOUSING AND MANAGEMENT

<u>Housing</u>

Assignment of treatments to pens was conducted using Microsoft Excel. The computer-generated assignment was as follows:

	T1	T2	T3	T4	T5	T6	T7	T8
Block 1	135	133	136	134	98	99	97	100
Block 2	108	102	101	104	103	107	105	106
Block 3	114	110	115	112	113	109	116	111
Block 4	120	122	123	118	121	119	124	117
Block 5	126	128	130	129	131	132	125	127
Block 6	148	141	145	147	144	143	146	142
Block 7	149	152	150	151	154	155	153	156
Block 8	162	161	164	163	160	159	166	165
Block 9	169	174	173	171	168	167	170	172
Block 10	138	180	139	137	177	179	178	140
Block 11	187	188	186	185	181	183	182	184
Block 12	195	196	189	191	193	192	190	194

Birds were housed in concrete floor pens (~ 3' x 5') within an environmentally controlled facility (Facility # 7). All birds were placed in clean pens containing clean pine shavings as bedding. Additional shavings were added to pens if they became too damp for comfortable conditions for the test birds during the study. Lighting was via incandescent lights and a commercial lighting program was used. Hours of light for every 24-hour period were as follows:

Approximate Bird Age (days)	Approximate Hours of Continuous Light per 24 hr period	~Light Intensity (foot candles)
0 – 4	24	1.0 – 1.3
5 – 10	10	1.0 – 1.3
11 – 18	12	0.2 – 0.3
19 – Study End	16	0.2 – 0.3

Environmental conditions for the birds (floor space & bird density [~ ~~88~~ 0.88 ft^2/bird], temperature, lighting, feeder and water space) were similar for all treatment groups. In order to prevent bird migration, each pen was checked to ensure that no openings greater than 1 inch existed for approximately 12 inches in height between pens. To achieve this, a wood or plastic solid partition was in place for approximately the first 12 inches from the floor between each pen.

Vaccinations:

Birds were vaccinated for Mareks at the hatchery. Newcastle, Infectious Bronchitis (NCB) vaccine was administered using a spray cabinet upon receipt of chicks (Poulvac Aero; Pfizer Animal Health; Exton, PA; Serial No. 1401371; Expiration 30JUN15). No other vaccinations or treatments (except as indicated above), were administered during the study unless approved by the Sponsor.

Water:

Water was provided *ad libitum* throughout the study via one automatic nipple drinker (4 nipples per drinker) per pen. Drinkers were checked twice daily and cleaned as needed to ensure a clean and constant water supply to the birds.

Feed:

Feed was provided *ad libitum* throughout the study via one hanging, ~17 inch diameter tube feeder per pen. One chick feeder tray was placed in each pen for approximately the first four days. Birds were placed on their respective treatment diets on Day 0 and as per the experimental design. Feed added and removed from pens from Day 0 to study end was weighed and recorded.

Daily observations:

The test facility, pens and birds were observed at least twice daily for general flock condition, lighting, water, feed, ventilation and unanticipated events. No abnormal conditions or abnormal behaviors were noted during the study. The minimum-maximum temperature and humidity of the test facility was recorded once daily.

Mortality and Culls:

Starting on study day 0, any bird that was found dead or was removed and sacrificed was weighed and necropsied. Cull birds that were unable to reach feed or water were sacrificed, weighed, and documented. The weight and probable cause of death and necropsy findings were recorded on the pen mortality record.

Veterinary Care, Intervention and Euthanasia:

Birds that developed clinically significant concurrent disease unrelated to the test procedures were, at the discretion of the Study Investigator or a designee, removed from the study and euthanized in accordance with site SOPs. In addition, moribund or injured birds whose condition may have affected the outcome of the study were euthanized upon the authority of a Site Veterinarian or a qualified technician. The reason for withdrawal was documented. If an animal died, or was removed and euthanized for humane reasons, it was recorded on the mortality sheet for the pen and a necropsy performed and filed to document the reason for removal.

If euthanasia was deemed necessary by the Study Investigator or a qualified technician, animals were euthanized by cervical dislocation.

<u>Body Weights and Feed Intake</u>:

Birds were weighed by pen on Study Days 0, 21, and 42. The weights of all mortalities and culls over the course of the study were recorded on the Mortality & Necropsy Records for the appropriate pens. Average bird weight on a pen basis, on each weigh day, was summarized.

The feed remaining in each pen's feeder was weighed and the amount of feed consumed per pen was calculated by subtracting the feed weighed out of the pen from the total amount of feed weighed into the pen. Feeders were weighed on or before Study Day 0 and on Study Days 14, 21, and 42.

<u>Weight Gains and Feed Conversion:</u>

Average feed conversion was calculated for Days 0 – 21, 21 – 42, and 0 – 42 by dividing the total feed intake for that pen by the weight of the surviving birds in that pen.

Adjusted feed conversion was calculated for Days 0 – 21, 21 – 42, and 0 – 42 by dividing the total feed intake for that pen by the weight of the surviving birds in that pen and the weight of the birds that died or were removed from that pen.

<u>Scales:</u>

Scales used in the weighing of feed, feed additives, and birds were licensed by the State of Colorado. At each use the scales were checked using standard weights according to CQR Standard Operating Procedures.

C. BONE PARMETERS AND ILEAL PHOSPHORUS DIGESTIBILITY:

TiO2 was placed in all feeds starting on study day 14.

At Days 21 and 42, three birds were randomly collected from each pen, sacrificed ,and ileal and left tibia samples were collected. The tibia samples were pooled in one bag per pen (3 tibias per pen in a bag). Adhering muscle was carefully removed from each tibia to get them mostly clean and then they were frozen and retained until Sponsor instructed shipment to the laboratory for the determination of mineral weight and % ash.

The ileal samples were also be pooled in one bag per pen (3 ileal samples per pen in a bag) and were frozen retained until Sponsor instructed shipment to the laboratory for the determination of ileal phosphorus digestibility.

D. STATISTICAL DESIGN

Data generated from the study was statistically analyzed by the Sponsor using the General Linear Model system (SAS, Inc., Cary, NC).

V. DATA COLLECTED

- Bird weights by pen, on approximately Days 0, 21, and 42.
- Feed amounts added and removed from each pen from day 0 to study end (day 42).
- Mortality: sex, weight and probable cause of death day 0 to study end.
- Removed birds: reason for culling, sex and weight day 0 to study end.
- Daily observation of facility and birds and daily facility temperature
- Feed conversion by pen and treatment group for days 0-21 and 21-42.

VI. DISPOSITIONS

Excess Test Articles

An accounting was maintained of the test articles received and used for this study. Excess test articles were retained in the CQR general inventory until instruction from the Sponsor is received regarding the disposal or shipment of them. Documentation was provided with the study records.

Feed

An accounting was maintained of all treatment diets. The amount mixed, used, and discarded was documented. Unused feed was discarded to the landfill at study end. Retention feed samples were discarded to the landfill upon receipt of permission from the Sponsor. Disposition was documented in the study records.

Test Animals

An accounting was maintained of all birds received for the study. All mortalities, birds culled, or sacrificed were disposed of by dumpster and commercial landfill. Disposal of mortalities, birds culled, or birds sacrificed during the study and at study end was by dumpster and commercial landfill. Surviving birds at study end were euthanized and disposed of by dumpster and commercial landfill as they were not suitable for human consumption. Documentation of disposition was provided with the study records.

VII. RECORDS AND REPORT

A final report and the original study records were provided to the Sponsor following study completion. The Sponsor was provided with an electronic copy of the data in excel CQR spreadsheet format, with individual replicates represented in rows, and measurements made and identifying criteria (such as treatment, pen, block) in columns. No statistics were included in the final report unless provided by the Sponsor. A copy of the report, data and study records will be kept in CQR archives for a period of 5 years.

VIII. PERSONNEL

Key personnel involved in this study was as follows:

Agrivida, Inc.	
Sponsor Representative	Jim Ligon
CQR	
Investigator	Dan Moore, PhD.
Test Facility Management	Stephen W. Davis, DVM, Dip. ACPV
Feed Mill Manager	Ken Johlke, B.S.
Data Manager	Shoshana Gray, B.A.
Farm Manager	Kyle Kline, B.S.
Research Technician	Jamie Meneuy, B.S.

IX. INVESTIGATOR'S STATEMENT

There were no known circumstances that may have affected the data quality or integrity during this study.

Summary tables and graphs of bird performance have been prepared and are attached to this report (See Tables 1 – 8 and Graphs 1 – 3).

Overall mortality and moribund removal was as expected to slightly increased for study conditions and ranged from 1.47% (Treatment Group 2) to 7.843% (Treatment Group 6). However, a large portion of mortality in treatment group 6 was early in life due to bacteria and not likely related to the treatment. See Tables 10 and 11 for mortality and removal information.

Performance during the trial was as expected for study conditions with body weight ranging from 2.343 Kg for the low phosphate group (Treatment Group 1) to 2.933 Kg for the highest phytase dose (Treatment Group 7), and feed conversion ranging from 1.497 (Treatment group 8) to 1.581 (Treatment Group 1) at 42D. The high phosphate control group outperformed the low phosphate control group at both 21D and 42D for body weight gain and feed conversion. There were incremental improvements in both body weight gain and feed conversion with increasing levels of the test phytase when compared to the negative control at both time points tested with the exception of treatment 5 for body weight gain at 42D which had higher body weight gain than the negative control but it was not an incremental increase.

There was a single protocol amendment over the course of the study. It was as follows:

Amendment Number	Protocol Section Affected	Purpose of Amendment	Impact on Study Outcome
1	Research Facility Diagram	Correction of a typographical error in the original diagram.	None.

There was a single protocol deviation over the course of the study. It was as follows:

Deviation Number	Protocol Section Affected	Reason for Deviation	Impact on Study Outcome
1	Daily Observations and Data to Be Collected	Facility daily humidity was not recorded during the study.	None.

The report and data herein submitted to the Sponsor for CQR Project No. AGV-15-1 are accurate in that they represent the actual results of the study, were collected in a manner which did not misrepresent the true effects of the test articles and were complete in that all data obtained in this study was submitted to the Sponsor.

17 JUL 15

Dan Moore, Ph.D.
Investigator

Date

Final Report Amendment

Study Number: AGV-15-1

Amendment Number 1 — Effective Date 5-Jan-16

Author Dan Moore

Final Report Section Number(s) Affected: III.A. TESTING/SUPPORT FACILITIES; III.C. BASAL AND EXPERIMENTAL DIETS; III.D. SAMPLES AND ASSAYS; IV.C. BONE PARAMETERS AND ILEAL PHOSPHORUS DIGESTIBILITY; VI. DISPOSITIONS

Amended Final Report Statements (changes made to the final report are indicated in yellow):

III. MATERIALS AND METHODS

A. TESTING/SUPPORT FACILITIES & PERSONNEL

~~*Facility*~~	~~*Purpose*~~
~~Colorado Quality Research, Inc.~~ ~~400 East County Road 72~~ ~~Wellington, Colorado 80549~~	~~Investigator's office,~~ ~~test article storage, archives, feed preparation, test animal housing~~
~~Agrivida Inc.~~ ~~200 Boston Ave., Ste. 2975~~ ~~Medford, MA 02155~~	~~Test article source, feed analysis, statistical anlaysis~~
~~Simmons Foods Hatchery~~ ~~Siloam Springs, AR~~	~~Chick Source~~
~~MVTL Laboratories~~ ~~2 N. German St.~~ ~~New Ulm, MN 56073~~	~~Proximate analysis of basal feed~~

Study Investigator	
Dan Moore, PhD (CV: on file, available upon request)	Colorado Quality Research, Inc. 400 E. County Road 72 Wellington, CO 80549 W: 970-568-7738 F: 970-568-7719 dan@coloradoqualityresearch.com
Sponsor Representative	
Jim Ligon, PhD (CV: on file, available upon request)	Agrivida, Inc. VP Business Development 200 Boston Ave, Suite 2975 Medford, MA 02155 M: (b) (6) (b) (6)@gmail.com
Enzyme Analysis	
Phillip A. Lessard, Ph.D. (CV: on file, available upon request)	Agrivida, Inc. 200 Boston Ave., Suite 2975 Medford, MA 02155 Philip.lessard@agrivida.com
Contributing Scientist – Tibia Ash Parameters	
Linda Kirby (CV: on file, available upon request)	University of Arkansas Central Analytical Lab 1260 W. Maple Street Fayetteville, AR 72701 lkirby@uark.edu

Contributing Scientist – Ileal Phosphorus Digestibility, Feed Analysis	
Thomas P. Mawhinney (CV: on file, available upon request)	Experimental Station Chemical Laboratories Room 4, Agricultural Building University of Missouri Columbia, MO 65211-7170 mawhinneyt@missouri.edu
Contributing Scientist – Proximate Analysis of Basal Feeds	
Bryan Brock (CV: on file, available upon request)	MVTL Laboratories 2 N. German Street New Ulm, MN 56072 W: (800) 782-3557 bbrock@mvtl.com

C. BASAL AND EXPERIMENTAL DIETS

Diets were formulated by CQR. Diets met and conformed with the commercial standards for feed based on breed and age range of broilers. Copies of the diet formulations were included in the study records and Final Report.

There were two different basal diet formulations. Low Phosphate (LP) diets contained ~0.3% AvP in the Starter 1 and Starter 2 diets and ~0.25% AvP in the Grower/Finisher diets. The High Phosphate (HP) diets contained ~0.45% AvP in the Starter 1 and Starter 2 diets and ~0.4% AvP in the Grower/Finisher diets.

Basal diets were manufactured at CQR and stored in bulk mash form. The treatment diets were mixed at the CQR feed mill. A 500 pound capacity vertical mixer, a 4000 pound capacity vertical mixer, and/or a 14,000 lb horizontal mixer and a California Pellet Mill system were used to prepare the Starter and Grower/Finisher diets. Feed was pelleted using a ~5-mm die and the Starter 1 diet was further processed into crumbles. The pelleting temperature was ~65 ºC. Mixed feed was stored in bulk storage bins labeled with study number, treatment letter code, and diet type. Complete records of diet mixing were included in the study records.

Approximate Feeding Program:

Diet	Form	Period	~Lbs Feed Mixed per Trt
Starter 1	Crumbled	0 – 14 Days	300
Starter 2	Pelleted	14 – 21 Days	390
Grower/Finisher	Pelleted	21 – 42 Days	1680

Test article and control article were added to the basal feed in the following approximate quantities in order to achieve the targeted levels of phytase in the treatment feeds:

Trt Group	Product	Starter 1	Starter 2	Grower/Finisher
1	NA	NA	NA	NA
2	NA	NA	NA	NA
3	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	(b) (4) [redacted]
4	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
5	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
6	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
7	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
8	Phytase 2500 TPT Premix[2]	0.060 lb	0.078 lb	0.336 lb

[1] Concentration of GraINzyme Phytase Phy02 as determined analytically by Agrivida was (b) (4) [redacted] FTU/g.
[2] Concentration of Phytase 2500 TPT Premix as indicated on the label was 2,500 FTU/g.

D. SAMPLES AND ASSAYS

Prior to the pelleting process, a ~500g sample was taken of all treatment diets.

Following pelleting, treatment feeds were sampled (~500 g sample size) in duplicate according to CQR standard operating procedures (SOP FM-4 rev04). Five to ten samples of approximately equal size were collected from evenly distributed points as the feed was exiting the mixer/pelleter. These samples were combined into a representative composite sample which was then split into two duplicate samples in a manner appropriate to ensure minimal risk of cross-contamination. One sample was submitted to Agrivida for enzyme (phytase) analysis. The second sample of the treatment feeds was retained by CQR until notification from the Sponsor was received that the back-up samples were no longer needed. All samples were labeled with the CQR project number, sample description, and date of collection.

Basal feeds were sampled (~500 g sample size) in triplicate according to CQR standard operating procedures. One sample was submitted to MVTL for proximate analysis [See the following: AOAC 942.05; AOAC 930.15; AOAC (18) 2005 985.01; AOAC 968.08 (D.(a)); AOAC 990.03; AOAC 2003.06; AOAC 2003.05; ISO 11085-2008; AN 3414 (2005-03-02) Revision 4.1; AOAC (18) 2005 Method 994.12; and AOCS B1 6a-05], one sample was submitted to Agrivida for enzyme (phytase) analysis, and the third sample was retained by CQR until notification from the Sponsor was received that the back-up sample was no longer needed. All samples were labeled with the CQR project number, sample description, and date of collection.

B. BONE PARMETERS AND ILEAL PHOSPHORUS DIGESTIBILITY:

TiO_2 was placed in all feeds starting on study day 14.

At Days 21 and 42, three birds were randomly collected from each pen, sacrificed ,and ileal and left tibia samples were collected. The tibia samples were pooled in one bag per pen (3 tibias per pen in a bag). Adhering muscle was carefully removed from each tibia to get them mostly clean and then they were frozen and retained until Sponsor instructed shipment to the laboratory for the determination of mineral weight and % ash (AOAC 923.03).

The ileal samples were also be pooled in one bag per pen (3 ileal samples per pen in a bag) and were frozen retained until Sponsor instructed shipment to the laboratory for the determination of ileal phosphorus digestibility. From each bird starting at the Meckel's Diverticulum, the contents of the ileum were squeezed into the plastic bags.

VI. DISPOSITIONS

Excess Test Articles

An accounting was maintained of the test articles received and used for this study. Excess test articles were returned to the Sponsor ~~retained in the CQR general inventory until instruction from the Sponsor is received regarding the disposal or shipment of them~~. Documentation was provided with the study records.

Reason for Amendment

This amendment is necessary for the following reason:

The Sponsor requested additional information accompany the submitted Final Report.

Describe Anticipated Impact on Study:

This amendment has no anticipated impact on the outcome of the study. It serves to further clarify study event, personnel, and activities.

Study Investigator [signature] Date 05 JAN 16

LIST OF REPORT TABLES AND GRAPHS

Tables

Table 1. Day 0 Pen Weights (29MAY15)
Table 2. Day 0 Pen Weights (29MAY15) Summarized by Treatment Group
Table 3. Bird Weights and Feed Conversion Days 0 – 21 (19JUN15)
Table 4. Bird Weights and Feed Conversion Days 0 – 21 (19JUN15) Summarized by Treatment Group
Table 5. Bird Weights and Feed Conversion Days 0 - 42 (10JUL15)
Table 6. Bird Weights and Feed Conversion Days 0 - 42 (10JUL15) Summarized by Treatment Group
Table 7. Bird Weights and Feed Conversion Days 21 - 42 (10JUL15)
Table 8. Bird Weights and Feed Conversion Days 21 - 42 (10JUL15) Summarized by Treatment Group
Table 9. Feed Added and Removed by Pen Day 0 - Study End (kg)
Table 10. Mortality and Removal Weights (Day 0 - Study End)
Table 11. Summary of Mortalities and Removals (Day 0 - Study End)

Graphs

Graph 1. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 21) Summarized by Treatment Group
Graph 2. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 42) Summarized by Treatment Group
Graph 3. Average Bird Weight Gain and Adjusted Feed Conversion (Days 21 - 42) Summarized by Treatment Group

LIST OF REPORT APPENDICES

Body weights, feed and mortality/necropsy records
Diet formulations, preparation, accounting, and disposition
Bird receipt, accounting, vaccination, disposition
Daily logs/house observation/temperature records, scale checks, notes to file
Personnel, protocol, correspondence

FEED FORMULATIONS

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER

Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151SP AGV-15-1 BS PC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1135.89	56.795	164.64	113.20	295.20			
1914	SBM , CQR	716.19	35.810	508.00	261.40	843.60			
1542	Soy Oil	38.93	1.947	600.00	224.40	2008.40			
1554	DICALCIUM PHOS	36.42	1.821	255.24		25253.0			
1553	Sand	28.02	1.401	15.00		29.40		1.6000	
1552	Limestone, CQR	19.87	0.994	30.00	15.00	29505.6			
1544	SALT, PLAIN (N	8.81	0.440	29.34	15.00	145444.			
1549	DL-METHIONINE,	5.98	0.299	2637.89	15.00	23294.8			
1548	CQR Choline	3.92	0.196	2534.00	15.00	48090.4			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1545	Salinomycin (6	0.820	0.041	0.00			0.0410	0.0410	
1551	Threonine, CQR	0.169	0.008	1849.00	15.00	15136.0			
1550	L-LYSINE, CQR	0.166	0.008	1725.00	15.00	8300.60			

Total Batch: 2000.00 Lbs at 309.15 $/Ton 15.458 $/100Lb 0.1546 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.5661	0.10 PCT
5	FAT, CRUDE	PCT	0.4283	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4130	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
35	THREONINE	PCT	0.1853	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.74	
3	MOISTURE		10.26	
4	PROTEIN, CRUDE	22.00	22.00	
5	FAT, CRUDE	4.50	4.50	
6	FIBER, CRUDE		2.23	
7	CALCIUM	0.93	0.9300	
8	PHOS. TOTAL	0.71	0.7205	
9	ASH		5.50	
10	PHOS., AVAILAB	0.45	0.4500	0.45
18	ADF		0.0000	
19	M.E. POULTRY	1378.00	1378.00	
21	M.E. SWINE		1485.49	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.55	0.6413	
32	CYSTINE		0.3487	
33	LYSINE	1.31	1.31	
34	TRYPTOPHAN		0.2980	
35	THREONINE	0.92	0.9200	
36	ISOLEUCINE		1.13	
37	HISTIDINE		0.6218	
38	VALINE		1.24	
39	LEUCINE		1.98	
40	ARGININE		1.52	
41	PHENYLALANINE		1.24	
42	TSAA	0.99	0.9900	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5274	
47	VITAMIN A		1265.17	
48	VITAMIN E		12.30	
49	THIAMIN		1.95	
50	RIBOFLAVIN		2.68	
51	PANTOTHENIC AC		8.67	
52	BIOTIN		156.14	
53	FOLIC ACID		446.81	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.21	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.9437	
63	MAGNESIUM		0.1613	
64	SULPHUR		0.2044	
65	MANGANESE		107.18	
66	IRON		371.60	
67	COPPER		19.98	
68	ZINC		89.49	
69	SELENIUM		0.3028	
70	COBALT		0.0000	
71	FLOURINE		0.0033	
72	CHLORIDE	0.28	0.2979	
73	SALT		0.4405	
74	IODINE		0.5957	
76	Dig Methionine		0.6129	
77	Dig Cystine		0.2885	
78	Dig Lysine		1.18	
79	Dig Tryptophan		0.2168	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Formulated By: Single Product Formulation
Trial Version: 17
Product: AGV151SP AGV-15-1 BS PC
Using Costs: Plant 1 Owning Costs
Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.8039	
81	Dig Isoleucine		1.04	
82	Dig Histidine		0.5584	
83	Dig Valine		1.12	
84	Dig Leucine		1.83	
85	Dig Arginine		1.39	
86	Dig Phenylalan		1.43	
87	Dig TSAA		0.9018	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		0.8943	

CFC/Concept5 Least Cost Formula

Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER
Trial Version: 16
Prod'n Version: 0
Page: 1

Plant: 1 Silver Springs
Product: AGV151SN AGV-15-1 BS NC

Formulated By: Single Product Formulation
Using Costs: Plant 1 Owning Costs

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1135.89	56.795	164.64		295.20			
1914	SBM , CQR	716.19	35.810	508.00	261.40	*******			
1542	Soy Oil	38.93	1.947	600.00	224.40				
1553	Sand	33.48	1.674	15.00		29.40		1.6800	-0.14
1552	Limestone, CQR	30.68	1.534	30.00	15.00	29505.6			
1554	DICALCIUM PHOS	20.11	1.006	255.24		29394.8			
1544	SALT, PLAIN (N	8.84	0.442	29.34	15.00	404093.			
1549	DL-METHIONINE,	5.98	0.299	2637.89	15.00	23294.8			
1548	CQR Choline	3.92	0.196	2534.00	15.00	74427.2			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1545	Salinomycin (6	0.820	0.041	0.00			0.0410	0.0410	
1551	Threonine, CQR	0.169	0.008	1849.00	15.00	15136.0			
1550	L-LYSINE, CQR	0.166	0.008	1725.00	15.00	8300.60			

Total Batch: 2000.00 Lbs at 307.27 $/Ton 15.364 $/100Lb 0.1536 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.5661	0.10 PCT
5	FAT, CRUDE	PCT	0.4283	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4130	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
35	THREONINE	PCT	0.1853	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.74	
3	MOISTURE		10.26	
4	PROTEIN, CRUDE	22.00	22.00	
5	FAT, CRUDE	4.50	4.50	
6	FIBER, CRUDE		2.23	
7	CALCIUM	0.93	0.9290	0.93
8	PHOS. TOTAL	0.56	0.5705	
9	ASH		5.32	
10	PHOS., AVAILAB	0.30	0.3000	0.30
18	ADF		0.0000	
19	M.E. POULTRY	1378.00	1378.00	1378.00
21	M.E. SWINE		1485.49	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.55	0.6413	
32	CYSTINE		0.3487	
33	LYSINE	1.31	1.31	
34	TRYPTOPHAN		0.2980	
35	THREONINE	0.92	0.9200	
36	ISOLEUCINE		1.13	
37	HISTIDINE		0.6218	
38	VALINE		1.24	
39	LEUCINE		1.98	
40	ARGININE		1.52	
41	PHENYLALANINE		1.24	
42	TSAA	0.99	0.9900	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5274	
47	VITAMIN A		1265.17	
48	VITAMIN E		12.30	
49	THIAMIN		1.95	
50	RIBOFLAVIN		2.68	
51	PANTOTHENIC AC		8.67	
52	BIOTIN		156.14	
53	FOLIC ACID		446.81	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.21	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	0.20
62	POTASSIUM		0.9431	
63	MAGNESIUM		0.1564	
64	SULPHUR		0.2044	
65	MANGANESE		104.73	
66	IRON		290.08	
67	COPPER		19.33	
68	ZINC		87.70	
69	SELENIUM		0.2979	
70	COBALT		0.0000	
71	FLOURINE		0.0018	
72	CHLORIDE	0.28	0.2990	
73	SALT		0.4421	
74	IODINE		0.5957	
76	Dig Methionine		0.6129	
77	Dig Cystine		0.2885	
78	Dig Lysine		1.18	
79	Dig Tryptophan		0.2168	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Formulated By: Single Product Formulation
Trial Version: 16
Product: AGV151SN AGV-15-1 BS NC
Using Costs: Plant 1 Owning Costs
Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.8039	
81	Dig Isoleucine		1.04	
82	Dig Histidine		0.5584	
83	Dig Valine		1.12	
84	Dig Leucine		1.83	
85	Dig Arginine		1.39	
86	Dig Phenylalan		1.43	
87	Dig TSAA		0.9018	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		1.38	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PROSUSER

Plant: 1 Silver Springs
Product: AGV151GP AGV-15-1 BG PC

Formulated By: Single Product Formulation
Using Costs: Plant 1 Owning Costs

Trial Version: 16
Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1252.29	62.615	164.64	113.60	295.60			
1914	SBM , CQR	629.58	31.479	508.00	227.40	841.60			
1542	Soy Oil	41.69	2.084	600.00	223.40	1999.80			
1554	DICALCIUM PHOS	31.53	1.576	255.24		25099.8			
1552	Limestone, CQR	18.88	0.944	30.00	15.00	33574.0			
1544	SALT, PLAIN (N	8.85	0.442	29.34	15.00	144552.			
1549	DL-METHIONINE,	4.23	0.212	2637.89	15.00	26146.0			
1548	CQR Choline	4.13	0.206	2534.00	15.00	47811.2			
1553	Sand	3.58	0.179	15.00		29.40		1.5000	
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1550	L-LYSINE, CQR	0.441	0.022	1725.00	15.00	9208.20			

Total Batch: 2000.00 Lbs at 294.77 $/Ton 14.738 $/100Lb 0.1474 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.6442	0.10 PCT
5	FAT, CRUDE	PCT	0.4294	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4106	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Unused Ingredients

Ingr Code	Ingredient Name	Current $/Ton	At $/Ton	Would Use	Minimum Pct	Maximum Pct	Rcost
1551	Threonine, CQR	1849.00	15.00				18.34

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.47	
3	MOISTURE		10.53	
4	PROTEIN, CRUDE	20.30	20.30	
5	FAT, CRUDE	4.80	4.80	
6	FIBER, CRUDE		2.20	
7	CALCIUM	0.84	0.8400	
8	PHOS. TOTAL	0.66	0.6607	
9	ASH		5.03	
10	PHOS., AVAILAB	0.40	0.4000	0.40
18	ADF		0.0000	
19	M.E. POULTRY	1425.00	1425.00	
21	M.E. SWINE		1518.02	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.51	0.5332	
32	CYSTINE		0.3268	
33	LYSINE	1.20	1.20	
34	TRYPTOPHAN		0.2709	
35	THREONINE	0.83	0.8395	
36	ISOLEUCINE		1.03	
37	HISTIDINE		0.5784	
38	VALINE		1.14	
39	LEUCINE		1.87	
40	ARGININE		1.39	
41	PHENYLALANINE		1.14	
42	TSAA	0.86	0.8600	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5815	
47	VITAMIN A		1311.15	
48	VITAMIN E		12.86	
49	THIAMIN		1.99	
50	RIBOFLAVIN		2.66	
51	PANTOTHENIC AC		8.50	
52	BIOTIN		151.84	
53	FOLIC ACID		435.80	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.37	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.8718	
63	MAGNESIUM		0.1519	
64	SULPHUR		0.1900	
65	MANGANESE		104.89	
66	IRON		341.03	
67	COPPER		19.27	
68	ZINC		87.99	
69	SELENIUM		0.3017	
70	COBALT		0.0000	
71	FLOURINE		0.0028	
72	CHLORIDE	0.26	0.3006	
73	SALT		0.4424	
74	IODINE		0.5944	
76	Dig Methionine		0.5065	
77	Dig Cystine		0.2709	
78	Dig Lysine		1.08	
79	Dig Tryptophan		0.1987	

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Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Formulated By: Single Product Formulation
Trial Version: 16
roduct: AGV151GP AGV-15-1 BG PC
Using Costs: Plant 1 Owning Costs
Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.7313	
81	Dig Isoleucine		0.9463	
82	Dig Histidine		0.5214	
83	Dig Valine		1.03	
84	Dig Leucine		1.73	
85	Dig Arginine		1.27	
86	Dig Phenylalan		1.37	
87	Dig TSAA		0.7777	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		0.8494	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER

Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151GN AGV-15-1 BG NC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1252.29	62.615	164.64	113.60	295.60			
1914	SBM , CQR	629.58	31.479	508.00	227.40	841.60			
1542	Soy Oil	41.69	2.084	600.00	223.40	1999.80			
1552	Limestone, CQR	29.75	1.487	30.00	15.00	33574.0			
1554	DICALCIUM PHOS	15.22	0.761	255.24		25099.8			
1553	Sand	8.98	0.449	15.00		29.40		1.5000	
1544	SALT, PLAIN (N	8.88	0.444	29.34	15.00	144552.			
1549	DL-METHIONINE,	4.23	0.212	2637.89	15.00	26146.0			
1548	CQR Choline	4.13	0.206	2534.00	15.00	47811.2			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1550	L-LYSINE, CQR	0.441	0.022	1725.00	15.00	9208.20			

Total Batch: 2000.00 Lbs at 292.89 $/Ton 14.645 $/100Lb 0.1464 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.6442	0.10 PCT
5	FAT, CRUDE	PCT	0.4294	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4106	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Unused Ingredients

Ingr Code	Ingredient Name	Current $/Ton	At $/Ton	Would Use	Minimum Pct	Maximum Pct	Rcost
1551	Threonine, CQR	1849.00	15.00				18.34

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.47	
3	MOISTURE		10.53	
4	PROTEIN, CRUDE	20.30	20.30	
5	FAT, CRUDE	4.80	4.80	
6	FIBER, CRUDE		2.20	
7	CALCIUM	0.84	0.8400	
8	PHOS. TOTAL	0.51	0.5107	
9	ASH		4.85	
10	PHOS., AVAILAB	0.25	0.2500	0.25
18	ADF		0.0000	
19	M.E. POULTRY	1425.00	1425.00	
21	M.E. SWINE		1518.02	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.51	0.5332	
32	CYSTINE		0.3268	
33	LYSINE	1.20	1.20	
34	TRYPTOPHAN		0.2709	
35	THREONINE	0.83	0.8395	
36	ISOLEUCINE		1.03	
37	HISTIDINE		0.5784	
38	VALINE		1.14	
39	LEUCINE		1.87	
40	ARGININE		1.39	
41	PHENYLALANINE		1.14	
42	TSAA	0.86	0.8600	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5815	
47	VITAMIN A		1311.15	
48	VITAMIN E		12.86	
49	THIAMIN		1.99	
50	RIBOFLAVIN		2.66	
51	PANTOTHENIC AC		8.50	
52	BIOTIN		151.84	
53	FOLIC ACID		435.80	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.37	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.8713	
63	MAGNESIUM		0.1470	
64	SULPHUR		0.1900	
65	MANGANESE		102.44	
66	IRON		259.51	
67	COPPER		18.62	
68	ZINC		86.19	
69	SELENIUM		0.2968	
70	COBALT		0.0000	
71	FLOURINE		0.0014	
72	CHLORIDE	0.26	0.3016	
73	SALT		0.4441	
74	IODINE		0.5944	
76	Dig Methionine		0.5065	
77	Dig Cystine		0.2709	
78	Dig Lysine		1.08	
79	Dig Tryptophan		0.1987	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151GN AGV-15-1 BG NC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.7313	
81	Dig Isoleucine		0.9463	
82	Dig Histidine		0.5214	
83	Dig Valine		1.03	
84	Dig Leucine		1.73	
85	Dig Arginine		1.27	
86	Dig Phenylalan		1.37	
87	Dig TSAA		0.7777	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		1.34	

Table 2. Day 0 Pen Weights (29MAY15) - AGV-15-1 - Summarized by Treatment Group

Block	Treat-ment	Pen	No. of Birds	Pen Wt (kg)	Avg. Bird Wt (kg)
2	1	108	17	0.601	0.035
3	1	114	17	0.592	0.035
4	1	120	17	0.597	0.035
5	1	126	17	0.596	0.035
1	1	135	17	0.588	0.035
10	1	138	17	0.595	0.035
6	1	148	17	0.603	0.035
7	1	149	17	0.606	0.036
8	1	162	17	0.593	0.035
9	1	169	17	0.604	0.036
11	1	187	17	0.605	0.036
12	1	195	17	0.605	0.036
Totals & Averages			**204**	**0.599**	**0.035**
Standard Deviations				**0.006**	**0.000**
CVs				**1.007%**	**1.007%**

Block	Treat-ment	Pen	No. of Birds	Pen Wt (kg)	Avg. Bird Wt (kg)
2	4	104	17	0.602	0.035
3	4	112	17	0.597	0.035
4	4	118	17	0.588	0.035
5	4	129	17	0.596	0.035
1	4	134	17	0.607	0.036
10	4	137	17	0.602	0.035
6	4	147	17	0.605	0.036
7	4	151	17	0.594	0.035
8	4	163	17	0.604	0.036
9	4	171	17	0.597	0.035
11	4	185	17	0.606	0.036
12	4	191	17	0.599	0.035
Totals & Averages			**204**	**0.600**	**0.035**
Standard Deviations				**0.006**	**0.000**
CVs				**0.938%**	**0.938%**

Block	Treat-ment	Pen	No. of Birds	Pen Wt (kg)	Avg. Bird Wt (kg)
1	7	97	17	0.609	0.036
2	7	105	17	0.595	0.035
3	7	116	17	0.593	0.035
4	7	124	17	0.606	0.036
5	7	125	17	0.601	0.035
6	7	146	17	0.602	0.035
7	7	153	17	0.602	0.035
8	7	166	17	0.593	0.035
9	7	170	17	0.608	0.036
10	7	178	17	0.604	0.036
11	7	182	17	0.598	0.035
12	7	190	17	0.597	0.035
Totals & Averages			**204**	**0.601**	**0.035**
Standard Deviations				**0.006**	**0.000**
CVs				**0.921%**	**0.921%**

2	2	102	17	0.591	0.035
3	2	110	17	0.601	0.035
4	2	122	17	0.599	0.035
5	2	128	17	0.599	0.035
1	2	133	17	0.606	0.036
6	2	141	17	0.593	0.035
7	2	152	17	0.602	0.035
8	2	161	17	0.597	0.035
9	2	174	17	0.587	0.035
10	2	180	17	0.609	0.036
11	2	188	17	0.606	0.036
12	2	196	17	0.606	0.036
Totals & Averages			**204**	**0.600**	**0.035**
Standard Deviations				**0.007**	**0.000**
CVs				**1.127%**	**1.127%**

1	5	98	17	0.607	0.036
2	5	103	17	0.601	0.035
3	5	113	17	0.602	0.035
4	5	121	17	0.595	0.035
5	5	131	17	0.599	0.035
6	5	144	17	0.593	0.035
7	5	154	17	0.606	0.036
8	5	160	17	0.606	0.036
9	5	168	17	0.603	0.035
10	5	177	17	0.591	0.035
11	5	181	17	0.600	0.035
12	5	193	17	0.590	0.035
Totals & Averages			**204**	**0.599**	**0.035**
Standard Deviations				**0.006**	**0.000**
CVs				**0.989%**	**0.989%**

1	8	100	17	0.586	0.034
2	8	106	17	0.595	0.035
3	8	111	17	0.587	0.035
4	8	117	17	0.599	0.035
5	8	127	17	0.592	0.035
10	8	140	17	0.596	0.035
6	8	142	17	0.597	0.035
7	8	156	17	0.590	0.035
8	8	165	17	0.593	0.035
9	8	172	17	0.595	0.035
11	8	184	17	0.590	0.035
12	8	194	17	0.592	0.035
Totals & Averages			**204**	**0.593**	**0.035**
Standard Deviations				**0.004**	**0.000**
CVs				**0.668%**	**0.668%**

2	3	101	17	0.590	0.035
3	3	115	17	0.603	0.035
4	3	123	17	0.602	0.035
5	3	130	17	0.597	0.035
1	3	136	17	0.592	0.035
10	3	139	17	0.591	0.035
6	3	145	17	0.590	0.035
7	3	150	17	0.606	0.036
8	3	164	17	0.589	0.035
9	3	173	17	0.590	0.035
11	3	186	17	0.602	0.035
12	3	189	17	0.596	0.035
Totals & Averages			**204**	**0.596**	**0.035**
Standard Deviations				**0.006**	**0.000**
CVs				**1.036%**	**1.036%**

1	6	99	17	0.597	0.035
2	6	107	17	0.590	0.035
3	6	109	17	0.604	0.036
4	6	119	17	0.599	0.035
5	6	132	17	0.595	0.035
6	6	143	17	0.606	0.036
7	6	155	17	0.598	0.035
8	6	159	17	0.608	0.036
9	6	167	17	0.599	0.035
10	6	179	17	0.603	0.035
11	6	183	17	0.598	0.035
12	6	192	17	0.597	0.035
Totals & Averages			**204**	**0.600**	**0.035**
Standard Deviations				**0.005**	**0.000**
CVs				**0.834%**	**0.834%**

Table 4. Bird Weights and Feed Conversion Days 0 - 21 (19JUN15) Summarized by Treatment Group
CQR Study Number AGV-15-1

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	1	135	17	0	0	0	17	10.240	0.602	0.568	1.459	1.459
2	1	108	17	1	0	0	16	9.520	0.595	0.560	1.393	1.385
3	1	114	17	2	0	0	15	9.040	0.603	0.568	1.420	1.397
4	1	120	17	0	0	0	17	9.700	0.571	0.535	1.382	1.382
5	1	126	17	0	0	0	17	10.360	0.609	0.574	1.379	1.379
6	1	148	17	0	0	0	17	10.060	0.592	0.556	1.491	1.491
7	1	149	17	0	0	0	17	10.220	0.601	0.566	1.400	1.400
8	1	162	17	1	0	0	16	9.600	0.600	0.565	1.419	1.406
9	1	169	17	1	0	0	16	10.300	0.644	0.608	1.425	1.420
10	1	138	17	0	0	0	17	9.080	0.534	0.499	1.586	1.586
11	1	187	17	0	0	0	17	9.360	0.551	0.515	1.515	1.515
12	1	195	17	1	0	0	16	9.480	0.593	0.557	1.449	1.441
Totals & Avgs			**204**	**6**	**0**	**0**	**198**	**9.747**	**0.591**	**0.556**	**1.443**	**1.438**
Std Devs								**0.476**	**0.028**	**0.028**	**0.062**	**0.064**
CVs								**4.879%**	**4.805%**	**5.107%**	**4.278%**	**4.449%**

1	2	133	17	0	0	0	17	11.620	0.684	0.648	1.405	1.405
2	2	102	17	0	0	0	17	11.160	0.656	0.622	1.383	1.383
3	2	110	17	0	0	0	17	11.000	0.647	0.612	1.444	1.444
4	2	122	17	0	0	0	17	11.400	0.671	0.635	1.361	1.361
5	2	128	17	0	0	0	17	11.460	0.674	0.639	1.403	1.403
6	2	141	17	0	0	0	17	11.220	0.660	0.625	1.387	1.387
7	2	152	17	0	0	0	17	11.900	0.700	0.665	1.423	1.423
8	2	161	17	0	0	0	17	11.940	0.702	0.667	1.374	1.374
9	2	174	17	0	0	0	17	11.680	0.687	0.653	1.381	1.381
10	2	180	17	0	0	0	17	11.740	0.691	0.655	1.452	1.452
11	2	188	17	0	0	0	17	12.100	0.712	0.676	1.382	1.382
12	2	196	17	0	0	0	17	12.120	0.713	0.677	1.357	1.357
Totals & Avgs			**204**	**0**	**0**	**0**	**204**	**11.612**	**0.683**	**0.648**	**1.396**	**1.396**
Std Devs								**0.370**	**0.022**	**0.022**	**0.031**	**0.031**
CVs								**3.189%**	**3.189%**	**3.335%**	**2.191%**	**2.191%**

1	3	136	17	0	1	0	16	10.860	0.679	0.644	1.387	1.363
2	3	101	17	0	0	0	17	11.340	0.667	0.632	1.369	1.369
3	3	115	17	0	0	0	17	11.620	0.684	0.648	1.345	1.345
4	3	123	17	0	0	0	17	11.100	0.653	0.618	1.347	1.347
5	3	130	17	0	0	0	17	11.760	0.692	0.657	1.365	1.365
6	3	145	17	1	0	0	16	10.580	0.661	0.627	1.381	1.373
7	3	150	17	0	0	0	17	11.640	0.685	0.649	1.381	1.381
8	3	164	17	0	0	0	17	11.180	0.658	0.623	1.346	1.346
9	3	173	17	0	0	0	17	11.260	0.662	0.628	1.351	1.351
10	3	139	17	0	0	0	17	11.520	0.678	0.643	1.341	1.341
11	3	186	17	0	0	0	17	11.160	0.656	0.621	1.326	1.326
12	3	189	17	0	0	0	17	10.920	0.642	0.607	1.389	1.389
Totals & Avgs			**204**	**1**	**1**	**0**	**202**	**11.245**	**0.668**	**0.633**	**1.361**	**1.358**
Std Devs								**0.354**	**0.015**	**0.015**	**0.021**	**0.018**
CVs								**3.144%**	**2.255%**	**2.369%**	**1.522%**	**1.351%**

Table 4. Bird Weights and Feed Conversion Days 0 - 21 (19JUN15) Summarized by Treatment Group
CQR Study Number AGV-15-1

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	4	134	17	0	0	0	17	12.700	0.747	0.711	1.340	1.340
2	4	104	17	0	0	0	17	11.740	0.691	0.655	1.345	1.345
3	4	112	17	0	0	0	17	11.460	0.674	0.639	1.357	1.357
4	4	118	17	0	0	0	17	12.040	0.708	0.674	1.277	1.277
5	4	129	17	0	0	0	17	11.700	0.688	0.653	1.367	1.367
6	4	147	17	0	0	0	17	11.640	0.685	0.649	1.396	1.396
7	4	151	17	0	0	0	17	11.620	0.684	0.649	1.373	1.373
8	4	163	17	0	0	0	17	12.080	0.711	0.675	1.344	1.344
9	4	171	17	1	0	0	16	11.500	0.719	0.684	1.354	1.346
10	4	137	17	1	0	0	16	11.160	0.698	0.662	1.368	1.359
11	4	185	17	0	0	0	17	11.820	0.695	0.660	1.366	1.366
12	4	191	17	1	0	0	16	10.960	0.685	0.650	1.349	1.341
Totals & Avgs			**204**	**3**	**0**	**0**	**201**	**11.702**	**0.699**	**0.663**	**1.353**	**1.351**
Std Devs								**0.450**	**0.020**	**0.020**	**0.029**	**0.028**
CVs								**3.842%**	**2.856%**	**2.995%**	**2.114%**	**2.109%**
1	5	98	17	0	0	0	17	11.760	0.692	0.656	1.345	1.345
2	5	103	17	0	0	0	17	11.760	0.692	0.656	1.375	1.375
3	5	113	17	0	0	0	17	12.180	0.716	0.681	1.320	1.320
4	5	121	17	0	1	0	16	10.960	0.685	0.650	1.356	1.339
5	5	131	17	1	1	0	15	11.260	0.751	0.715	1.379	1.332
6	5	144	17	0	0	0	17	11.800	0.694	0.659	1.313	1.313
7	5	154	17	0	0	0	17	12.200	0.718	0.682	1.330	1.330
8	5	160	17	0	0	0	17	11.780	0.693	0.657	1.333	1.333
9	5	168	17	0	0	0	17	12.720	0.748	0.713	1.325	1.325
10	5	177	17	0	0	0	17	12.040	0.708	0.673	1.315	1.315
11	5	181	17	1	0	0	16	11.440	0.715	0.680	1.330	1.325
12	5	193	17	0	0	0	17	11.640	0.685	0.650	1.343	1.343
Totals & Avgs			**204**	**2**	**2**	**0**	**200**	**11.795**	**0.708**	**0.673**	**1.339**	**1.333**
Std Devs								**0.464**	**0.023**	**0.023**	**0.022**	**0.017**
CVs								**3.930%**	**3.207%**	**3.362%**	**1.619%**	**1.241%**
1	6	99	17	0	0	0	17	11.860	0.698	0.663	1.314	1.314
2	6	107	17	0	0	0	17	11.360	0.668	0.634	1.333	1.333
3	6	109	17	0	0	0	17	12.040	0.708	0.673	1.327	1.327
4	6	119	17	0	0	0	17	11.540	0.679	0.644	1.349	1.349
5	6	132	17	0	0	0	17	12.160	0.715	0.680	1.332	1.332
6	6	143	17	1	0	0	16	11.000	0.688	0.652	1.370	1.361
7	6	155	17	2	0	0	15	10.880	0.725	0.690	1.348	1.325
8	6	159	17	2	1	0	14	10.180	0.727	0.691	1.417	1.339
9	6	167	17	1	0	0	16	11.660	0.729	0.694	1.347	1.343
10	6	179	17	2	0	0	15	10.780	0.719	0.683	1.405	1.339
11	6	183	17	0	0	0	17	11.920	0.701	0.666	1.309	1.309
12	6	192	17	0	0	0	17	12.360	0.727	0.692	1.343	1.343
Totals & Avgs			**204**	**8**	**1**	**0**	**195**	**11.478**	**0.707**	**0.672**	**1.350**	**1.335**
Std Devs								**0.654**	**0.020**	**0.020**	**0.033**	**0.015**
CVs								**5.700%**	**2.899%**	**3.037%**	**2.452%**	**1.092%**

Table 4. Bird Weights and Feed Conversion Days 0 - 21 (19JUN15) Summarized by Treatment Group
CQR Study Number AGV-15-1

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	7	97	17	0	0	0	17	13.180	0.775	0.739	1.309	1.309
2	7	105	17	0	0	0	17	12.560	0.739	0.704	1.295	1.295
3	7	116	17	0	0	0	17	12.860	0.756	0.722	1.303	1.303
4	7	124	17	0	0	0	17	12.120	0.713	0.677	1.322	1.322
5	7	125	17	0	0	0	17	11.980	0.705	0.669	1.332	1.332
6	7	146	17	1	0	0	16	11.220	0.701	0.666	1.343	1.333
7	7	153	17	0	0	0	17	12.080	0.711	0.675	1.336	1.336
8	7	166	17	0	0	0	17	12.560	0.739	0.704	1.317	1.317
9	7	170	17	1	0	0	16	11.840	0.740	0.704	1.346	1.343
10	7	178	17	0	0	0	17	12.680	0.746	0.710	1.313	1.313
11	7	182	17	0	0	0	17	12.240	0.720	0.685	1.299	1.299
12	7	190	17	1	0	0	16	11.660	0.729	0.694	1.298	1.293
Totals & Avgs			**204**	**3**	**0**	**0**	**201**	**12.248**	**0.731**	**0.696**	**1.318**	**1.316**
Std Devs								**0.549**	**0.022**	**0.022**	**0.018**	**0.017**
CVs								**4.479%**	**3.053%**	**3.207%**	**1.370%**	**1.294%**

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	8	100	17	0	0	0	17	11.580	0.681	0.647	1.333	1.333
2	8	106	17	1	0	0	16	10.820	0.676	0.641	1.365	1.360
3	8	111	17	0	0	0	17	11.740	0.691	0.656	1.359	1.359
4	8	117	17	0	0	0	17	12.340	0.726	0.691	1.315	1.315
5	8	127	17	0	0	0	17	11.780	0.693	0.658	1.334	1.334
6	8	142	17	1	0	0	16	11.600	0.725	0.690	1.336	1.332
7	8	156	17	0	0	0	17	10.780	0.634	0.599	1.341	1.341
8	8	165	17	1	1	0	15	11.540	0.769	0.734	1.363	1.317
9	8	172	17	0	0	0	17	11.720	0.689	0.654	1.314	1.314
10	8	140	17	0	0	0	17	12.040	0.708	0.673	1.342	1.342
11	8	184	17	0	0	0	17	11.900	0.700	0.665	1.324	1.324
12	8	194	17	0	0	0	17	11.560	0.680	0.645	1.331	1.331
Totals & Avgs			**204**	**3**	**1**	**0**	**200**	**11.617**	**0.698**	**0.663**	**1.338**	**1.334**
Std Devs								**0.445**	**0.033**	**0.033**	**0.017**	**0.015**
CVs								**3.833%**	**4.737%**	**4.971%**	**1.277%**	**1.146%**

Table 6. Bird Weights and Feed Conversion Days 0 - 42 (10JUL15) Summarized by Treatment Group
CQR Study Number AGV-15-1

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	1	135	17	1	0	3	13	31.080	2.391	2.356	1.709	1.573
2	1	108	17	1	0	3	13	30.340	2.334	2.298	1.701	1.604
3	1	114	17	3	0	3	11	26.140	2.376	2.342	1.721	1.551
4	1	120	17	1	0	3	13	29.380	2.260	2.225	1.664	1.550
5	1	126	17	1	0	3	13	31.080	2.391	2.356	1.763	1.574
6	1	148	17	0	0	3	14	32.720	2.337	2.302	1.668	1.575
7	1	149	17	0	1	3	13	31.920	2.455	2.420	1.726	1.564
8	1	162	17	1	0	3	13	31.320	2.409	2.374	1.665	1.565
9	1	169	17	1	0	3	13	32.480	2.498	2.463	1.683	1.584
10	1	138	17	0	0	3	14	30.900	2.207	2.172	1.730	1.643
11	1	187	17	0	0	3	14	31.000	2.214	2.179	1.696	1.616
12	1	195	17	1	0	3	13	29.200	2.246	2.211	1.665	1.574
Totals & Avgs			**204**	**10**	**1**	**36**	**157**	**30.630**	**2.343**	**2.308**	**1.699**	**1.581**
Std Devs								**1.768**	**0.095**	**0.095**	**0.032**	**0.027**
CVs								**5.773%**	**4.034%**	**4.096%**	**1.873%**	**1.733%**
1	2	133	17	0	0	3	14	39.000	2.786	2.750	1.626	1.547
2	2	102	17	0	1	3	13	38.000	2.923	2.888	1.633	1.505
3	2	110	17	0	0	3	14	40.560	2.897	2.862	1.600	1.530
4	2	122	17	0	0	3	14	38.680	2.763	2.728	1.606	1.518
5	2	128	17	1	0	3	13	38.300	2.946	2.911	1.661	1.507
6	2	141	17	0	0	3	14	38.880	2.777	2.742	1.604	1.517
7	2	152	17	0	0	3	14	39.320	2.809	2.773	1.635	1.545
8	2	161	17	0	0	3	14	40.320	2.880	2.845	1.625	1.537
9	2	174	17	0	0	3	14	39.000	2.786	2.751	1.606	1.514
10	2	180	17	0	0	3	14	39.560	2.826	2.790	1.622	1.538
11	2	188	17	1	0	3	13	37.620	2.894	2.858	1.694	1.528
12	2	196	17	0	0	3	14	36.400	2.600	2.564	1.663	1.567
Totals & Avgs			**204**	**2**	**1**	**36**	**165**	**38.803**	**2.824**	**2.789**	**1.631**	**1.529**
Std Devs								**1.144**	**0.094**	**0.094**	**0.029**	**0.018**
CVs								**2.949%**	**3.332%**	**3.377%**	**1.761%**	**1.195%**
1	3	136	17	1	1	3	12	33.160	2.763	2.729	1.659	1.535
2	3	101	17	0	1	3	13	36.860	2.835	2.801	1.663	1.521
3	3	115	17	0	0	3	14	38.920	2.780	2.745	1.621	1.532
4	3	123	17	0	0	3	14	36.900	2.636	2.600	1.602	1.511
5	3	130	17	1	0	3	13	36.560	2.812	2.777	1.644	1.520
6	3	145	17	1	1	3	12	33.680	2.807	2.772	1.660	1.518
7	3	150	17	0	1	3	13	36.260	2.789	2.754	1.672	1.544
8	3	164	17	0	0	3	14	37.620	2.687	2.652	1.616	1.529
9	3	173	17	0	0	3	14	38.640	2.760	2.725	1.597	1.515
10	3	139	17	0	1	3	13	36.140	2.780	2.745	1.649	1.517
11	3	186	17	0	0	3	14	37.780	2.699	2.663	1.607	1.522
12	3	189	17	0	0	3	14	35.620	2.544	2.509	1.638	1.546
~~Totals~~ & Avgs			**204**	**3**	**5**	**36**	**160**	**36.512**	**2.741**	**2.706**	**1.636**	**1.526**
Std Devs								**1.750**	**0.085**	**0.085**	**0.026**	**0.011**
CVs								**4.793%**	**3.092%**	**3.135%**	**1.585%**	**0.743%**
1	4	134	17	0	0	3	14	40.960	2.926	2.890	1.607	1.513
2	4	104	17	0	1	3	13	38.060	2.928	2.892	1.655	1.514
3	4	112	17	0	1	3	13	38.660	2.974	2.939	1.612	1.512
4	4	118	17	0	0	3	14	38.800	2.771	2.737	1.593	1.501

Table 6. Bird Weights and Feed Conversion Days 0 - 42 (10JUL15) Summarized by Treatment Group
CQR Study Number AGV-15-1

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
5	4	129	17	0	1	3	13	38.880	2.991	2.956	1.594	1.492
6	4	147	17	0	1	3	13	37.020	2.848	2.812	1.642	1.528
7	4	151	17	0	0	3	14	38.400	2.743	2.708	1.601	1.509
8	4	163	17	0	0	3	14	39.360	2.811	2.776	1.611	1.516
9	4	171	17	1	1	3	12	35.340	2.945	2.910	1.669	1.512
10	4	137	17	1	0	3	13	36.260	2.789	2.754	1.624	1.527
11	4	185	17	0	0	3	14	39.960	2.854	2.819	1.600	1.515
12	4	191	17	2	1	3	11	31.000	2.818	2.783	1.676	1.493
Totals & Avgs			**204**	**4**	**6**	**36**	**158**	**37.725**	**2.867**	**2.831**	**1.624**	**1.511**
Std Devs								**2.622**	**0.083**	**0.083**	**0.029**	**0.011**
CVs								**6.950%**	**2.910%**	**2.944%**	**1.816%**	**0.746%**
1	5	98	17	0	0	3	14	39.280	2.806	2.770	1.610	1.524
2	5	103	17	0	0	3	14	40.160	2.869	2.833	1.598	1.518
3	5	113	17	0	1	3	13	38.040	2.926	2.891	1.606	1.489
4	5	121	17	0	1	3	13	35.960	2.766	2.731	1.579	1.482
5	5	131	17	1	2	3	11	32.520	2.956	2.921	1.767	1.544
6	5	144	17	1	0	3	13	37.320	2.871	2.836	1.611	1.492
7	5	154	17	0	1	3	13	36.340	2.795	2.760	1.672	1.532
8	5	160	17	0	0	3	14	39.360	2.811	2.776	1.613	1.534
9	5	168	17	0	0	3	14	41.000	2.929	2.893	1.600	1.510
10	5	177	17	0	1	3	13	35.420	2.725	2.690	1.672	1.534
11	5	181	17	1	0	3	13	38.860	2.989	2.954	1.509	1.426
12	5	193	17	0	0	3	14	38.100	2.721	2.687	1.600	1.515
Totals & Avgs			**204**	**3**	**6**	**36**	**159**	**37.697**	**2.847**	**2.812**	**1.620**	**1.508**
Std Devs								**2.352**	**0.090**	**0.090**	**0.062**	**0.033**
CVs								**6.240%**	**3.160%**	**3.196%**	**3.846%**	**2.161%**
1	6	99	17	0	0	3	14	40.360	2.883	2.848	1.584	1.478
2	6	107	17	0	0	3	14	40.160	2.869	2.834	1.580	1.489
3	6	109	17	1	1	3	12	35.840	2.987	2.951	1.741	1.514
4	6	119	17	0	1	3	13	35.420	2.725	2.689	1.671	1.519
5	6	132	17	1	0	3	13	36.600	2.815	2.780	1.630	1.510
6	6	143	17	1	1	3	12	35.020	2.918	2.883	1.665	1.511
7	6	155	17	3	0	3	11	30.920	2.811	2.776	1.715	1.513
8	6	159	17	2	1	3	11	32.460	2.951	2.915	1.622	1.490
9	6	167	17	1	1	3	12	36.760	3.063	3.028	1.668	1.506
10	6	179	17	2	0	3	12	34.540	2.878	2.843	1.627	1.497
11	6	183	17	0	1	3	13	37.100	2.854	2.819	1.638	1.489
12	6	192	17	0	0	3	14	38.920	2.780	2.745	1.598	1.504
Totals & Avgs			**204**	**11**	**6**	**36**	**151**	**36.175**	**2.878**	**2.843**	**1.645**	**1.502**
Std Devs								**2.835**	**0.093**	**0.093**	**0.049**	**0.013**
CVs								**7.837%**	**3.235%**	**3.271%**	**3.006%**	**0.848%**
1	7	97	17	0	0	3	14	42.480	3.034	2.998	1.587	1.503
2	7	105	17	0	0	3	14	42.820	3.059	3.024	1.560	1.478
3	7	116	17	0	1	3	13	38.540	2.965	2.930	1.621	1.493
4	7	124	17	0	0	3	14	41.860	2.990	2.954	1.569	1.484
5	7	125	17	1	0	3	13	37.980	2.922	2.886	1.596	1.481
6	7	146	17	1	0	3	13	38.520	2.963	2.928	1.581	1.488
7	7	153	17	0	0	3	14	39.640	2.831	2.796	1.580	1.489
8	7	166	17	0	0	3	14	42.060	3.004	2.969	1.592	1.512

Table 6. Bird Weights and Feed Conversion Days 0 - 42 (10JUL15) Summarized by Treatment Group
CQR Study Number AGV-15-1

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
9	7	170	17	1	0	3	13	37.880	2.914	2.878	1.602	1.501
10	7	178	17	0	0	3	14	40.240	2.874	2.839	1.605	1.512
11	7	182	17	0	0	3	14	39.520	2.823	2.788	1.604	1.515
12	7	190	17	1	0	3	13	36.660	2.820	2.785	1.613	1.514
Totals & Avgs			**204**	**4**	**1**	**36**	**163**	**39.850**	**2.933**	**2.898**	**1.592**	**1.498**
Std Devs								**2.045**	**0.083**	**0.083**	**0.018**	**0.014**
CVs								**5.132%**	**2.823%**	**2.858%**	**1.120%**	**0.917%**
1	8	100	17	0	0	3	14	40.320	2.880	2.846	1.569	1.480
2	8	106	17	1	0	3	13	38.000	2.923	2.888	1.590	1.499
3	8	111	17	0	0	3	14	40.040	2.860	2.825	1.595	1.511
4	8	117	17	0	1	3	13	37.800	2.908	2.872	1.637	1.482
5	8	127	17	1	0	3	13	37.420	2.878	2.844	1.650	1.504
6	8	142	17	1	0	3	13	38.000	2.923	2.888	1.569	1.486
7	8	156	17	0	0	3	14	37.560	2.683	2.648	1.589	1.511
8	8	165	17	1	3	3	10	30.220	3.022	2.987	1.727	1.503
9	8	172	17	0	0	3	14	40.340	2.881	2.846	1.568	1.492
10	8	140	17	0	0	3	14	41.320	2.951	2.916	1.568	1.485
11	8	184	17	1	0	3	13	36.020	2.771	2.736	1.610	1.501
12	8	194	17	0	0	3	14	39.540	2.824	2.789	1.573	1.512
Totals & Avgs			**204**	**5**	**4**	**36**	**159**	**38.048**	**2.875**	**2.841**	**1.604**	**1.497**
Std Devs								**2.914**	**0.087**	**0.087**	**0.047**	**0.012**
CVs								**7.659%**	**3.035%**	**3.069%**	**2.958%**	**0.789%**

Table 8. Bird Weights and Feed Conversion Days 21 - 42 (10JUL15) Summarized by Treatment Group
CQR Study Number AGV-15-1

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D21-42	Adj. Feed Conversion D21-42
1	1	135	17	1	0	3	13	31.080	2.391	1.788	1.824	1.620
2	1	108	16	0	0	3	13	30.340	2.334	1.739	1.833	1.692
3	1	114	15	1	0	3	11	26.140	2.376	1.774	1.869	1.618
4	1	120	17	1	0	3	13	29.380	2.260	1.689	1.795	1.620
5	1	126	17	1	0	3	13	31.080	2.391	1.781	1.944	1.652
6	1	148	17	0	0	3	14	32.720	2.337	1.745	1.741	1.607
7	1	149	17	0	1	3	13	31.920	2.455	1.854	1.871	1.627
8	1	162	16	0	0	3	13	31.320	2.409	1.809	1.767	1.626
9	1	169	16	0	0	3	13	32.480	2.498	1.855	1.795	1.650
10	1	138	17	0	0	3	14	30.900	2.207	1.673	1.786	1.664
11	1	187	17	0	0	3	14	31.000	2.214	1.664	1.769	1.654
12	1	195	16	0	0	3	13	29.200	2.246	1.654	1.763	1.630
Totals & Avgs			**198**	**4**	**1**	**36**	**157**	**30.630**	**2.343**	**1.752**	**1.813**	**1.638**
Std Devs								**1.768**	**0.095**	**0.071**	**0.058**	**0.024**
CVs								**5.773%**	**4.034%**	**4.027%**	**3.210%**	**1.484%**

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D21-42	Adj. Feed Conversion D21-42
1	2	133	17	0	0	3	14	39.000	2.786	2.102	1.714	1.600
2	2	102	17	0	1	3	13	38.000	2.923	2.267	1.731	1.548
3	2	110	17	0	0	3	14	40.560	2.897	2.250	1.654	1.558
4	2	122	17	0	0	3	14	38.680	2.763	2.092	1.702	1.576
5	2	128	17	1	0	3	13	38.300	2.946	2.272	1.766	1.544
6	2	141	17	0	0	3	14	38.880	2.777	2.117	1.687	1.563
7	2	152	17	0	0	3	14	39.320	2.809	2.109	1.723	1.591
8	2	161	17	0	0	3	14	40.320	2.880	2.178	1.725	1.597
9	2	174	17	0	0	3	14	39.000	2.786	2.099	1.698	1.564
10	2	180	17	0	0	3	14	39.560	2.826	2.135	1.689	1.571
11	2	188	17	1	0	3	13	37.620	2.894	2.182	1.835	1.585
12	2	196	17	0	0	3	14	36.400	2.600	1.887	1.808	1.659
Totals & Avgs			**204**	**2**	**1**	**36**	**165**	**38.803**	**2.824**	**2.141**	**1.728**	**1.580**
Std Devs								**1.144**	**0.094**	**0.104**	**0.052**	**0.031**
CVs								**2.949%**	**3.332%**	**4.873%**	**3.005%**	**1.951%**

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D21-42	Adj. Feed Conversion D21-42
1	3	136	16	1	0	3	12	33.160	2.763	2.085	1.784	1.608
2	3	101	17	0	1	3	13	36.860	2.835	2.168	1.786	1.577
3	3	115	17	0	0	3	14	38.920	2.780	2.096	1.732	1.602
4	3	123	17	0	0	3	14	36.900	2.636	1.983	1.706	1.572
5	3	130	17	1	0	3	13	36.560	2.812	2.121	1.769	1.583
6	3	145	16	0	1	3	12	33.680	2.807	2.145	1.781	1.573
7	3	150	17	0	1	3	13	36.260	2.789	2.105	1.802	1.609
8	3	164	17	0	0	3	14	37.620	2.687	2.029	1.724	1.597
9	3	173	17	0	0	3	14	38.640	2.760	2.098	1.693	1.575
10	3	139	17	0	1	3	13	36.140	2.780	2.102	1.786	1.586
11	3	186	17	0	0	3	14	37.780	2.699	2.042	1.719	1.594
12	3	189	17	0	0	3	14	35.620	2.544	1.902	1.743	1.606
Totals & Avgs			**202**	**2**	**4**	**36**	**160**	**36.512**	**2.741**	**2.073**	**1.752**	**1.590**
Std Devs								**1.750**	**0.085**	**0.074**	**0.037**	**0.014**
CVs								**4.793%**	**3.092%**	**3.562%**	**2.097%**	**0.892%**

Table 8. Bird Weights and Feed Conversion Days 21 - 42 (10JUL15) Summarized by Treatment Group
CQR Study Number AGV-15-1

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D21-42	Adj. Feed Conversion D21-42
1	4	134	17	0	0	3	14	40.960	2.926	2.179	1.722	1.582
2	4	104	17	0	1	3	13	38.060	2.928	2.237	1.786	1.577
3	4	112	17	0	1	3	13	38.660	2.974	2.300	1.713	1.569
4	4	118	17	0	0	3	14	38.800	2.771	2.063	1.728	1.589
5	4	129	17	0	1	3	13	38.880	2.991	2.303	1.687	1.538
6	4	147	17	0	1	3	13	37.020	2.848	2.163	1.749	1.581
7	4	151	17	0	0	3	14	38.400	2.743	2.059	1.695	1.561
8	4	163	17	0	0	3	14	39.360	2.811	2.101	1.724	1.582
9	4	171	16	0	1	3	12	35.340	2.945	2.226	1.813	1.578
10	4	137	16	0	0	3	13	36.260	2.789	2.092	1.732	1.593
11	4	185	17	0	0	3	14	39.960	2.854	2.159	1.693	1.570
12	4	191	16	1	1	3	11	31.000	2.818	2.133	1.845	1.560
Totals & Avgs			**201**	**1**	**6**	**36**	**158**	**37.725**	**2.867**	**2.168**	**1.741**	**1.573**
Std Devs								**2.622**	**0.083**	**0.084**	**0.050**	**0.015**
CVs								**6.950%**	**2.910%**	**3.889%**	**2.854%**	**0.949%**
1	5	98	17	0	0	3	14	39.280	2.806	2.114	1.717	1.592
2	5	103	17	0	0	3	14	40.160	2.869	2.177	1.685	1.571
3	5	113	17	0	1	3	13	38.040	2.926	2.210	1.735	1.557
4	5	121	16	0	0	3	13	35.960	2.766	2.081	1.671	1.538
5	5	131	15	0	1	3	11	32.520	2.956	2.206	1.961	1.636
6	5	144	17	1	0	3	13	37.320	2.871	2.177	1.742	1.563
7	5	154	17	0	1	3	13	36.340	2.795	2.078	1.837	1.618
8	5	160	17	0	0	3	14	39.360	2.811	2.118	1.726	1.610
9	5	168	17	0	0	3	14	41.000	2.929	2.180	1.717	1.583
10	5	177	17	0	1	3	13	35.420	2.725	2.016	1.846	1.628
11	5	181	16	0	0	3	13	38.860	2.989	2.274	1.580	1.463
12	5	193	17	0	0	3	14	38.100	2.721	2.037	1.707	1.581
Totals & Avgs			**200**	**1**	**4**	**36**	**159**	**37.697**	**2.847**	**2.139**	**1.744**	**1.578**
Std Devs								**2.352**	**0.090**	**0.077**	**0.098**	**0.047**
CVs								**6.240%**	**3.160%**	**3.619%**	**5.609%**	**2.979%**
1	6	99	17	0	0	3	14	40.360	2.883	2.185	1.691	1.537
2	6	107	17	0	0	3	14	40.160	2.869	2.200	1.672	1.543
3	6	109	17	1	1	3	12	35.840	2.987	2.278	1.939	1.588
4	6	119	17	0	1	3	13	35.420	2.725	2.046	1.818	1.586
5	6	132	17	1	0	3	13	36.600	2.815	2.100	1.771	1.586
6	6	143	16	0	1	3	12	35.020	2.918	2.231	1.793	1.568
7	6	155	15	1	0	3	11	30.920	2.811	2.086	1.903	1.596
8	6	159	14	0	0	3	11	32.460	2.951	2.224	1.710	1.552
9	6	167	16	0	1	3	12	36.760	3.063	2.335	1.809	1.568
10	6	179	15	0	0	3	12	34.540	2.878	2.160	1.722	1.561
11	6	183	17	0	1	3	13	37.100	2.854	2.153	1.786	1.560
12	6	192	17	0	0	3	14	38.920	2.780	2.053	1.711	1.570
Totals & Avgs			**195**	**3**	**5**	**36**	**151**	**36.175**	**2.878**	**2.171**	**1.777**	**1.568**
Std Devs								**2.835**	**0.093**	**0.090**	**0.083**	**0.018**
CVs								**7.837%**	**3.235%**	**4.123%**	**4.665%**	**1.178%**

Table 8. Bird Weights and Feed Conversion Days 21 - 42 (10JUL15) Summarized by Treatment Group
CQR Study Number AGV-15-1

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D21-42	Adj. Feed Conversion D21-42
1	7	97	17	0	0	3	14	42.480	3.034	2.259	1.706	1.579
2	7	105	17	0	0	3	14	42.820	3.059	2.320	1.664	1.545
3	7	116	17	0	1	3	13	38.540	2.965	2.208	1.773	1.573
4	7	124	17	0	0	3	14	41.860	2.990	2.277	1.665	1.542
5	7	125	17	1	0	3	13	37.980	2.922	2.217	1.711	1.540
6	7	146	16	0	0	3	13	38.520	2.963	2.262	1.674	1.544
7	7	153	17	0	0	3	14	39.640	2.831	2.121	1.681	1.548
8	7	166	17	0	0	3	14	42.060	3.004	2.265	1.703	1.586
9	7	170	16	0	0	3	13	37.880	2.914	2.174	1.712	1.564
10	7	178	17	0	0	3	14	40.240	2.874	2.128	1.732	1.592
11	7	182	17	0	0	3	14	39.520	2.823	2.103	1.734	1.600
12	7	190	16	0	0	3	13	36.660	2.820	2.091	1.752	1.604
Totals & Avgs			**201**	**1**	**1**	**36**	**163**	**39.850**	**2.933**	**2.202**	**1.709**	**1.568**
Std Devs								**2.045**	**0.083**	**0.077**	**0.034**	**0.024**
CVs								**5.132%**	**2.823%**	**3.504%**	**2.014%**	**1.539%**

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D21-42	Adj. Feed Conversion D21-42
1	8	100	17	0	0	3	14	40.320	2.880	2.199	1.660	1.531
2	8	106	16	0	0	3	13	38.000	2.923	2.247	1.674	1.547
3	8	111	17	0	0	3	14	40.040	2.860	2.169	1.688	1.567
4	8	117	17	0	1	3	13	37.800	2.908	2.182	1.786	1.549
5	8	127	17	1	0	3	13	37.420	2.878	2.186	1.788	1.570
6	8	142	16	0	0	3	13	38.000	2.923	2.198	1.667	1.546
7	8	156	17	0	0	3	14	37.560	2.683	2.049	1.684	1.572
8	8	165	15	0	2	3	10	30.220	3.022	2.253	1.940	1.596
9	8	172	17	0	0	3	14	40.340	2.881	2.192	1.667	1.557
10	8	140	17	0	0	3	14	41.320	2.951	2.243	1.656	1.536
11	8	184	17	1	0	3	13	36.020	2.771	2.071	1.745	1.575
12	8	194	17	0	0	3	14	39.540	2.824	2.144	1.668	1.578
Totals & Avgs			**200**	**2**	**3**	**36**	**159**	**38.048**	**2.875**	**2.178**	**1.718**	**1.560**
Std Devs								**2.914**	**0.087**	**0.064**	**0.084**	**0.019**
CVs								**7.659%**	**3.035%**	**2.940%**	**4.915%**	**1.224%**

Table 9. Feed Added and Removed by Pen Day 0 - Study End (kg)
CQR Study Number AGV-15-1

			Day 0 - 14			Day 14 - 21				Day 21 - 42						
Block	Trt	Pen No.	Feed 1 27-May-15	WB (D14) 12-Jun-15	Feed Consumed D 0 - 14 (kg)	Feed 2 12-Jun-15	WB (D21) 19-Jun-15	Feed Consumed D 14 - 21 (kg)	Feed Consumed D 0 - 21 (kg)	Feed 3 19-Jun-15	Feed 4 26-Jun-15	Feed 5 2-Jul-15	Feed 6 8-Jul-05	WB (D42) 10-Jul-15	Feed Consumed D 21 - 42 (kg)	Feed Consumed D 0 - 42 (kg)
1	7	97	10.00	3.50	6.50	13.00	3.04	9.96	16.46	20.00	12.00	16.00	6.00	4.02	49.98	66.44
1	5	98	10.00	3.96	6.04	13.00	4.04	8.96	15.00	20.00	12.00	16.00	6.00	6.74	47.26	62.26
1	6	99	10.00	4.22	5.78	13.00	3.98	9.02	14.80	20.00	12.00	16.00	6.00	5.80	48.20	63.00
1	8	100	10.00	4.16	5.84	13.00	4.18	8.82	14.66	20.00	12.00	16.00	6.00	6.30	47.70	62.36
2	3	101	10.00	4.12	5.88	13.00	4.16	8.84	14.72	20.00	12.00	16.00	6.00	8.42	45.58	60.30
2	2	102	10.00	4.06	5.94	13.00	4.32	8.68	14.62	20.00	12.00	16.00	6.00	7.54	46.46	61.08
2	5	103	10.00	3.84	6.16	13.00	3.82	9.18	15.34	20.00	12.00	16.00	6.00	6.14	47.86	63.20
2	4	104	10.00	4.20	5.80	13.00	3.82	9.18	14.98	20.00	12.00	16.00	6.00	7.00	47.00	61.98
2	7	105	10.00	3.90	6.10	13.00	3.60	9.40	15.50	20.00	12.00	16.00	6.00	3.64	50.36	65.86
2	8	106	10.00	4.32	5.68	13.00	4.72	8.28	13.96	20.00	12.00	16.00	6.00	8.50	45.50	59.46
2	6	107	10.00	4.24	5.76	13.00	4.40	8.60	14.36	20.00	12.00	16.00	6.00	5.84	48.16	62.52
2	1	108	10.00	4.88	5.12	13.00	5.70	7.30	12.42	20.00	12.00	16.00	6.00	15.84	38.16	50.58
3	6	109	10.00	3.90	6.10	13.00	3.92	9.08	15.18	20.00	12.00	16.00	6.00	7.84	46.16	61.34
3	2	110	10.00	3.90	6.10	13.00	4.08	8.92	15.02	20.00	12.00	16.00	6.00	5.10	48.90	63.92
3	8	111	10.00	3.86	6.14	13.00	3.98	9.02	15.16	20.00	12.00	16.00	6.00	6.24	47.76	62.92
3	4	112	10.00	4.02	5.98	13.00	4.24	8.76	14.74	20.00	12.00	16.00	6.00	7.40	46.60	61.34
3	5	113	10.00	3.80	6.20	13.00	3.92	9.08	15.28	20.00	12.00	16.00	6.00	9.14	44.86	60.14
3	1	114	10.00	5.00	5.00	13.00	6.00	7.00	12.00	20.00	12.00	16.00	6.00	22.04	31.96	43.96
3	3	115	10.00	3.98	6.02	13.00	4.20	8.80	14.82	20.00	12.00	16.00	6.00	6.72	47.28	62.10
3	7	116	10.00	3.62	6.38	13.00	3.40	9.60	15.98	20.00	12.00	16.00	6.00	8.48	45.52	61.50
4	8	117	10.00	3.72	6.28	13.00	3.84	9.16	15.44	20.00	12.00	16.00	6.00	8.54	45.46	60.90
4	4	118	10.00	4.18	5.82	13.00	4.20	8.80	14.62	20.00	12.00	16.00	6.00	7.76	46.24	60.86
4	6	119	10.00	4.14	5.86	13.00	4.10	8.90	14.76	20.00	12.00	16.00	6.00	10.58	43.42	58.18
4	1	120	10.00	4.70	5.30	13.00	5.72	7.28	12.58	20.00	12.00	16.00	6.00	18.68	35.32	47.90
4	5	121	10.00	4.16	5.84	13.00	4.78	8.22	14.06	20.00	12.00	16.00	6.00	12.22	41.78	55.84
4	2	122	10.00	4.10	5.90	13.00	4.20	8.80	14.70	20.00	12.00	16.00	6.00	7.56	46.44	61.14
4	3	123	10.00	4.26	5.74	13.00	4.60	8.40	14.14	20.00	12.00	16.00	6.00	9.98	44.02	58.16
4	7	124	10.00	3.82	6.18	13.00	3.96	9.04	15.22	20.00	12.00	16.00	6.00	4.48	49.52	64.74
5	7	125	10.00	3.80	6.20	13.00	4.04	8.96	15.16	20.00	12.00	16.00	6.00	9.52	44.48	59.64
5	1	126	10.00	4.36	5.64	13.00	5.18	7.82	13.46	20.00	12.00	16.00	6.00	13.72	40.28	53.74
5	8	127	10.00	4.00	6.00	13.00	4.08	8.92	14.92	20.00	12.00	16.00	6.00	8.16	45.84	60.76
5	2	128	10.00	3.80	6.20	13.00	3.96	9.04	15.24	20.00	12.00	16.00	6.00	6.60	47.40	62.64
5	4	129	10.00	3.94	6.06	13.00	3.88	9.12	15.18	20.00	12.00	16.00	6.00	8.14	45.86	61.04
5	3	130	10.00	3.86	6.14	13.00	3.90	9.10	15.24	20.00	12.00	16.00	6.00	10.12	43.88	59.12
5	5	131	10.00	4.20	5.80	13.00	4.10	8.90	14.70	20.00	12.00	16.00	6.00	12.30	41.70	56.40
5	6	132	10.00	3.98	6.02	13.00	3.62	9.38	15.40	20.00	12.00	16.00	6.00	10.72	43.28	58.68
1	2	133	10.00	3.84	6.16	13.00	3.68	9.32	15.48	20.00	12.00	16.00	6.00	7.06	46.94	62.42
1	4	134	10.00	3.56	6.44	13.00	3.24	9.76	16.20	20.00	12.00	16.00	6.00	5.34	48.66	64.86
1	1	135	10.00	4.18	5.82	13.00	4.74	8.26	14.08	20.00	12.00	16.00	6.00	15.98	38.02	52.10
1	3	136	10.00	4.20	5.80	13.00	4.56	8.44	14.24	20.00	12.00	16.00	6.00	14.22	39.78	54.02
10	4	137	10.00	4.26	5.74	13.00	4.30	8.70	14.44	20.00	12.00	16.00	6.00	10.52	43.48	57.92
10	1	138	10.00	4.16	5.84	13.00	5.38	7.62	13.46	20.00	12.00	16.00	6.00	15.02	38.98	52.44
10	3	139	10.00	4.14	5.86	13.00	4.20	8.80	14.66	20.00	12.00	16.00	6.00	10.04	43.96	58.62
10	8	140	10.00	3.96	6.04	13.00	3.68	9.32	15.36	20.00	12.00	16.00	6.00	5.50	48.50	63.86
6	2	141	10.00	4.20	5.80	13.00	4.06	8.94	14.74	20.00	12.00	16.00	6.00	7.34	46.66	61.40
6	8	142	10.00	4.10	5.90	13.00	4.20	8.80	14.70	20.00	12.00	16.00	6.00	10.00	44.00	58.70
6	6	143	10.00	4.28	5.72	13.00	4.48	8.52	14.24	20.00	12.00	16.00	6.00	10.94	43.06	57.30
6	5	144	10.00	4.12	5.88	13.00	4.16	8.84	14.72	20.00	12.00	16.00	6.00	9.54	44.46	59.18
6	3	145	10.00	4.60	5.40	13.00	4.60	8.40	13.80	20.00	12.00	16.00	6.00	12.86	41.14	54.94

Table 9. Feed Added and Removed by Pen Day 0 - Study End (kg)
CQR Study Number AGV-15-1

Block	Trt	Pen No.	Day 0 - 14: Feed 1 27-May-15	Day 0 - 14: WB (D14) 12-Jun-15	Day 0 - 14: Feed Consumed D 0 - 14 (kg)	Day 14 - 21: Feed 2 12-Jun-15	Day 14 - 21: WB (D21) 19-Jun-15	Day 14 - 21: Feed Consumed D 14 - 21 (kg)	Day 14 - 21: Feed Consumed D 0 - 21 (kg)	Day 21 - 42: Feed 3 19-Jun-15	Day 21 - 42: Feed 4 26-Jun-15	Day 21 - 42: Feed 5 2-Jul-15	Day 21 - 42: Feed 6 8-Jul-05	Day 21 - 42: WB (D42) 10-Jul-15	Day 21 - 42: Feed Consumed D 21 - 42 (kg)	Day 21 - 42: Feed Consumed D 0 - 42 (kg)
6	7	146	10.00	4.42	5.58	13.00	4.32	8.68	14.26	20.00	12.00	16.00	6.00	8.30	45.70	59.96
6	4	147	10.00	3.72	6.28	13.00	3.88	9.12	15.40	20.00	12.00	16.00	6.00	9.62	44.38	59.78
6	1	148	10.00	4.30	5.70	13.00	4.60	8.40	14.10	20.00	12.00	16.00	6.00	14.54	39.46	53.56
7	1	149	10.00	4.44	5.56	13.00	5.10	7.90	13.46	20.00	12.00	16.00	6.00	13.40	40.60	54.06
7	3	150	10.00	3.80	6.20	13.00	3.96	9.04	15.24	20.00	12.00	16.00	6.00	9.64	44.36	59.60
7	4	151	10.00	3.80	6.20	13.00	4.06	8.94	15.14	20.00	12.00	16.00	6.00	8.62	45.38	60.52
7	2	152	10.00	3.20	6.80	13.00	3.72	9.28	16.08	20.00	12.00	16.00	6.00	6.76	47.24	63.32
7	7	153	10.00	3.80	6.20	13.00	3.86	9.14	15.34	20.00	12.00	16.00	6.00	7.66	46.34	61.68
7	5	154	10.00	3.80	6.20	13.00	3.78	9.22	15.42	20.00	12.00	16.00	6.00	9.66	44.34	59.76
7	6	155	10.00	4.32	5.68	13.00	4.82	8.18	13.86	20.00	12.00	16.00	6.00	15.86	38.14	52.00
7	8	156	10.00	4.70	5.30	13.00	4.64	8.36	13.66	20.00	12.00	16.00	6.00	8.90	45.10	58.76
8	6	159	10.00	4.52	5.48	13.00	4.92	8.08	13.56	20.00	12.00	16.00	6.00	15.90	38.10	51.66
8	5	160	10.00	4.12	5.88	13.00	3.98	9.02	14.90	20.00	12.00	16.00	6.00	6.40	47.60	62.50
8	2	161	10.00	3.66	6.34	13.00	3.76	9.24	15.58	20.00	12.00	16.00	6.00	5.04	48.96	64.54
8	1	162	10.00	4.72	5.28	13.00	5.50	7.50	12.78	20.00	12.00	16.00	6.00	15.62	38.38	51.16
8	4	163	10.00	3.76	6.24	13.00	3.82	9.18	15.42	20.00	12.00	16.00	6.00	6.98	47.02	62.44
8	3	164	10.00	4.22	5.78	13.00	4.52	8.48	14.26	20.00	12.00	16.00	6.00	8.42	45.58	59.84
8	8	165	10.00	3.90	6.10	13.00	4.18	8.82	14.92	20.00	12.00	16.00	6.00	17.76	36.24	51.16
8	7	166	10.00	3.66	6.34	13.00	3.58	9.42	15.76	20.00	12.00	16.00	6.00	3.76	50.24	66.00
9	6	167	10.00	3.86	6.14	13.00	4.24	8.76	14.90	20.00	12.00	16.00	6.00	8.60	45.40	60.30
9	5	168	10.00	3.60	6.40	13.00	3.34	9.66	16.06	20.00	12.00	16.00	6.00	5.44	48.56	64.62
9	1	169	10.00	4.46	5.54	13.00	4.72	8.28	13.82	20.00	12.00	16.00	6.00	14.18	39.82	53.64
9	7	170	10.00	3.80	6.20	13.00	4.08	8.92	15.12	20.00	12.00	16.00	6.00	9.42	44.58	59.70
9	4	171	10.00	3.94	6.06	13.00	4.30	8.70	14.76	20.00	12.00	16.00	6.00	10.78	43.22	57.98
9	8	172	10.00	4.06	5.94	13.00	4.32	8.68	14.62	20.00	12.00	16.00	6.00	6.30	47.70	62.32
9	3	173	10.00	4.32	5.68	13.00	4.26	8.74	14.42	20.00	12.00	16.00	6.00	7.64	46.36	60.78
9	2	174	10.00	3.66	6.34	13.00	4.02	8.98	15.32	20.00	12.00	16.00	6.00	7.62	46.38	61.70
10	5	177	10.00	4.04	5.96	13.00	3.90	9.10	15.06	20.00	12.00	16.00	6.00	10.84	43.16	58.22
10	7	178	10.00	3.64	6.36	13.00	3.50	9.50	15.86	20.00	12.00	16.00	6.00	6.26	47.74	63.60
10	6	179	10.00	4.26	5.74	13.00	4.44	8.56	14.30	20.00	12.00	16.00	6.00	13.08	40.92	55.22
10	2	180	10.00	3.62	6.38	13.00	3.22	9.78	16.16	20.00	12.00	16.00	6.00	7.00	47.00	63.16
11	5	181	10.00	4.28	5.72	13.00	4.30	8.70	14.42	20.00	12.00	16.00	6.00	10.68	43.32	57.74
11	7	182	10.00	4.06	5.94	13.00	3.82	9.18	15.12	20.00	12.00	16.00	6.00	6.70	47.30	62.42
11	6	183	10.00	4.18	5.82	13.00	4.00	9.00	14.82	20.00	12.00	16.00	6.00	9.02	44.98	59.80
11	8	184	10.00	3.82	6.18	13.00	4.20	8.80	14.98	20.00	12.00	16.00	6.00	11.92	42.08	57.06
11	4	185	10.00	3.90	6.10	13.00	3.78	9.22	15.32	20.00	12.00	16.00	6.00	6.36	47.64	62.96
11	3	186	10.00	4.36	5.64	13.00	4.64	8.36	14.00	20.00	12.00	16.00	6.00	8.24	45.76	59.76
11	1	187	10.00	4.60	5.40	13.00	5.14	7.86	13.26	20.00	12.00	16.00	6.00	15.72	38.28	51.54
11	2	188	10.00	3.90	6.10	13.00	3.22	9.78	15.88	20.00	12.00	16.00	6.00	7.18	46.82	62.70
12	3	189	10.00	4.56	5.44	13.00	4.10	8.90	14.34	20.00	12.00	16.00	6.00	10.96	43.04	57.38
12	7	190	10.00	4.30	5.70	13.00	4.34	8.66	14.36	20.00	12.00	16.00	6.00	10.20	43.80	58.16
12	4	191	10.00	4.44	5.56	13.00	4.58	8.42	13.98	20.00	12.00	16.00	6.00	17.02	36.98	50.96
12	6	192	10.00	3.78	6.22	13.00	3.42	9.58	15.80	20.00	12.00	16.00	6.00	8.56	45.44	61.24
12	5	193	10.00	4.08	5.92	13.00	4.08	8.92	14.84	20.00	12.00	16.00	6.00	8.84	45.16	60.00
12	8	194	10.00	4.22	5.78	13.00	4.18	8.82	14.60	20.00	12.00	16.00	6.00	7.34	46.66	61.26
12	1	195	10.00	4.68	5.32	13.00	5.46	7.54	12.86	20.00	12.00	16.00	6.00	19.24	34.76	47.62
12	2	196	10.00	3.74	6.26	13.00	3.64	9.36	15.62	20.00	12.00	16.00	6.00	10.10	43.90	59.52

Abbreviations for Causes of Mortality in Poultry Feeding Studies*

Abbrev.	Cause of Death	Abbrev.	Cause of Death
ACT	Ascites	IE	Intestinal enteritis
ACT-S	Ascites + SDS	INJ	Injury
AS	Airsacculitis	NE	Necrotic enteritis
BAC	Bacterial	PRO	Prolapsed
CAN	Cannibalism	RH	Round heart (ascites)
CC	Coccidiosis	SDS	Sudden death syndrome
CD	Cervical dislocation	SM	Smothered
DH	Dehydrated	SO	Starve-out
EC	*E. coli*	UNK	Unknown cause of death
M	Mortality; R1 = removed, bird moribund bound R2 = removed; bird not moribund bound		
Comments/Findings Codes			
Code	**Comment/Finding**	**Code**	**Comment/Finding**
BL	Bad leg	LS	Lesion score
C	Cull	NGL	No gross lesions
C-SB	Cull, small bird	RCT	Recount bird
DC	Decomposed	SMPL	Sample bird
FHN	Femoral head necrosis	SS	Sex slip

*This table was added to the Final Study Report after the report was finalized in order to define the abbreviations for causes of mortality in birds that were removed from the study. The data on bird mortality is contained in Tables 10 and 11 that follow.

Table 10. Mortality and Removal Weights (Day 0 - Study End)
CQR Study Number AGV-15-1

				Days 0 - 14 (29MAY15 - 12JUN15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
1	7	97	17							0.000	17
1	5	98	17							0.000	17
1	6	99	17							0.000	17
1	8	100	17							0.000	17
2	3	101	17							0.000	17
2	2	102	17							0.000	17
2	5	103	17							0.000	17
2	4	104	17							0.000	17
2	7	105	17							0.000	17
2	8	106	17	1			BAC	0.040		0.040	16
2	6	107	17							0.000	17
2	1	108	17	1			BAC	0.050		0.050	16
3	6	109	17							0.000	17
3	2	110	17							0.000	17
3	8	111	17							0.000	17
3	4	112	17							0.000	17
3	5	113	17							0.000	17
3	1	114	17	2			BAC; SDS	0.140		0.140	15
3	3	115	17							0.000	17
3	7	116	17							0.000	17
4	8	117	17							0.000	17
4	4	118	17							0.000	17
4	6	119	17							0.000	17
4	1	120	17							0.000	17
4	5	121	17		1		CD-C/BL		0.133	0.133	16

				Days 0 - 14 (29MAY15 - 12JUN15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
4	2	122	17							0.000	17
4	3	123	17							0.000	17
4	7	124	17							0.000	17
5	7	125	17							0.000	17
5	1	126	17							0.000	17
5	8	127	17							0.000	17
5	2	128	17							0.000	17
5	4	129	17							0.000	17
5	3	130	17							0.000	17
5	5	131	17	1			BAC	0.042		0.042	16
5	6	132	17							0.000	17
1	2	133	17							0.000	17
1	4	134	17							0.000	17
1	1	135	17							0.000	17
1	3	136	17		1		CD-C/BL		0.181	0.181	16
10	4	137	17	1			BAC	0.071		0.071	16
10	1	138	17							0.000	17
10	3	139	17							0.000	17
10	8	140	17							0.000	17
6	2	141	17							0.000	17
6	8	142	17	1			BAC	0.033		0.033	16
6	6	143	17	1			BAC	0.066		0.066	16
6	5	144	17							0.000	17
6	3	145	17	1			BAC	0.058		0.058	16
6	7	146	17	1			BAC	0.081		0.081	16
6	4	147	17							0.000	17
6	1	148	17							0.000	17
7	1	149	17							0.000	17
7	3	150	17							0.000	17
7	4	151	17							0.000	17

				Days 0 - 14 (29MAY15 - 12JUN15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
7	2	152	17							0.000	17
7	7	153	17							0.000	17
7	5	154	17							0.000	17
7	6	155	17	2			BAC; DH	0.177		0.177	15
7	8	156	17							0.000	17
8	6	159	17	2			2 BAC	0.130		0.130	15
8	5	160	17							0.000	17
8	2	161	17							0.000	17
8	1	162	17	1			BAC	0.080		0.080	16
8	4	163	17							0.000	17
8	3	164	17							0.000	17
8	8	165	17							0.000	17
8	7	166	17							0.000	17
9	6	167	17	1			BAC	0.036		0.036	16
9	5	168	17							0.000	17
9	1	169	17	1			BAC	0.039		0.039	16
9	7	170	17	1			DH	0.029		0.029	16
9	4	171	17	1			BAC	0.066		0.066	16
9	8	172	17							0.000	17
9	3	173	17							0.000	17
9	2	174	17							0.000	17
10	5	177	17							0.000	17
10	7	178	17							0.000	17
10	6	179	17	1			BAC	0.041		0.041	16
10	2	180	17							0.000	17
11	5	181	17	1			BAC	0.041		0.041	16
11	7	182	17							0.000	17
11	6	183	17							0.000	17
11	8	184	17							0.000	17
11	4	185	17							0.000	17

				Days 0 - 14 (29MAY15 - 12JUN15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
11	3	186	17							0.000	17
11	1	187	17							0.000	17
11	2	188	17							0.000	17
12	3	189	17							0.000	17
12	7	190	17	1			BAC	0.043		0.043	16
12	4	191	17	1			BAC	0.062		0.062	16
12	6	192	17							0.000	17
12	5	193	17							0.000	17
12	8	194	17							0.000	17
12	1	195	17	1			BAC	0.050		0.050	16
12	2	196	17							0.000	17

Table 10. Mortality and Removal Weights (Day 0 - Study End)
CQR Study Number AGV-15-1
Facility Number 7

			Days 14 - 21 (12JUN15 - 19JUN15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
1	7	97							0.000	17
1	5	98							0.000	17
1	6	99							0.000	17
1	8	100							0.000	17
2	3	101							0.000	17
2	2	102							0.000	17
2	5	103							0.000	17
2	4	104							0.000	17
2	7	105							0.000	17
2	8	106							0.000	16
2	6	107							0.000	17
2	1	108							0.000	16
3	6	109							0.000	17
3	2	110							0.000	17
3	8	111							0.000	17
3	4	112							0.000	17
3	5	113							0.000	17
3	1	114							0.000	15
3	3	115							0.000	17
3	7	116							0.000	17
4	8	117							0.000	17
4	4	118							0.000	17
4	6	119							0.000	17
4	1	120							0.000	17
4	5	121							0.000	16

			Days 14 - 21 (12JUN15 - 19JUN15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
4	2	122							0.000	17
4	3	123							0.000	17
4	7	124							0.000	17
5	7	125							0.000	17
5	1	126							0.000	17
5	8	127							0.000	17
5	2	128							0.000	17
5	4	129							0.000	17
5	3	130							0.000	17
5	5	131		1		CD-BAC		0.330	0.330	15
5	6	132							0.000	17
1	2	133							0.000	17
1	4	134							0.000	17
1	1	135							0.000	17
1	3	136							0.000	16
10	4	137							0.000	16
10	1	138							0.000	17
10	3	139							0.000	17
10	8	140							0.000	17
6	2	141							0.000	17
6	8	142							0.000	16
6	6	143							0.000	16
6	5	144							0.000	17
6	3	145							0.000	16
6	7	146							0.000	16
6	4	147							0.000	17
6	1	148							0.000	17
7	1	149							0.000	17
7	3	150							0.000	17
7	4	151							0.000	17

			Days 14 - 21 (12JUN15 - 19JUN15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
7	2	152							0.000	17
7	7	153							0.000	17
7	5	154							0.000	17
7	6	155							0.000	15
7	8	156							0.000	17
8	6	159		1		CD-BL/FHN		0.428	0.428	14
8	5	160							0.000	17
8	2	161							0.000	17
8	1	162							0.000	16
8	4	163							0.000	17
8	3	164							0.000	17
8	8	165	1	1		BAC; CD-BL	0.192	0.191	0.383	15
8	7	166							0.000	17
9	6	167							0.000	16
9	5	168							0.000	17
9	1	169							0.000	16
9	7	170							0.000	16
9	4	171							0.000	16
9	8	172							0.000	17
9	3	173							0.000	17
9	2	174							0.000	17
10	5	177							0.000	17
10	7	178							0.000	17
10	6	179	1			SDS	0.460		0.460	15
10	2	180							0.000	17
11	5	181							0.000	16
11	7	182							0.000	17
11	6	183							0.000	17
11	8	184							0.000	17
11	4	185							0.000	17

			Days 14 - 21 (12JUN15 - 19JUN15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
11	3	186							0.000	17
11	1	187							0.000	17
11	2	188							0.000	17
12	3	189							0.000	17
12	7	190							0.000	16
12	4	191							0.000	16
12	6	192							0.000	17
12	5	193							0.000	17
12	8	194							0.000	17
12	1	195							0.000	16
12	2	196							0.000	17

Table 10. Mortality and Removal Weights (Day 0 - Study End)
CQR Study Number AGV-15-1
Facility Number 7

			Days 21 - 42 (19JUN15 - 10JUL15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 21 - 42	No. Birds Remaining Day 42
1	7	97			3	3 CD-SMPL		2.346	2.346	14
1	5	98			3	3 CD-SMPL		2.167	2.167	14
1	6	99			3	3 CD-SMPL		2.854	2.854	14
1	8	100			3	3 CD-SMPL		2.410	2.410	14
2	3	101		1	3	3 CD-SMPL; CD-Soft Bone		3.383	3.383	13
2	2	102		1	3	3 CD-SMPL; CD-FHN/Soft Bone		3.170	3.170	13
2	5	103			3	3 CD-SMPL		2.066	2.066	14
2	4	104		1	3	3 CD-SMPL; CD-BL/FHN/Soft Bone		3.492	3.492	13
2	7	105			3	3 CD-SMPL		2.341	2.341	14
2	8	106			3	3 CD-SMPL		2.228	2.228	13
2	6	107			3	3 CD-SMPL		2.407	2.407	14
2	1	108			3	3 CD-SMPL		1.735	1.735	13
3	6	109	1	1	3	ACT; CD-BAC; 3 CD-SMPL	1.271	4.003	5.274	12
3	2	110			3	3 CD-SMPL		1.828	1.828	14
3	8	111			3	3 CD-SMPL		2.176	2.176	14
3	4	112		1	3	3 CD-SMPL; CD-C/SB/BAC		2.508	2.508	13
3	5	113		1	3	CD-BAC; 3 CD-SMPL		2.959	2.959	13
3	1	114	1		3	3 CD-SMPL; SDS	0.601	2.053	2.654	11
3	3	115			3	3 CD-SMPL		2.222	2.222	14
3	7	116		1	3	CD-BL/FHN; 3 CD-SMPL		3.257	3.257	13
4	8	117		1	3	3 CD-SMPL; CD-C/BL/Soft Bone		3.883	3.883	13
4	4	118			3	3 CD-SMPL		2.336	2.336	14
4	6	119		1	3	3 CD-SMPL; CD-Soft Bone		3.489	3.489	13
4	1	120	1		3	BAC; 3 CD-SMPL	0.392	1.725	2.117	13
4	5	121			3	3 CD-SMPL		2.170	2.170	13

			Days 21 - 42 (19JUN15 - 10JUL15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 21 - 42	No. Birds Remaining Day 42
4	2	122			3	3 CD-SMPL		2.190	2.190	14
4	3	123			3	3 CD-SMPL		2.201	2.201	14
4	7	124			3	3 CD-SMPL		2.378	2.378	14
5	7	125	1		3	3 CD-SMPL; SDS	0.769	2.113	2.882	13
5	1	126	1		3	ACT; 3 CD-SMPL	1.695	1.961	3.656	13
5	8	127	1		3	3 CD-SMPL; SDS	1.486	2.072	3.558	13
5	2	128	1		3	3 CD-SMPL; SDS	1.704	2.150	3.854	13
5	4	129		1	3	CD-BAC; 3 CD-SMPL		2.631	2.631	13
5	3	130	1		3	3 CD-SMPL; SDS	0.865	2.056	2.921	13
5	5	131		1	3	3 CD-SMPL; CD-BAC/FHN		4.224	4.224	11
5	6	132	1		3	BAC; 3 CD-SMPL	0.537	2.308	2.845	13
1	2	133			3	3 CD-SMPL		1.965	1.965	14
1	4	134			3	3 CD-SMPL		2.503	2.503	14
1	1	135	1		3	3 CD-SMPL; SDS	0.518	2.111	2.629	13
1	3	136	1		3	BAC; 3 CD-SMPL	0.482	1.956	2.438	12
10	4	137			3	3 CD-SMPL		2.196	2.196	13
10	1	138			3	3 CD-SMPL		1.605	1.605	14
10	3	139		1	3	3 CD-SMPL; CD-C/ACT/BAC/FHN		3.100	3.100	13
10	8	140			3	3 CD-SMPL		2.292	2.292	14
6	2	141			3	3 CD-SMPL		2.192	2.192	14
6	8	142			3	3 CD-SMPL		2.066	2.066	13
6	6	143		1	3	CD-ACT; 3 CD-SMPL		3.448	3.448	12
6	5	144	1		3	3 CD-SMPL; SDS	0.755	2.178	2.933	13
6	3	145		1	3	3 CD-SMPL; CD-C/SS/Soft Bone		3.054	3.054	12
6	7	146			3	3 CD-SMPL		2.296	2.296	13
6	4	147		1	3	CD-BAC; 3 CD-SMPL		2.696	2.696	13
6	1	148			3	3 CD-SMPL		1.888	1.888	14
7	1	149		1	3	3 CD-SMPL; CD-FHN		3.251	3.251	13
7	3	150		1	3	CD-BL; 3 CD-SMPL		2.949	2.949	13
7	4	151			3	3 CD-SMPL		2.289	2.289	14

			Days 21 - 42 (19JUN15 - 10JUL15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 21 - 42	No. Birds Remaining Day 42
7	2	152			3	3 CD-SMPL		2.276	2.276	14
7	7	153			3	3 CD-SMPL		2.377	2.377	14
7	5	154		1	3	3 CD-SMPL; CD-C/BL		3.262	3.262	13
7	6	155	1		3	3 CD-SMPL; SDS	1.550	2.314	3.864	11
7	8	156			3	3 CD-SMPL		1.917	1.917	14
8	6	159			3	3 CD-SMPL		2.271	2.271	11
8	5	160			3	3 CD-SMPL		1.987	1.987	14
8	2	161			3	3 CD-SMPL		2.272	2.272	14
8	1	162			3	3 CD-SMPL		1.888	1.888	13
8	4	163			3	3 CD-SMPL		2.437	2.437	14
8	3	164			3	3 CD-SMPL		2.098	2.098	14
8	8	165		2	3	CD-BAC; CD-BAC/BL; 3 CD-SMPL		4.032	4.032	10
8	7	166			3	3 CD-SMPL		2.177	2.177	14
9	6	167		1	3	3 CD-SMPL; CD-C/SS		3.846	3.846	12
9	5	168			3	3 CD-SMPL		2.396	2.396	14
9	1	169			3	3 CD-SMPL		1.953	1.953	13
9	7	170			3	3 CD-SMPL		2.468	2.468	13
9	4	171		1	3	3 CD-SMPL; CD-C/BAC/BL		3.542	3.542	12
9	8	172			3	3 CD-SMPL		2.017	2.017	14
9	3	173			3	3 CD-SMPL		2.059	2.059	14
9	2	174			3	3 CD-SMPL		2.335	2.335	14
10	5	177		1	3	CD-BAC; 3 CD-SMPL		3.135	3.135	13
10	7	178			3	3 CD-SMPL		2.424	2.424	14
10	6	179			3	3 CD-SMPL		2.459	2.459	12
10	2	180			3	3 CD-SMPL		2.106	2.106	14
11	5	181			3	3 CD-SMPL		2.190	2.190	13
11	7	182			3	3 CD-SMPL		2.281	2.281	14
11	6	183		1	3	3 CD-SMPL; CD-C/BL/Soft Bone		3.649	3.649	13
11	8	184	1		3	BAC; 3 CD-SMPL	0.355	2.238	2.593	13
11	4	185			3	3 CD-SMPL		2.209	2.209	14

			Days 21 - 42 (19JUN15 - 10JUL15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 21 - 42	No. Birds Remaining Day 42
11	3	186			3	3 CD-SMPL		2.090	2.090	14
11	1	187			3	3 CD-SMPL		1.502	1.502	14
11	2	188	1		3	ACT-FHN/BL; 3 CD-SMPL		4.026	4.026	13
12	3	189			3	3 CD-SMPL		2.103	2.103	14
12	7	190			3	3 CD-SMPL		2.302	2.302	13
12	4	191	1	1	3	ACT; CD-BAC; 3 CD-SMPL	0.941	2.718	3.659	11
12	6	192			3	3 CD-SMPL		2.390	2.390	14
12	5	193			3	3 CD-SMPL		2.107	2.107	14
12	8	194			3	3 CD-SMPL		1.581	1.581	14
12	1	195			3	3 CD-SMPL		1.611	1.611	13
12	2	196			3	3 CD-SMPL		2.186	2.186	14

Table 11. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number AGV-15-1

				Days 0 - 14 (29MAY15 - 12JUN15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 0 - 14	% Removed Days 0 - 14	% M & R Days 0 - 14	No. Birds Remaining Day 14
1	1	135	17					0.000%	0.000%	0.000%	17
2	1	108	17	1			BAC	5.882%	0.000%	5.882%	16
3	1	114	17	2			BAC; SDS	11.765%	0.000%	11.765%	15
4	1	120	17					0.000%	0.000%	0.000%	17
5	1	126	17					0.000%	0.000%	0.000%	17
6	1	148	17					0.000%	0.000%	0.000%	17
7	1	149	17					0.000%	0.000%	0.000%	17
8	1	162	17	1			BAC	5.882%	0.000%	5.882%	16
9	1	169	17	1			BAC	5.882%	0.000%	5.882%	16
10	1	138	17					0.000%	0.000%	0.000%	17
11	1	187	17					0.000%	0.000%	0.000%	17
12	1	195	17	1			BAC	5.882%	0.000%	5.882%	16
Treatment 1			**204**	**6**	**0**	**0**	**5 BAC; SDS**	**2.941%**	**0.000%**	**2.941%**	**198**
1	2	133	17					0.000%	0.000%	0.000%	17
2	2	102	17					0.000%	0.000%	0.000%	17
3	2	110	17					0.000%	0.000%	0.000%	17
4	2	122	17					0.000%	0.000%	0.000%	17
5	2	128	17					0.000%	0.000%	0.000%	17
6	2	141	17					0.000%	0.000%	0.000%	17
7	2	152	17					0.000%	0.000%	0.000%	17
8	2	161	17					0.000%	0.000%	0.000%	17
9	2	174	17					0.000%	0.000%	0.000%	17
10	2	180	17					0.000%	0.000%	0.000%	17
11	2	188	17					0.000%	0.000%	0.000%	17
12	2	196	17					0.000%	0.000%	0.000%	17
Treatment 2			**204**	**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**204**

Block	Trt	Pen No.	No. Birds Started Day 0	Days 0 - 14 (29MAY15 - 12JUN15) Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 0 - 14	% Removed Days 0 - 14	% M & R Days 0 - 14	No. Birds Remaining Day 14
1	3	136	17		1		CD-C/BL	0.000%	5.882%	5.882%	16
2	3	101	17					0.000%	0.000%	0.000%	17
3	3	115	17					0.000%	0.000%	0.000%	17
4	3	123	17					0.000%	0.000%	0.000%	17
5	3	130	17					0.000%	0.000%	0.000%	17
6	3	145	17	1			BAC	5.882%	0.000%	5.882%	16
7	3	150	17					0.000%	0.000%	0.000%	17
8	3	164	17					0.000%	0.000%	0.000%	17
9	3	173	17					0.000%	0.000%	0.000%	17
10	3	139	17					0.000%	0.000%	0.000%	17
11	3	186	17					0.000%	0.000%	0.000%	17
12	3	189	17					0.000%	0.000%	0.000%	17
Treatment 3			**204**	**1**	**1**	**0**	**BAC; CD-C/BL**	**0.490%**	**0.490%**	**0.980%**	**202**
1	4	134	17					0.000%	0.000%	0.000%	17
2	4	104	17					0.000%	0.000%	0.000%	17
3	4	112	17					0.000%	0.000%	0.000%	17
4	4	118	17					0.000%	0.000%	0.000%	17
5	4	129	17					0.000%	0.000%	0.000%	17
6	4	147	17					0.000%	0.000%	0.000%	17
7	4	151	17					0.000%	0.000%	0.000%	17
8	4	163	17					0.000%	0.000%	0.000%	17
9	4	171	17	1			BAC	5.882%	0.000%	5.882%	16
10	4	137	17	1			BAC	5.882%	0.000%	5.882%	16
11	4	185	17					0.000%	0.000%	0.000%	17
12	4	191	17	1			BAC	5.882%	0.000%	5.882%	16
Treatment 4			**204**	**3**	**0**	**0**	**3 BAC**	**1.471%**	**0.000%**	**1.471%**	**201**

Block	Trt	Pen No.	No. Birds Started Day 0	Days 0 - 14 (29MAY15 - 12JUN15) Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 0 - 14	% Removed Days 0 - 14	% M & R Days 0 - 14	No. Birds Remaining Day 14
1	5	98	17					0.000%	0.000%	0.000%	17
2	5	103	17					0.000%	0.000%	0.000%	17
3	5	113	17					0.000%	0.000%	0.000%	17
4	5	121	17		1		CD-C/BL	0.000%	5.882%	5.882%	16
5	5	131	17	1			BAC	5.882%	0.000%	5.882%	16
6	5	144	17					0.000%	0.000%	0.000%	17
7	5	154	17					0.000%	0.000%	0.000%	17
8	5	160	17					0.000%	0.000%	0.000%	17
9	5	168	17					0.000%	0.000%	0.000%	17
10	5	177	17					0.000%	0.000%	0.000%	17
11	5	181	17	1			BAC	5.882%	0.000%	5.882%	16
12	5	193	17					0.000%	0.000%	0.000%	17
Treatment 5			**204**	**2**	**1**	**0**	**2 BAC; CD-C/BL**	**0.980%**	**0.490%**	**1.471%**	**201**
1	6	99	17					0.000%	0.000%	0.000%	17
2	6	107	17					0.000%	0.000%	0.000%	17
3	6	109	17					0.000%	0.000%	0.000%	17
4	6	119	17					0.000%	0.000%	0.000%	17
5	6	132	17					0.000%	0.000%	0.000%	17
6	6	143	17	1			BAC	5.882%	0.000%	5.882%	16
7	6	155	17	2			BAC; DH	11.765%	0.000%	11.765%	15
8	6	159	17	2			2 BAC	11.765%	0.000%	11.765%	15
9	6	167	17	1			BAC	5.882%	0.000%	5.882%	16
10	6	179	17	1			BAC	5.882%	0.000%	5.882%	16
11	6	183	17					0.000%	0.000%	0.000%	17
12	6	192	17					0.000%	0.000%	0.000%	17
Treatment 6			**204**	**7**	**0**	**0**	**6 BAC; DH**	**3.431%**	**0.000%**	**3.431%**	**197**

				Days 0 - 14 (29MAY15 - 12JUN15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 0 - 14	% Removed Days 0 - 14	% M & R Days 0 - 14	No. Birds Remaining Day 14
1	7	97	17					0.000%	0.000%	0.000%	17
2	7	105	17					0.000%	0.000%	0.000%	17
3	7	116	17					0.000%	0.000%	0.000%	17
4	7	124	17					0.000%	0.000%	0.000%	17
5	7	125	17					0.000%	0.000%	0.000%	17
6	7	146	17	1			BAC	5.882%	0.000%	5.882%	16
7	7	153	17					0.000%	0.000%	0.000%	17
8	7	166	17					0.000%	0.000%	0.000%	17
9	7	170	17	1			DH	5.882%	0.000%	5.882%	16
10	7	178	17					0.000%	0.000%	0.000%	17
11	7	182	17					0.000%	0.000%	0.000%	17
12	7	190	17	1			BAC	5.882%	0.000%	5.882%	16
Treatment 7			**204**	**3**	**0**	**0**	**2 BAC; DH**	**1.471%**	**0.000%**	**1.471%**	**201**

1	8	100	17					0.000%	0.000%	0.000%	17
2	8	106	17	1			BAC	5.882%	0.000%	5.882%	16
3	8	111	17					0.000%	0.000%	0.000%	17
4	8	117	17					0.000%	0.000%	0.000%	17
5	8	127	17					0.000%	0.000%	0.000%	17
6	8	142	17	1			BAC	5.882%	0.000%	5.882%	16
7	8	156	17					0.000%	0.000%	0.000%	17
8	8	165	17					0.000%	0.000%	0.000%	17
9	8	172	17					0.000%	0.000%	0.000%	17
10	8	140	17					0.000%	0.000%	0.000%	17
11	8	184	17					0.000%	0.000%	0.000%	17
12	8	194	17					0.000%	0.000%	0.000%	17
Treatment 8			**204**	**2**	**0**	**0**	**2 BAC**	**0.980%**	**0.000%**	**0.980%**	**202**

Table 11. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number AGV-15-1
Facility Number 7

			Days 14 - 21 (12JUN15 - 19JUN15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 14 - 21	% Removed Days 14 - 21	% M & R Days 14 - 21	No. Birds Remaining Day 21
1	1	135					0.000%	0.000%	0.000%	17
2	1	108					0.000%	0.000%	0.000%	16
3	1	114					0.000%	0.000%	0.000%	15
4	1	120					0.000%	0.000%	0.000%	17
5	1	126					0.000%	0.000%	0.000%	17
6	1	148					0.000%	0.000%	0.000%	17
7	1	149					0.000%	0.000%	0.000%	17
8	1	162					0.000%	0.000%	0.000%	16
9	1	169					0.000%	0.000%	0.000%	16
10	1	138					0.000%	0.000%	0.000%	17
11	1	187					0.000%	0.000%	0.000%	17
12	1	195					0.000%	0.000%	0.000%	16
Treatment 1			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**198**
1	2	133					0.000%	0.000%	0.000%	17
2	2	102					0.000%	0.000%	0.000%	17
3	2	110					0.000%	0.000%	0.000%	17
4	2	122					0.000%	0.000%	0.000%	17
5	2	128					0.000%	0.000%	0.000%	17
6	2	141					0.000%	0.000%	0.000%	17
7	2	152					0.000%	0.000%	0.000%	17
8	2	161					0.000%	0.000%	0.000%	17
9	2	174					0.000%	0.000%	0.000%	17
10	2	180					0.000%	0.000%	0.000%	17
11	2	188					0.000%	0.000%	0.000%	17
12	2	196					0.000%	0.000%	0.000%	17
Treatment 2			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**204**

Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 14 - 21	% Removed Days 14 - 21	% M & R Days 14 - 21	No. Birds Remaining Day 21
			Days 14 - 21 (12JUN15 - 19JUN15)							
1	3	136					0.000%	0.000%	0.000%	16
2	3	101					0.000%	0.000%	0.000%	17
3	3	115					0.000%	0.000%	0.000%	17
4	3	123					0.000%	0.000%	0.000%	17
5	3	130					0.000%	0.000%	0.000%	17
6	3	145					0.000%	0.000%	0.000%	16
7	3	150					0.000%	0.000%	0.000%	17
8	3	164					0.000%	0.000%	0.000%	17
9	3	173					0.000%	0.000%	0.000%	17
10	3	139					0.000%	0.000%	0.000%	17
11	3	186					0.000%	0.000%	0.000%	17
12	3	189					0.000%	0.000%	0.000%	17
Treatment 3			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**202**
1	4	134					0.000%	0.000%	0.000%	17
2	4	104					0.000%	0.000%	0.000%	17
3	4	112					0.000%	0.000%	0.000%	17
4	4	118					0.000%	0.000%	0.000%	17
5	4	129					0.000%	0.000%	0.000%	17
6	4	147					0.000%	0.000%	0.000%	17
7	4	151					0.000%	0.000%	0.000%	17
8	4	163					0.000%	0.000%	0.000%	17
9	4	171					0.000%	0.000%	0.000%	16
10	4	137					0.000%	0.000%	0.000%	16
11	4	185					0.000%	0.000%	0.000%	17
12	4	191					0.000%	0.000%	0.000%	16
Treatment 4			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**201**

			Days 14 - 21 (12JUN15 - 19JUN15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 14 - 21	% Removed Days 14 - 21	% M & R Days 14 - 21	No. Birds Remaining Day 21
1	5	98					0.000%	0.000%	0.000%	17
2	5	103					0.000%	0.000%	0.000%	17
3	5	113					0.000%	0.000%	0.000%	17
4	5	121					0.000%	0.000%	0.000%	16
5	5	131		1		CD-BAC	0.000%	6.250%	6.250%	15
6	5	144					0.000%	0.000%	0.000%	17
7	5	154					0.000%	0.000%	0.000%	17
8	5	160					0.000%	0.000%	0.000%	17
9	5	168					0.000%	0.000%	0.000%	17
10	5	177					0.000%	0.000%	0.000%	17
11	5	181					0.000%	0.000%	0.000%	16
12	5	193					0.000%	0.000%	0.000%	17
Treatment 5			**0**	**1**	**0**	**CD-BAC**	**0.000%**	**0.498%**	**0.498%**	**200**

1	6	99					0.000%	0.000%	0.000%	17
2	6	107					0.000%	0.000%	0.000%	17
3	6	109					0.000%	0.000%	0.000%	17
4	6	119					0.000%	0.000%	0.000%	17
5	6	132					0.000%	0.000%	0.000%	17
6	6	143					0.000%	0.000%	0.000%	16
7	6	155					0.000%	0.000%	0.000%	15
8	6	159		1		CD-BL/FHN	0.000%	6.667%	6.667%	14
9	6	167					0.000%	0.000%	0.000%	16
10	6	179	1			SDS	6.250%	0.000%	6.250%	15
11	6	183					0.000%	0.000%	0.000%	17
12	6	192					0.000%	0.000%	0.000%	17
Treatment 6			**1**	**1**	**0**	**CD-BL/FHN; SDS**	**0.508%**	**0.508%**	**1.015%**	**195**

			Days 14 - 21 (12JUN15 - 19JUN15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 14 - 21	% Removed Days 14 - 21	% M & R Days 14 - 21	No. Birds Remaining Day 21
1	7	97					0.000%	0.000%	0.000%	17
2	7	105					0.000%	0.000%	0.000%	17
3	7	116					0.000%	0.000%	0.000%	17
4	7	124					0.000%	0.000%	0.000%	17
5	7	125					0.000%	0.000%	0.000%	17
6	7	146					0.000%	0.000%	0.000%	16
7	7	153					0.000%	0.000%	0.000%	17
8	7	166					0.000%	0.000%	0.000%	17
9	7	170					0.000%	0.000%	0.000%	16
10	7	178					0.000%	0.000%	0.000%	17
11	7	182					0.000%	0.000%	0.000%	17
12	7	190					0.000%	0.000%	0.000%	16
Treatment 7			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**201**

1	8	100					0.000%	0.000%	0.000%	17
2	8	106					0.000%	0.000%	0.000%	16
3	8	111					0.000%	0.000%	0.000%	17
4	8	117					0.000%	0.000%	0.000%	17
5	8	127					0.000%	0.000%	0.000%	17
6	8	142					0.000%	0.000%	0.000%	16
7	8	156					0.000%	0.000%	0.000%	17
8	8	165	1	1		BAC; CD-BL	5.882%	5.882%	11.765%	15
9	8	172					0.000%	0.000%	0.000%	17
10	8	140					0.000%	0.000%	0.000%	17
11	8	184					0.000%	0.000%	0.000%	17
12	8	194					0.000%	0.000%	0.000%	17
Treatment 8			**1**	**1**	**0**	**BAC; CD-BL**	**0.495%**	**0.495%**	**0.990%**	**200**

Table 11. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number AGV-15-1
Facility Number 7

			Days 21 - 42 (19JUN15 - 10JUL15)											
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 21 - 42	% Removal-1 Days 14 - 21	% Removal-2 Days 14 - 21	% M & R-1 Dys 21 - 42	No. Birds Remaining Day 42	% Mortality Days 0 - 42	% Removal-1 Days 0 - 42	% Removal-2 Days 0 - 42
1	1	135	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
2	1	108			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
3	1	114	1		3	3 CD-SMPL; SDS	6.667%	0.000%	20.000%	6.667%	11	**17.647%**	**0.000%**	**17.647%**
4	1	120	1		3	BAC; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
5	1	126	1		3	ACT; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
6	1	148			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
7	1	149		1	3	3 CD-SMPL; CD-FHN	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
8	1	162			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
9	1	169			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
10	1	138			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
11	1	187			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
12	1	195			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
Treatment 1			**4**	**1**	**36**	**ACT; BAC; CD-FHN; 36 CD-SMPL; 2 SDS**	**2.020%**	**0.505%**	**18.182%**	**2.525%**	**157**	**4.902%**	**0.490%**	**17.647%**
1	2	133			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
2	2	102		1	3	3 CD-SMPL; CD-FHN/Soft Bone	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
3	2	110			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
4	2	122			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
5	2	128	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
6	2	141			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
7	2	152			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
8	2	161			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
9	2	174			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
10	2	180			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
11	2	188	1		3	ACT-FHN/BL; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
12	2	196			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
Treatment 2			**2**	**1**	**36**	**ACT-FHN/BL; CD-FHN/Soft Bone; 36 CD-SMPL; SDS**	**0.980%**	**0.490%**	**17.647%**	**1.471%**	**165**	**0.980%**	**0.490%**	**17.647%**

Block	Trt	Pen No.	Days 21 - 42 (19JUN15 - 10JUL15) Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 21 - 42	% Removal-1 Days 14 - 21	% Removal-2 Days 14 - 21	% M & R-1 Dys 21 - 42	No. Birds Remaining Day 42	% Mortality Days 0 - 42	% Removal-1 Days 0 - 42	% Removal-2 Days 0 - 42
1	3	136	1		3	BAC; 3 CD-SMPL	6.250%	0.000%	18.750%	6.250%	12	**5.882%**	**5.882%**	**17.647%**
2	3	101		1	3	3 CD-SMPL; CD-Soft Bone	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
3	3	115			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
4	3	123			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
5	3	130	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
6	3	145		1	3	3 CD-SMPL; CD-C/SS/Soft Bone	0.000%	6.250%	18.750%	6.250%	12	**5.882%**	**5.882%**	**17.647%**
7	3	150		1	3	CD-BL; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
8	3	164			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
9	3	173			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
10	3	139		1	3	3 CD-SMPL; CD-C/ACT/BAC/FHN	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
11	3	186			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
12	3	189			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
Treatment 3			**2**	**4**	**36**	**BAC; CD-BL; CD-Soft Bone; CD-C/SS/Soft Bone; CD-C/ACT/BAC/FHN; 36 CD-SMPL; SDS**	**0.990%**	**1.980%**	**17.822%**	**2.970%**	**160**	**1.471%**	**2.451%**	**17.647%**
1	4	134			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
2	4	104		1	3	3 CD-SMPL; CD-BL/FHN/Soft Bone	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
3	4	112		1	3	3 CD-SMPL; CD-C/SB/BAC	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
4	4	118			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
5	4	129		1	3	CD-BAC; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
6	4	147		1	3	CD-BAC; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
7	4	151			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
8	4	163			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
9	4	171		1	3	3 CD-SMPL; CD-C/BAC/BL	0.000%	6.250%	18.750%	6.250%	12	**5.882%**	**5.882%**	**17.647%**
10	4	137			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
11	4	185			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
12	4	191	1	1	3	ACT; CD-BAC; 3 CD-SMPL	6.250%	6.250%	18.750%	12.500%	11	**11.765%**	**5.882%**	**17.647%**
Treatment 4			**1**	**6**	**36**	**ACT; CD-BL/FHN/Soft Bone; CD-C/SB/BAC; 3 CD-BAC; CD-C/BAC/BL; 36 CD-SMPL**	**0.498%**	**2.985%**	**17.910%**	**3.483%**	**158**	**1.961%**	**2.941%**	**17.647%**

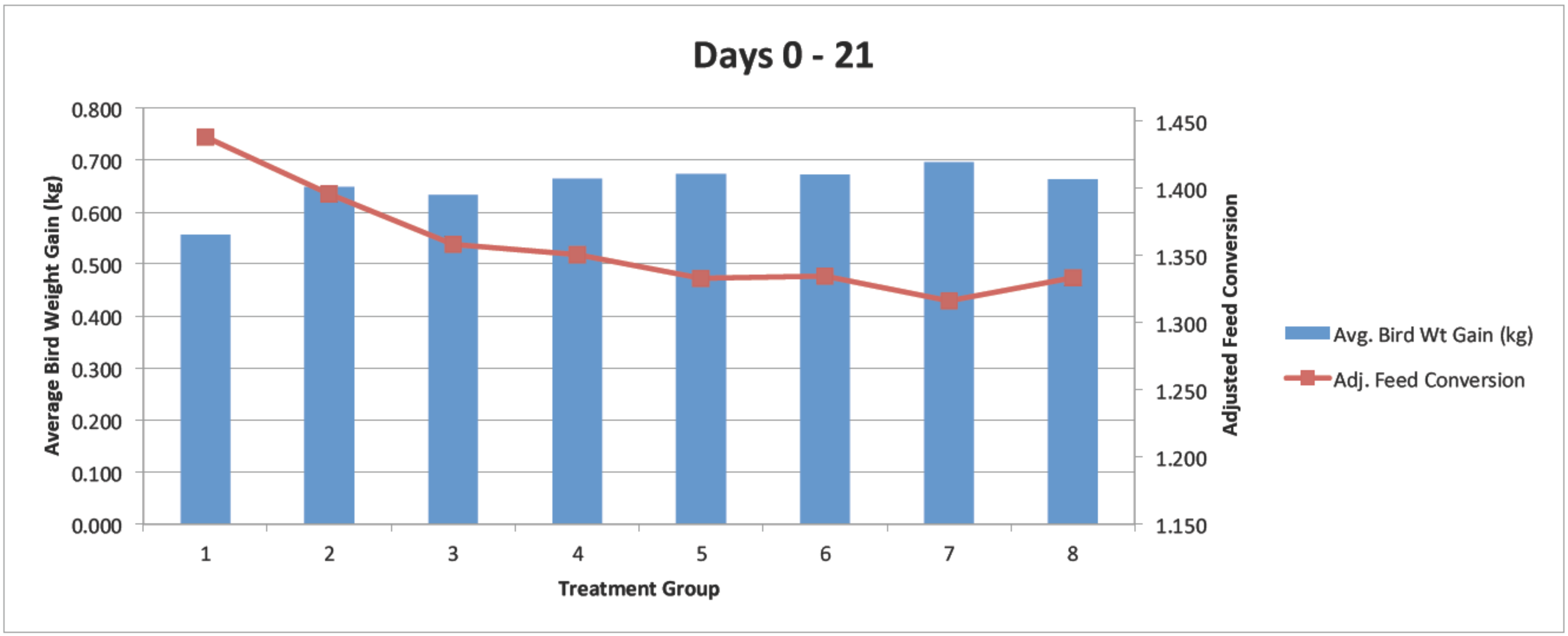
Block	Trt	Pen No.	Days 21 - 42 (19JUN15 - 10JUL15)									% Mortality Days 0 - 42	% Removal-1 Days 0 - 42	% Removal-2 Days 0 - 42
			Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 21 - 42	% Removal-1 Days 14 - 21	% Removal-2 Days 14 - 21	% M & R-1 Dys 21 - 42	No. Birds Remaining Day 42			
1	5	98			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
2	5	103			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
3	5	113		1	3	CD-BAC; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
4	5	121			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**0.000%**	**5.882%**	**17.647%**
5	5	131		1	3	3 CD-SMPL; CD-BAC/FHN	0.000%	6.667%	20.000%	6.667%	11	**5.882%**	**11.765%**	**17.647%**
6	5	144	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
7	5	154		1	3	3 CD-SMPL; CD-C/BL	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
8	5	160			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
9	5	168			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
10	5	177		1	3	CD-BAC; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
11	5	181			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
12	5	193			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
Treatment 5			**1**	**4**	**36**	**2 CD-BAC; CD-BAC/FHN; CD-C/BL; 36 CD-SMPL; SDS**	**0.500%**	**2.000%**	**18.000%**	**2.500%**	**159**	**1.471%**	**2.941%**	**17.647%**
1	6	99			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
2	6	107			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
3	6	109	1	1	3	ACT; CD-BAC; 3 CD-SMPL	5.882%	5.882%	17.647%	11.765%	12	**5.882%**	**5.882%**	**17.647%**
4	6	119		1	3	3 CD-SMPL; CD-Soft Bone	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
5	6	132	1		3	BAC; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
6	6	143		1	3	CD-ACT; 3 CD-SMPL	0.000%	6.250%	18.750%	6.250%	12	**5.882%**	**5.882%**	**17.647%**
7	6	155	1		3	3 CD-SMPL; SDS	6.667%	0.000%	20.000%	6.667%	11	**17.647%**	**0.000%**	**17.647%**
8	6	159			3	3 CD-SMPL	0.000%	0.000%	21.429%	0.000%	11	**11.765%**	**5.882%**	**17.647%**
9	6	167		1	3	3 CD-SMPL; CD-C/SS	0.000%	6.250%	18.750%	6.250%	12	**5.882%**	**5.882%**	**17.647%**
10	6	179			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	**11.765%**	**0.000%**	**17.647%**
11	6	183		1	3	3 CD-SMPL; CD-C/BL/Soft Bone	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
12	6	192			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
Treatment 6			**3**	**5**	**36**	**ACT; BAC; CD-ACT; CD-BAC; CD-Soft Bone; CD-C/SS; CD-C/BL/Soft Bone; 36 CD-SMPL; SDS**	**1.538%**	**2.564%**	**18.462%**	**4.103%**	**151**	**5.392%**	**2.941%**	**17.647%**

			Days 21 - 42 (19JUN15 - 10JUL15)											
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality Days 21 - 42	% Removal-1 Days 14 - 21	% Removal-2 Days 14 - 21	% M & R-1 Dys 21 - 42	No. Birds Remaining Day 42	% Mortality Days 0 - 42	% Removal-1 Days 0 - 42	% Removal-2 Days 0 - 42
1	7	97			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
2	7	105			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
3	7	116		1	3	CD-BL/FHN; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
4	7	124			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
5	7	125	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
6	7	146			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
7	7	153			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
8	7	166			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
9	7	170			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
10	7	178			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
11	7	182			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
12	7	190			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
Treatment 7			**1**	**1**	**36**	**CD-BL/FHN; 36 CD-SMPL; SDS**	**0.498%**	**0.498%**	**17.910%**	**0.995%**	**163**	**1.961%**	**0.490%**	**17.647%**

1	8	100			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
2	8	106			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
3	8	111			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
4	8	117		1	3	3 CD-SMPL; CD-C/BL/Soft Bone	0.000%	5.882%	17.647%	5.882%	13	**0.000%**	**5.882%**	**17.647%**
5	8	127	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
6	8	142			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
7	8	156			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
8	8	165		2	3	CD-BAC; CD-BAC/BL; 3 CD-SMPL	0.000%	13.333%	20.000%	13.333%	10	**5.882%**	**17.647%**	**17.647%**
9	8	172			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
10	8	140			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
11	8	184	1		3	BAC; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
12	8	194			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
Treatment 8			**2**	**3**	**36**	**BAC; CD-C/BL/Soft Bone; CD-BAC; CD-BAC/BL; 36 CD-SMPL; SDS**	**1.000%**	**1.500%**	**18.000%**	**2.500%**	**159**	**2.451%**	**1.961%**	**17.647%**

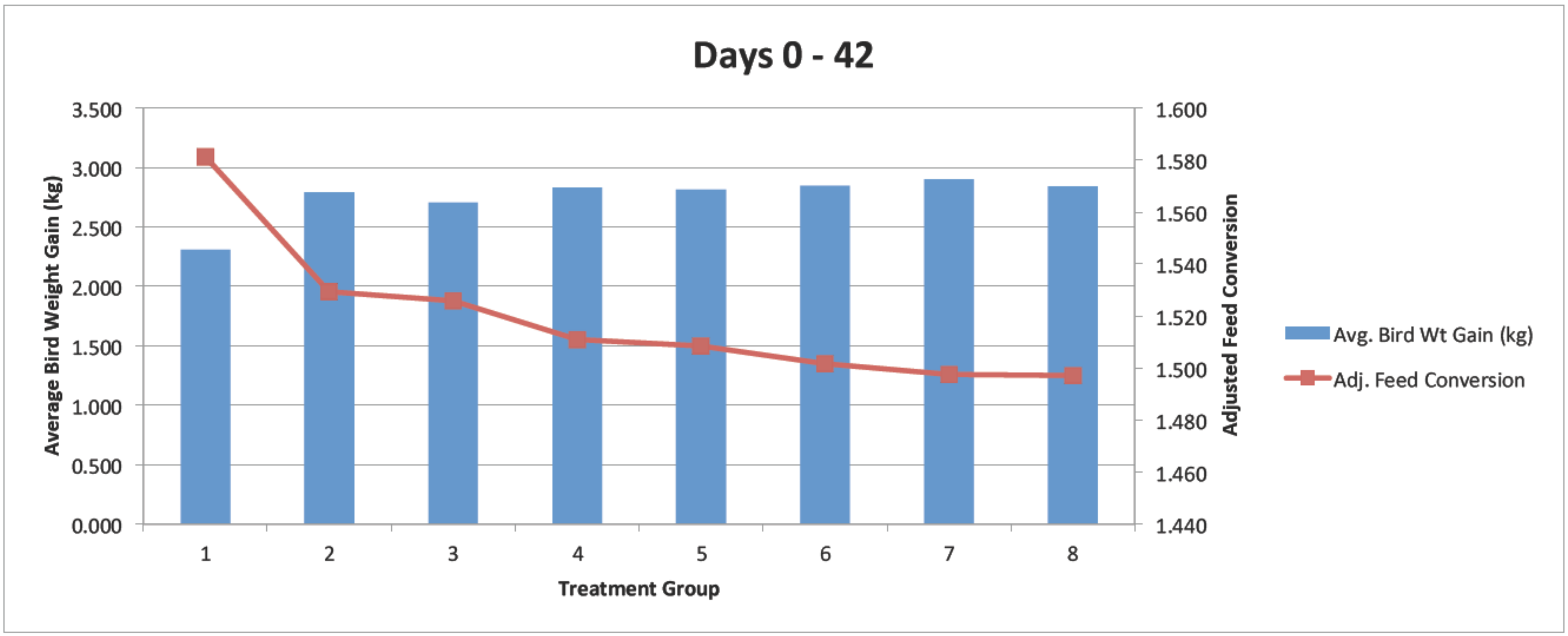
Graph 1. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 21) Summarized by Treatment Group
CQR Study Number AGV-15-1

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.556	1.438	Low Phosphate (LP)
2	0.648	1.396	High Phosphate (HP)
3	0.633	1.358	250 Units Phytase (LP)
4	0.663	1.351	500 Units Phytase (LP)
5	0.673	1.333	750 Units Phytase (LP)
6	0.672	1.335	1000 Units Phytase (LP)
7	0.696	1.316	3000 Units Phytase (LP)
8	0.663	1.334	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)



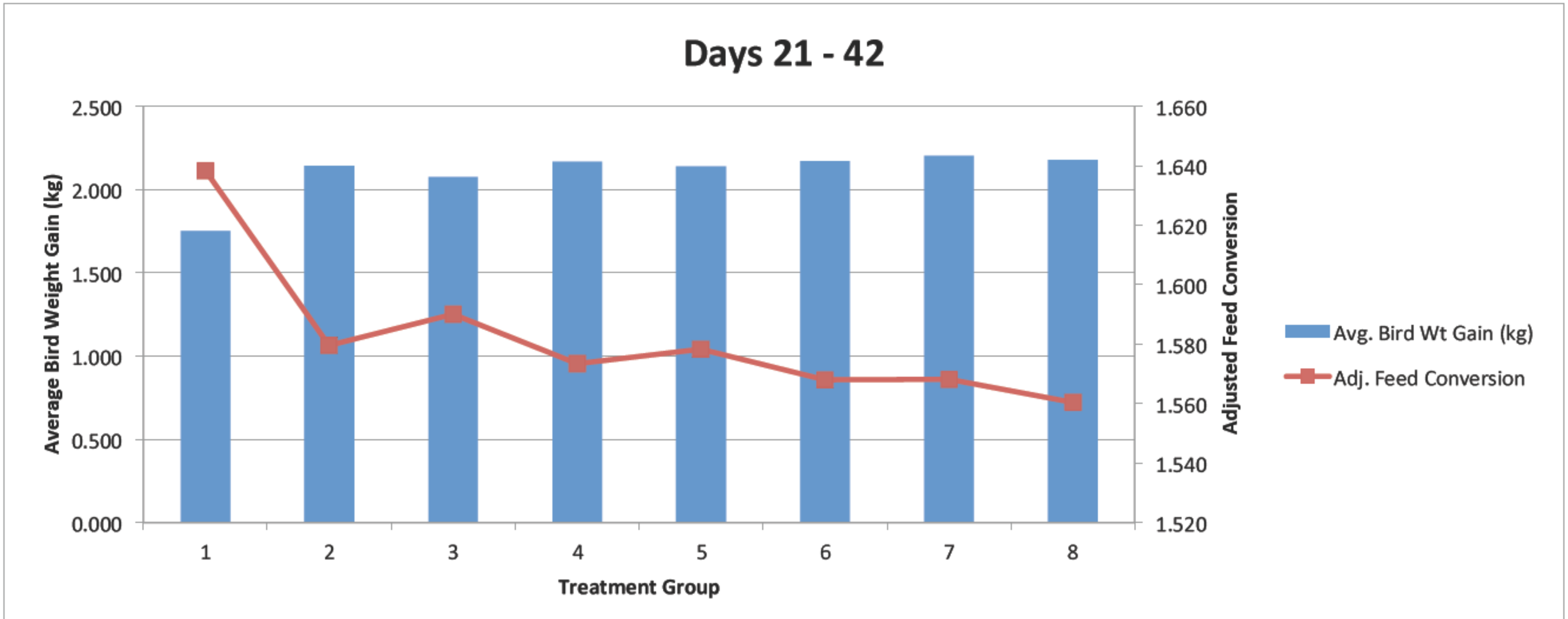
Graph 2. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 42) Summarized by Treatment Group
CQR Study Number AGV-15-1

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	2.308	1.581	Low Phosphate (LP)
2	2.789	1.529	High Phosphate (HP)
3	2.706	1.526	250 Units Phytase (LP)
4	2.831	1.511	500 Units Phytase (LP)
5	2.812	1.508	750 Units Phytase (LP)
6	2.843	1.502	1000 Units Phytase (LP)
7	2.898	1.498	3000 Units Phytase (LP)
8	2.841	1.497	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)



Graph 3. Average Bird Weight Gain and Adjusted Feed Conversion (Days 21 - 42) Summarized by Treatment Group
CQR Study Number AGV-15-1

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	1.752	1.638	Low Phosphate (LP)
2	2.141	1.580	High Phosphate (HP)
3	2.073	1.590	250 Units Phytase (LP)
4	2.168	1.573	500 Units Phytase (LP)
5	2.139	1.578	750 Units Phytase (LP)
6	2.171	1.568	1000 Units Phytase (LP)
7	2.202	1.568	3000 Units Phytase (LP)
8	2.178	1.560	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)



Summary of Phosphorus W/W % in Ileal Content Samples Collected on Days 21 and 42
AGV-15-1
Building 7

CQR ID	Study Day	Trt Group	Phosphorus W/W%
6/19/2015-103	21	1	0.21
6/19/2015-112	21	1	0.24
6/19/2015-118	21	1	0.33
6/19/2015-124	21	1	0.29
6/19/2015-130	21	1	0.20
6/19/2015-144	21	1	0.28
6/19/2015-145	21	1	0.25
6/19/2015-156	21	1	0.16
6/19/2015-165	21	1	0.22
6/19/2015-172	21	1	0.20
6/19/2015-187	21	1	0.22
6/19/2015-195	21	1	0.24
Average			**0.24**
Standard Deviation			**0.05**
CV			**19.69%**
6/19/2015-101	21	2	0.18
6/19/2015-106	21	2	0.26
6/19/2015-114	21	2	0.33
6/19/2015-126	21	2	0.29
6/19/2015-132	21	2	0.23
6/19/2015-137	21	2	0.22
6/19/2015-148	21	2	0.22
6/19/2015-155	21	2	0.13
6/19/2015-170	21	2	0.19
6/19/2015-180	21	2	0.26
6/19/2015-188	21	2	0.22
6/19/2015-196	21	2	0.39
Average			**0.24**
Standard Deviation			**0.07**
CV			**28.32%**
6/19/2015-104	21	3	0.24
6/19/2015-105	21	3	0.19
6/19/2015-119	21	3	0.26
6/19/2015-127	21	3	0.19
6/19/2015-134	21	3	0.25
6/19/2015-141	21	3	0.25
6/19/2015-146	21	3	0.19
6/19/2015-160	21	3	0.19
6/19/2015-169	21	3	0.25
6/19/2015-173	21	3	0.23
6/19/2015-186	21	3	0.15
6/19/2015-189	21	3	0.19
Average			**0.21**
Standard Deviation			**0.04**
CV			**16.70%**

CQR ID	Study Day	Trt Group	Phosphorus W/W%
7/10/2015-103	42	1	0.16
7/10/2015-112	42	1	0.14
7/10/2015-118	42	1	0.14
7/10/2015-124	42	1	0.16
7/10/2015-130	42	1	0.10
7/10/2015-144	42	1	0.18
7/10/2015-145	42	1	0.20
7/10/2015-156	42	1	0.10
7/10/2015-165	42	1	0.14
7/10/2015-172	42	1	0.19
7/10/2015-187	42	1	0.29
7/10/2015-195	42	1	0.26
Average			**0.17**
Standard Deviation			**0.06**
CV			**34.80%**
7/10/2015-101	42	2	0.24
7/10/2015-106	42	2	0.20
7/10/2015-114	42	2	0.18
7/10/2015-126	42	2	0.21
7/10/2015-132	42	2	0.17
7/10/2015-137	42	2	0.15
7/10/2015-148	42	2	0.14
7/10/2015-155	42	2	0.11
7/10/2015-170	42	2	0.18
7/10/2015-180	42	2	0.26
7/10/2015-188	42	2	0.27
7/10/2015-196	42	2	0.40
Average			**0.21**
Standard Deviation			**0.08**
CV			**37.53%**
7/10/2015-104	42	3	0.23
7/10/2015-105	42	3	0.19
7/10/2015-119	42	3	0.29
7/10/2015-127	42	3	0.17
7/10/2015-134	42	3	0.19
7/10/2015-141	42	3	0.21
7/10/2015-146	42	3	0.16
7/10/2015-160	42	3	0.18
7/10/2015-169	42	3	0.26
7/10/2015-173	42	3	0.21
7/10/2015-186	42	3	0.16
7/10/2015-189	42	3	0.21
Average			**0.20**
Standard Deviation			**0.04**
CV			**19.59%**

Summary of Phosphorus W/W % in Ileal Content Samples Collected on Days 21 and 42
AGV-15-1
Building 7

CQR ID	Study Day	Trt Group	Phosphorus W/W%
6/19/2015-102	21	4	0.22
6/19/2015-108	21	4	0.23
6/19/2015-116	21	4	0.31
6/19/2015-122	21	4	0.30
6/19/2015-133	21	4	0.23
6/19/2015-143	21	4	0.25
6/19/2015-147	21	4	0.30
6/19/2015-159	21	4	0.24
6/19/2015-167	21	4	0.19
6/19/2015-171	21	4	0.22
6/19/2015-185	21	4	0.23
6/19/2015-191	21	4	0.18
Average			**0.24**
Standard Deviation			**0.04**
CV			**17.31%**

CQR ID	Study Day	Trt Group	Phosphorus W/W%
7/10/2015-102	42	4	0.26
7/10/2015-108	42	4	0.12
7/10/2015-116	42	4	0.18
7/10/2015-122	42	4	0.25
7/10/2015-133	42	4	0.23
7/10/2015-143	42	4	0.18
7/10/2015-147	42	4	0.10
7/10/2015-159	42	4	0.21
7/10/2015-167	42	4	0.19
7/10/2015-171	42	4	0.25
7/10/2015-185	42	4	0.24
7/10/2015-191	42	4	0.21
Average			**0.20**
Standard Deviation			**0.05**
CV			**25.20%**

6/19/2015-107	21	5	0.28
6/19/2015-117	21	5	0.36
6/19/2015-125	21	5	0.20
6/19/2015-135	21	5	0.18
6/19/2015-140	21	5	0.22
6/19/2015-150	21	5	0.19
6/19/2015-154	21	5	0.21
6/19/2015-164	21	5	0.21
6/19/2015-177	21	5	0.14
6/19/2015-181	21	5	0.18
6/19/2015-193	21	5	0.17
6/19/2015-98	21	5	0.24
Average			**0.21**
Standard Deviation			**0.06**
CV			**26.21%**

7/10/2015-107	42	5	0.17
7/10/2015-117	42	5	0.16
7/10/2015-125	42	5	0.15
7/10/2015-135	42	5	0.11
7/10/2015-140	42	5	0.14
7/10/2015-150	42	5	0.14
7/10/2015-154	42	5	0.21
7/10/2015-164	42	5	0.19
7/10/2015-177	42	5	0.17
7/10/2015-181	42	5	0.21
7/10/2015-193	42	5	0.19
7/10/2015-98	42	5	0.25
Average			**0.17**
Standard Deviation			**0.04**
CV			**21.72%**

6/19/2015-111	21	6	0.32
6/19/2015-113	21	6	0.27
6/19/2015-123	21	6	0.24
6/19/2015-136	21	6	0.18
6/19/2015-139	21	6	0.22
6/19/2015-151	21	6	0.27
6/19/2015-153	21	6	0.18
6/19/2015-163	21	6	0.24
6/19/2015-179	21	6	0.24
6/19/2015-183	21	6	0.14
6/19/2015-192	21	6	0.16
6/19/2015-99	21	6	0.24
Average			**0.23**
Standard Deviation			**0.05**
CV			**22.97%**

7/10/2015-111	42	6	0.24
7/10/2015-113	42	6	0.22
7/10/2015-123	42	6	0.14
7/10/2015-136	42	6	0.23
7/10/2015-139	42	6	0.17
7/10/2015-151	42	6	0.08
7/10/2015-153	42	6	0.18
7/10/2015-163	42	6	0.10
7/10/2015-179	42	6	0.25
7/10/2015-183	42	6	0.10
7/10/2015-192	42	6	0.16
7/10/2015-99	42	6	0.19
Average			**0.17**
Standard Deviation			**0.06**
CV			**33.59%**

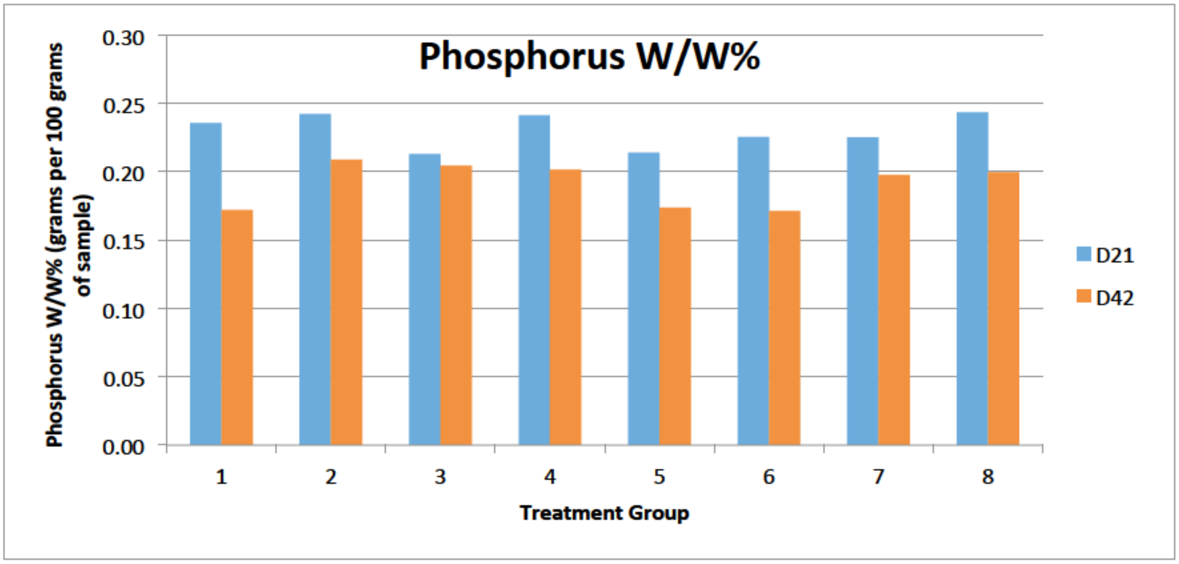
Summary of Phosphorus W/W % in Ileal Content Samples Collected on Days 21 and 42
AGV-15-1
Building 7

CQR ID	Study Day	Trt Group	Phosphorus W/W%
6/19/2015-109	21	7	0.25
6/19/2015-120	21	7	0.20
6/19/2015-128	21	7	0.30
6/19/2015-129	21	7	0.26
6/19/2015-142	21	7	0.24
6/19/2015-149	21	7	0.24
6/19/2015-162	21	7	0.21
6/19/2015-166	21	7	0.19
6/19/2015-178	21	7	0.20
6/19/2015-182	21	7	0.16
6/19/2015-190	21	7	0.18
6/19/2015-97	21	7	0.29
Average			**0.23**
Standard Deviation			**0.04**
CV			**19.16%**
6/19/2015-100	21	8	0.18
6/19/2015-110	21	8	0.27
6/19/2015-115	21	8	0.27
6/19/2015-121	21	8	0.27
6/19/2015-131	21	8	0.26
6/19/2015-138	21	8	0.33
6/19/2015-152	21	8	0.24
6/19/2015-161	21	8	0.29
6/19/2015-168	21	8	0.18
6/19/2015-174	21	8	0.16
6/19/2015-184	21	8	0.27
6/19/2015-194	21	8	0.19
Average			**0.24**
Standard Deviation			**0.05**
CV			**21.59%**

CQR ID	Study Day	Trt Group	Phosphorus W/W%
7/10/2015-109	42	7	0.17
7/10/2015-120	42	7	0.18
7/10/2015-128	42	7	0.25
7/10/2015-129	42	7	0.22
7/10/2015-142	42	7	0.27
7/10/2015-149	42	7	0.13
7/10/2015-162	42	7	0.21
7/10/2015-166	42	7	0.16
7/10/2015-178	42	7	0.21
7/10/2015-182	42	7	0.19
7/10/2015-190	42	7	0.19
7/10/2015-97	42	7	0.19
Average			**0.20**
Standard Deviation			**0.04**
CV			**19.92%**
7/10/2015-100	42	8	0.19
7/10/2015-110	42	8	0.23
7/10/2015-115	42	8	0.27
7/10/2015-121	42	8	0.14
7/10/2015-131	42	8	0.10
7/10/2015-138	42	8	0.12
7/10/2015-152	42	8	0.22
7/10/2015-161	42	8	0.27
7/10/2015-168	42	8	0.21
7/10/2015-174	42	8	0.22
7/10/2015-184	42	8	0.22
7/10/2015-194	42	8	0.22
Average			**0.20**
Standard Deviation			**0.05**
CV			**27.30%**

Summary of Phosphorus W/W % in Ileal Content Samples Collected on Days 21 and 42
AGV-15-1
Building 7

Trt Group	Phosphorus W/W%		Treatment Description
	D21	D42	
1	0.24	0.17	Low Phosphate (LP)
2	0.24	0.21	High Phosphate (HP)
3	0.21	0.20	250 Units Phytase (LP)
4	0.24	0.20	500 Units Phytase (LP)
5	0.21	0.17	750 Units Phytase (LP)
6	0.23	0.17	1000 Units Phytase (LP)
7	0.23	0.20	3000 Units Phytase (LP)
8	0.24	0.20	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)



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Poultry Science Center L-209
Fayetteville, AR 72701
479-575-6532

CEPS Central Analytical Laboratory Report

Report Date: 9/25/15
Report No: 161240

CAL Sample ID: 161240-161431

Investigator: Shoshana Gray
Institution: Colorado Quality Research, Inc.
Department:
Address: 400 East County Road 72; Wellington, CO 80549
Customer#: 121708
Phone#: 970-568-7738 email: shoshana@coloradoqualityresearch.com

Report Description: Analysis of **Tibia Bones--AGV-15-1**

Sample ID	Al ppm	Ca ppm	Cu ppm	Fe ppm	K ppm	Mg ppm	Mn ppm	Na ppm	P ppm	S ppm	Zn ppm	Ash %
Day 21												
Pen 97	N.D.	319302	2.17	342	27856	7893	7.11	16018	153735	9669	423	27.2
Pen 98	N.D.	299326	4.99	377	31941	7482	9.57	15995	142987	9538	424	25.4
Pen 99	N.D.	292887	2.36	319	29098	7484	6.27	15766	139985	7983	432	22.9
Pen 100	N.D.	298423	2.41	369	32440	7655	7.09	14307	145330	8934	437	25.8
Pen 101	N.D.	298648	9.82	347	33620	7103	5.61	16574	148636	9859	411	23.0
Pen 102	N.D.	309757	4.06	289	27292	7739	5.01	15765	149786	9674	362	26.4
Pen 103	N.D.	293125	6.69	488	40108	8212	7.06	18379	147488	10596	481	22.5
Pen 104	N.D.	303314	1.48	410	29245	7456	6.34	18764	145767	10828	427	27.2
Pen 105	N.D.	309007	4.67	328	19796	7179	6.45	15998	146795	8465	426	27.5
Pen 106	N.D.	305171	1.74	373	23931	7435	5.98	17071	145528	9082	431	27.5
Pen 107	N.D.	300439	2.06	371	30941	7449	7.96	15627	146619	9316	437	24.1
Pen 108	N.D.	291878	4.42	452	32453	6292	6.30	21703	137775	12549	380	23.4
Pen 109	N.D.	305334	1.39	316	24091	7413	6.20	16415	143947	9061	424	26.4
Pen 110	N.D.	293892	3.44	340	33096	7270	3.05	14060	146630	9178	347	25.1
Pen 111	N.D.	298258	4.38	336	27352	7031	4.95	18009	145633	9378	450	25.0
Pen 112	N.D.	294949	2.69	353	34125	7247	6.54	17036	146882	9345	446	22.3
Pen 113	N.D.	300119	4.96	322	23692	6876	5.37	16828	144479	9205	395	26.3
Pen 114	N.D.	288471	1.55	303	36610	6401	4.87	17420	138241	11452	399	21.9
Pen 115	N.D.	307871	N.D.	334	23123	7056	5.29	17652	150160	9525	417	26.2
Pen 116	N.D.	294664	N.D.	303	22523	7219	5.48	17650	145581	9329	402	26.9
Pen 117	N.D.	298202	13.6	371	20851	6962	5.86	17512	145453	9376	393	27.9
Pen 118	N.D.	298227	0.75	332	24542	7064	6.21	16234	147022	9086	399	26.1
Pen 119	N.D.	296321	1.62	341	25624	7161	5.70	18115	146705	9826	397	25.2
Pen 120	N.D.	307127	4.92	384	29097	6299	6.00	21194	141588	11890	433	22.5
Pen 121	N.D.	287800	1.69	367	31117	7246	5.62	18758	146654	9707	432	21.9
Pen 122	N.D.	297271	2.21	326	22159	7319	3.60	17802	146180	9376	362	26.3
Pen 123	N.D.	291217	0.89	365	24351	6837	4.85	18598	142186	9577	414	25.1
Pen 124	N.D.	291660	1.53	377	31787	7917	4.96	18484	149215	9110	464	22.4

Bones were dried, ashed, and digested for minerals.

Sample ID	Al ppm	Ca ppm	Cu ppm	Fe ppm	K ppm	Mg ppm	Mn ppm	Na ppm	P ppm	S ppm	Zn ppm	Ash %
Day 21												
Pen 125	N.D.	299177	3.19	285	22260	7066	6.15	17216	145811	8895	414	26.2
Pen 126	N.D.	306869	2.22	227	22075	6177	4.25	17165	142203	9396	384	21.6
Pen 127	N.D.	296682	N.D.	297	22096	7395	6.13	16909	145330	8815	423	26.7
Pen 128	N.D.	292586	0.44	284	25504	7403	4.83	17109	144732	8986	374	23.4
Pen 129	N.D.	294356	4.12	373	26728	7464	5.62	18298	145560	9414	427	25.4
Pen 130	N.D.	295379	0.74	304	24683	7050	4.55	17112	143935	8604	403	24.2
Pen 131	N.D.	298611	1.08	335	28508	7501	4.78	19481	149874	9549	442	22.1
Pen 132	N.D.	292955	1.23	374	22575	7143	6.72	18200	144508	9377	392	26.8
Pen 133	N.D.	295856	1.29	289	23252	7344	4.26	16579	148092	8488	361	25.0
Pen 134	N.D.	284647	1.95	388	29724	7349	4.96	19559	144201	9809	429	21.6
Pen 135	N.D.	290188	1.47	341	27000	6207	5.90	20264	136926	11163	402	22.5
Pen 136	N.D.	307742	3.59	422	30522	7828	21.5	19555	149693	9889	452	23.9
Pen 137	N.D.	291180	7.39	293	22489	6506	5.20	17229	143047	9031	432	26.9
Pen 138	N.D.	280795	7.69	381	41250	7590	9.16	25441	140534	13566	470	19.5
Pen 139	N.D.	282628	0.68	363	25896	7115	9.13	18958	141652	9814	388	24.4
Pen 140	N.D.	282675	3.21	303	28879	7442	5.91	18496	145019	9331	452	24.5
Pen 141	N.D.	287437	0.98	333	22913	7222	5.09	17500	144299	8763	350	26.1
Pen 142	N.D.	286143	1.33	307	24127	7086	5.74	18737	144373	9359	361	25.1
Pen 143	N.D.	283001	1.85	358	27373	7425	5.81	18281	140999	9404	427	24.4
Pen 144	N.D.	286403	1.07	308	26324	6997	4.88	16849	141073	9009	410	25.2
Pen 145	N.D.	355138	4.52	379	21948	7978	8.26	19380	165971	11131	450	27.3
Pen 146	N.D.	350605	4.75	329	22615	7721	6.40	17692	167591	10012	518	27.0
Pen 147	N.D.	352421	5.74	448	27958	8369	8.39	19596	170557	11135	521	25.4
Pen 148	N.D.	350524	6.21	355	30469	7013	8.00	22799	161632	13433	480	22.9
Pen 149	N.D.	343408	6.69	356	26118	6786	6.59	21782	158042	13756	445	24.9
Pen 150	N.D.	340711	10.7	363	25911	7691	6.31	18116	166998	10509	476	23.4
Pen 151	N.D.	335929	6.24	377	30359	7679	6.88	19139	164982	10888	508	22.9
Pen 152	N.D.	351270	2.65	352	21367	7800	4.55	18238	168957	10071	408	27.2
Pen 153	N.D.	341713	1.49	351	24349	8225	7.98	18541	168056	9990	475	27.1
Pen 154	N.D.	330771	4.97	399	39338	8428	7.80	20148	170849	10244	544	21.1
Pen 155	N.D.	341003	2.90	463	23266	8036	7.84	19536	164634	11002	490	26.9
Pen 156	N.D.	338489	5.33	348	23747	8014	7.49	19639	163662	10689	455	25.9
Pen 159	N.D.	342698	4.13	400	29439	8152	6.29	18377	168381	10769	501	23.1
Pen 160	N.D.	350823	3.40	318	21874	7280	6.80	16833	165055	9856	458	24.5
Pen 161	N.D.	352962	5.76	384	22228	8423	6.06	18987	169879	10789	404	27.3
Pen 162	N.D.	335225	9.35	531	35472	7353	5.82	24384	159237	14195	497	21.9
Pen 163	N.D.	346746	12.4	390	27317	8167	8.07	18977	169180	10732	503	22.8
Pen 164	N.D.	352024	2.18	381	25085	7644	7.04	18625	166262	10671	461	23.9
Pen 165	N.D.	358955	2.67	350	22136	8133	6.81	18224	174189	10144	493	28.4
Pen 166	N.D.	318674	2.38	471	38732	9149	7.77	22695	167579	12356	529	21.2
Pen 167	N.D.	363337	5.39	414	23943	8234	5.81	19177	177707	10426	489	26.2
Pen 168	N.D.	327700	2.28	418	28821	7963	7.11	17543	164531	9942	466	23.4
Pen 169	N.D.	316386	8.73	468	33497	7554	8.12	23875	157413	13854	475	23.7
Pen 170	N.D.	342505	4.22	314	22098	8053	7.96	18129	169166	9480	488	26.3
Pen 171	N.D.	344183	3.40	411	26621	8236	7.23	19931	170821	10990	468	26.5

Bones were dried, ashed, and digested for minerals.

Sample ID	Al ppm	Ca ppm	Cu ppm	Fe ppm	K ppm	Mg ppm	Mn ppm	Na ppm	P ppm	S ppm	Zn ppm	Ash %
Day 21												
Pen 172	N.D.	331800	5.21	313	33883	8448	9.18	20015	168528	11288	495	21.3
Pen 173	N.D.	371625	6.66	417	27827	8814	8.03	21833	180851	12482	498	26.2
Pen 174	N.D.	348420	4.43	366	23799	8362	7.54	18650	171435	10258	466	23.1
Pen 177	N.D.	345338	5.21	352	22881	8218	7.11	18176	169174	9778	451	26.2
Pen 178	N.D.	341051	4.80	376	22286	7962	7.06	18692	165413	10102	461	25.9
Pen 179	N.D.	343191	3.46	395	23888	8079	7.15	18590	166743	10190	484	25.2
Pen 180	N.D.	338594	5.06	343	30312	8305	5.45	16631	171683	9750	430	22.6
Pen 181	N.D.	347565	7.34	339	24319	8425	7.54	19077	168823	10511	492	25.7
Pen 182	N.D.	341496	3.51	372	25031	8277	7.75	18189	167369	9571	474	24.9
Pen 183	N.D.	337375	7.66	362	28652	8163	7.14	20601	165637	11325	463	25.5
Pen 184	N.D.	331881	0.52	377	31720	8289	6.15	17715	166165	10274	464	23.4
Pen 185	N.D.	336845	4.91	442	24758	8115	6.88	19498	163580	10873	486	26.7
Pen 186	N.D.	337499	5.87	377	25034	8025	6.38	19635	162306	11649	444	27.6
Pen 187	N.D.	325198	8.03	504	38114	8097	7.94	21123	161391	12485	459	19.5
Pen 188	N.D.	349338	2.65	318	21589	7840	5.23	18099	170192	9793	394	27.5
Pen 189	N.D.	335043	5.61	418	22575	7981	7.65	19820	162459	11027	467	26.2
Pen 190	N.D.	330305	2.04	395	28922	8234	7.54	17839	166554	10440	473	22.3
Pen 191	N.D.	333694	1.33	443	24490	8001	7.69	20859	164998	11442	442	26.3
Pen 192	N.D.	341906	2.09	352	21667	8008	5.92	18641	168099	9959	433	26.8
Pen 193	N.D.	328002	6.13	426	32226	8558	6.73	19309	165571	10364	455	21.7
Pen 194	N.D.	331148	0.69	338	23456	8113	4.83	17853	161715	9430	439	25.6
Pen 195	N.D.	334427	3.14	412	26087	6893	6.20	20259	155222	11624	449	23.3
Pen 196	N.D.	337900	1.71	340	21026	7711	6.22	19170	161778	10644	393	27.9
Day 42												
Pen 97	N.D.	331955	0.37	387	17254	7761	7.30	13321	156653	7448	363	33.2
Pen 98	N.D.	323868	4.16	418	20903	7190	7.87	15514	153717	7987	375	26.9
Pen 99	N.D.	330080	2.11	367	18729	7382	8.65	14524	155801	7703	384	28.1
Pen 100	N.D.	338111	2.42	368	20356	7887	7.45	15539	159454	8103	387	27.7
Pen 101	N.D.	333436	2.93	358	20671	7341	7.18	15540	158283	8005	356	25.5
Pen 102	N.D.	331234	3.25	466	24476	8193	7.18	16564	160941	8847	332	27.1
Pen 103	N.D.	334196	5.24	451	18444	7456	6.22	15616	156314	8471	359	30.7
Pen 104	N.D.	324104	2.00	408	20707	7139	8.40	15734	154772	8175	360	26.3
Pen 105	N.D.	325007	5.23	482	19379	7501	7.30	15099	157391	7968	351	30.0
Pen 106	N.D.	336063	N.D.	340	13932	7606	7.24	12999	158098	7308	352	37.2
Pen 107	N.D.	327235	3.76	390	20051	7587	6.68	17071	158071	8532	356	28.0
Pen 108	N.D.	326711	2.13	427	19836	7012	6.72	14871	151415	8794	325	27.2
Pen 109	N.D.	328479	3.42	390	19195	7467	7.54	15620	159139	8102	356	29.5
Pen 110	N.D.	329425	2.34	368	17386	7435	7.27	15996	158459	7919	318	27.6
Pen 111	N.D.	331282	2.78	402	18049	7566	6.76	15122	158220	7552	373	30.2
Pen 112	N.D.	330948	3.43	423	20554	7196	7.82	15698	155925	8315	334	26.6
Pen 113	N.D.	331549	1.19	406	19008	7349	8.56	15371	159275	7914	365	30.1
Pen 114	N.D.	326014	2.93	479	27180	7104	7.76	17015	155717	9718	360	24.2

Bones were dried, ashed, and digested for minerals.

Sample ID	Al ppm	Ca ppm	Cu ppm	Fe ppm	K ppm	Mg ppm	Mn ppm	Na ppm	P ppm	S ppm	Zn ppm	Ash %
Day 42												
Pen 115	N.D.	333601	2.08	420	19728	7005	7.32	15235	154455	8137	359	29.8
Pen 116	N.D.	324220	0.94	349	20326	7417	6.88	15728	157395	7996	357	28.0
Pen 117	N.D.	350691	2.60	379	17319	7986	8.15	14947	165974	7762	355	31.8
Pen 118	N.D.	316248	3.45	380	20851	7292	5.81	15728	153942	7889	332	25.6
Pen 119	N.D.	329360	0.01	316	15287	7349	4.84	14204	155844	7411	342	30.0
Pen 120	N.D.	323974	0.92	589	23507	7054	5.58	16639	151383	9315	329	27.1
Pen 121	N.D.	325846	1.57	354	17180	7288	7.47	13751	155395	7515	341	30.5
Pen 122	N.D.	328755	1.45	364	17674	7728	5.07	15378	159340	8082	297	31.3
Pen 123	N.D.	331464	1.58	432	18917	7323	6.78	15556	159712	7844	346	27.7
Pen 124	N.D.	328316	2.48	346	19481	7652	6.47	15030	159249	7874	357	26.7
Pen 125	N.D.	325734	2.42	381	18898	7545	5.80	15262	158692	7964	353	30.4
Pen 126	N.D.	324650	2.94	479	23909	7239	6.57	14902	153399	8455	322	25.1
Pen 127	N.D.	361556	N.D.	448	17912	8104	6.28	15483	168153	8039	373	32.7
Pen 128	N.D.	335534	1.68	322	15795	7817	5.81	13846	160289	7231	301	32.6
Pen 129	N.D.	336955	2.03	333	20689	7967	7.77	14156	161361	7615	343	28.8
Pen 130	N.D.	331068	2.74	405	18966	7391	6.70	15353	156763	8222	340	29.9
Pen 131	N.D.	329062	2.33	358	16397	7488	5.47	14854	158844	7601	356	30.4
Pen 132	N.D.	322773	0.84	422	19180	7651	7.11	17247	155216	9639	366	30.7
Pen 133	N.D.	313339	1.24	401	18339	7390	7.61	16832	153428	9359	350	26.7
Pen 134	N.D.	315450	2.78	445	22937	7599	7.56	16947	156811	9178	382	27.2
Pen 135	N.D.	319150	1.57	493	20605	7036	7.54	16629	150907	9464	318	29.6
Pen 136	N.D.	317218	2.98	501	20485	7519	7.60	16007	154132	8457	337	29.4
Pen 137	N.D.	321891	6.16	416	21339	7470	7.15	15812	154884	8275	352	26.8
Pen 138	N.D.	309311	N.D.	422	23204	6865	7.82	16794	147924	9623	337	28.1
Pen 139	N.D.	331396	1.66	432	22174	7798	6.85	16088	160673	8918	340	29.2
Pen 140	N.D.	315194	3.06	398	18691	7581	5.79	14994	156081	7695	372	31.1
Pen 141	N.D.	320341	1.49	391	18746	7489	6.10	15089	157034	7773	303	31.9
Pen 142	N.D.	306242	2.91	454	20581	7442	7.72	15194	152583	7221	349	27.4
Pen 143	N.D.	329980	N.D.	419	18761	7772	6.07	15194	158310	8304	362	33.3
Pen 144	N.D.	306092	2.09	439	23032	7485	7.48	15882	153851	8408	360	27.5
Pen 145	N.D.	322137	4.97	420	18135	7659	8.48	15358	157857	8723	336	31.9
Pen 146	N.D.	323962	2.35	367	17786	7753	7.78	14703	161569	7715	351	32.2
Pen 147	N.D.	325430	0.43	394	17649	7831	7.95	14383	159902	8217	363	34.3
Pen 148	N.D.	317105	3.06	564	23748	7459	7.07	16617	151792	9903	346	27.8
Pen 149	N.D.	313062	4.32	504	27934	7732	9.79	17196	152408	9871	345	23.3
Pen 150	N.D.	306386	N.D.	436	22249	7313	5.43	15365	154053	8589	360	27.3
Pen 151	N.D.	313567	2.89	403	18106	7266	5.97	15546	157858	8374	337	30.7
Pen 152	N.D.	314134	0.39	355	21699	7705	4.54	14941	161851	8606	307	28.9
Pen 153	N.D.	310632	2.60	460	18223	7897	6.16	14474	157497	7992	341	34.5
Pen 154	N.D.	301964	3.90	507	22169	7414	7.47	18036	154274	9198	353	27.4
Pen 155	N.D.	303263	1.27	418	23065	7295	6.30	15523	153970	8596	348	25.6
Pen 156	N.D.	304599	0.71	377	16899	7541	6.37	14544	151924	8021	323	33.5
Pen 159	N.D.	316670	N.D.	413	18527	7479	6.70	15136	154737	7887	371	29.5
Pen 160	N.D.	314418	1.85	402	17763	7077	5.22	13543	152777	7035	326	31.6

Bones were dried, ashed, and digested for minerals.

Sample ID	Al ppm	Ca ppm	Cu ppm	Fe ppm	K ppm	Mg ppm	Mn ppm	Na ppm	P ppm	S ppm	Zn ppm	Ash %
Day 42												
Pen 161	N.D.	319033	2.93	392	16812	7379	4.61	14589	154463	7144	297	33.1
Pen 162	N.D.	313646	2.69	440	24947	6871	7.41	14649	147859	8107	300	24.5
Pen 163	N.D.	316209	2.93	377	19991	7418	4.98	14443	155214	7925	349	29.0
Pen 164	N.D.	399284	2.60	501	26163	9182	7.10	18855	178932	9321	430	30.9
Pen 165	N.D.	308140	1.58	398	17281	7633	6.01	14803	150856	7210	289	32.1
Pen 166	N.D.	309490	0.31	402	14622	7387	6.13	13901	148165	7012	350	33.7
Pen 167	N.D.	309967	1.65	372	18951	7373	6.48	13374	152587	7316	336	31.5
Pen 168	N.D.	317891	1.85	384	15944	7279	7.07	14250	150933	7239	330	35.1
Pen 169	N.D.	376740	2.39	638	33613	8730	8.77	19605	172888	11465	395	24.7
Pen 170	N.D.	315301	0.82	432	24725	7838	6.60	16155	150323	7942	344	26.2
Pen 171	N.D.	310000	1.67	464	17663	7082	7.61	15146	146718	8106	292	33.1
Pen 172	N.D.	315949	0.63	359	20385	7333	4.88	13985	151806	7389	341	26.0
Pen 173	N.D.	316080	0.38	392	18454	7150	6.56	14974	151262	8044	323	29.3
Pen 174	N.D.	309567	0.88	352	19341	7393	5.60	14281	151147	7334	283	27.3
Pen 177	N.D.	326912	2.57	365	15208	7575	7.53	13767	152964	7852	316	35.2
Pen 178	N.D.	314920	1.37	356	16088	7028	4.95	13993	149121	7074	331	32.6
Pen 179	N.D.	304801	0.17	375	17244	7235	5.53	13827	149543	7259	302	30.5
Pen 180	N.D.	321642	3.75	418	25311	7967	7.34	15223	158210	8121	314	25.2
Pen 181	N.D.	308209	2.23	352	16047	7097	5.19	14766	148955	7241	340	30.3
Pen 182	N.D.	312188	1.74	373	20495	7388	7.12	14989	155145	7626	308	26.5
Pen 183	N.D.	303513	1.63	392	20970	7202	7.30	14337	148288	7455	313	27.3
Pen 184	N.D.	311065	0.25	303	14724	6972	6.77	13528	148152	6814	328	32.7
Pen 185	N.D.	309120	3.29	412	18120	7210	4.81	15018	148069	7757	322	30.9
Pen 186	N.D.	308429	N.D.	446	19789	7174	6.12	14292	149518	8219	300	34.2
Pen 187	N.D.	302833	1.08	451	19121	7006	4.68	14928	143540	8630	296	29.5
Pen 188	N.D.	314469	3.60	477	20055	7450	4.12	15434	148710	7848	314	31.0
Pen 189	N.D.	304374	3.40	448	22849	7232	5.39	15396	149551	7880	336	26.5
Pen 190	N.D.	309459	0.96	394	15417	7229	5.28	14362	149376	7530	299	36.1
Pen 191	N.D.	299274	2.15	457	22735	7155	7.53	15252	142650	7908	320	28.0
Pen 192	N.D.	312315	3.06	379	23622	7475	5.31	15730	151502	8258	316	26.0
Pen 193	N.D.	304888	0.73	454	18549	6966	5.14	15398	145584	7852	293	32.9
Pen 194	N.D.	305135	2.82	425	20464	7579	4.41	15590	148399	7878	318	30.4
Pen 195	N.D.	294205	1.19	501	20277	7056	2.83	15201	135632	9008	285	30.7
Pen 196	N.D.	298056	2.02	374	20517	7386	3.97	15062	143574	7889	307	28.7

Bones were dried, ashed, and digested for minerals.

Report Approved: ______________________________

Linda K. Kirby   Date

Block	Trt	Sample ID	Al ppm	Ca ppm	Cu ppm	Fe ppm	K ppm	Mg ppm	Mn ppm
		Day 21							
1	**1**	**Pen 135**	N.D.	290188	1.47	341	27000	6207	5.90
2	**1**	**Pen 108**	N.D.	291878	4.42	452	32453	6292	6.30
3	**1**	**Pen 114**	N.D.	288471	1.55	303	36610	6401	4.87
4	**1**	**Pen 120**	N.D.	307127	4.92	384	29097	6299	6.00
5	**1**	**Pen 126**	N.D.	306869	2.22	227	22075	6177	4.25
6	**1**	**Pen 148**	N.D.	350524	6.21	355	30469	7013	8.00
7	**1**	**Pen 149**	N.D.	343408	6.69	356	26118	6786	6.59
8	**1**	**Pen 162**	N.D.	335225	9.35	531	35472	7353	5.82
9	**1**	**Pen 169**	N.D.	316386	8.73	468	33497	7554	8.12
10	**1**	**Pen 138**	N.D.	280795	7.69	381	41250	7590	9.16
11	**1**	**Pen 187**	N.D.	325198	8.03	504	38114	8097	7.94
12	**1**	**Pen 195**	N.D.	334427	3.14	412	26087	6893	6.20
Averages			**NA**	**314208**	**5.37**	**393**	**31520**	**6889**	**6.60**
Standard Deviations			**NA**	**23560.3**	**2.83**	**86**	**5719**	**643**	**1.44**
CVs			**NA**	**7.50%**	**52.62%**	**22.00%**	**18.14%**	**9.34%**	**21.85%**
1	**2**	**Pen 133**	N.D.	295856	1.29	289	23252	7344	4.26
2	**2**	**Pen 102**	N.D.	309757	4.06	289	27292	7739	5.01
3	**2**	**Pen 110**	N.D.	293892	3.44	340	33096	7270	3.05
4	**2**	**Pen 122**	N.D.	297271	2.21	326	22159	7319	3.60
5	**2**	**Pen 128**	N.D.	292586	0.44	284	25504	7403	4.83
6	**2**	**Pen 141**	N.D.	287437	0.98	333	22913	7222	5.09
7	**2**	**Pen 152**	N.D.	351270	2.65	352	21367	7800	4.55
8	**2**	**Pen 161**	N.D.	352962	5.76	384	22228	8423	6.06
9	**2**	**Pen 174**	N.D.	348420	4.43	366	23799	8362	7.54
10	**2**	**Pen 180**	N.D.	338594	5.06	343	30312	8305	5.45
11	**2**	**Pen 188**	N.D.	349338	2.65	318	21589	7840	5.23
12	**2**	**Pen 196**	N.D.	337900	1.71	340	21026	7711	6.22
Averages			**NA**	**321274**	**2.89**	**330**	**24545**	**7728**	**5.07**
Standard Deviations			**NA**	**27098.1**	**1.68**	**31**	**3838**	**439**	**1.20**
CVs			**NA**	**8.43%**	**58.25%**	**9.44%**	**15.64%**	**5.68%**	**23.63%**
1	**3**	**Pen 136**	N.D.	307742	3.59	422	30522	7828	21.5
2	**3**	**Pen 101**	N.D.	298648	9.82	347	33620	7103	5.61
3	**3**	**Pen 115**	N.D.	307871	0.00	334	23123	7056	5.29
4	**3**	**Pen 123**	N.D.	291217	0.89	365	24351	6837	4.85
5	**3**	**Pen 130**	N.D.	295379	0.74	304	24683	7050	4.55
6	**3**	**Pen 145**	N.D.	355138	4.52	379	21948	7978	8.26
7	**3**	**Pen 150**	N.D.	340711	10.7	363	25911	7691	6.31
8	**3**	**Pen 164**	N.D.	352024	2.18	381	25085	7644	7.04
9	**3**	**Pen 173**	N.D.	371625	6.66	417	27827	8814	8.03
10	**3**	**Pen 139**	N.D.	282628	0.68	363	25896	7115	9.13
11	**3**	**Pen 186**	N.D.	337499	5.87	377	25034	8025	6.38
12	**3**	**Pen 189**	N.D.	335043	5.61	418	22575	7981	7.65
Averages			**NA**	**322960**	**4.27**	**373**	**25881**	**7594**	**7.88**
Standard Deviations			**NA**	**29180.1**	**3.59**	**35**	**3362**	**577**	**4.52**
CVs			**NA**	**9.04%**	**84.13%**	**9.44%**	**12.99%**	**7.60%**	**57.38%**

1	**4**	**Pen 134**	N.D.	284647	1.95	388	29724	7349	4.96
2	**4**	**Pen 104**	N.D.	303314	1.48	410	29245	7456	6.34
3	**4**	**Pen 112**	N.D.	294949	2.69	353	34125	7247	6.54
4	**4**	**Pen 118**	N.D.	298227	0.75	332	24542	7064	6.21
5	**4**	**Pen 129**	N.D.	294356	4.12	373	26728	7464	5.62
6	**4**	**Pen 147**	N.D.	352421	5.74	448	27958	8369	8.39
7	**4**	**Pen 151**	N.D.	335929	6.24	377	30359	7679	6.88
8	**4**	**Pen 163**	N.D.	346746	12.4	390	27317	8167	8.07
9	**4**	**Pen 171**	N.D.	344183	3.40	411	26621	8236	7.23
10	**4**	**Pen 137**	N.D.	291180	7.39	293	22489	6506	5.20
11	**4**	**Pen 185**	N.D.	336845	4.91	442	24758	8115	6.88
12	**4**	**Pen 191**	N.D.	333694	1.33	443	24490	8001	7.69
Averages			**NA**	**318041**	**4.36**	**388**	**27363**	**7638**	**6.67**
Standard Deviations			**NA**	**25492.1**	**3.29**	**47**	**3189**	**560**	**1.08**
CVs			**NA**	**8.02%**	**75.45%**	**12.13%**	**11.66%**	**7.33%**	**16.24%**
1	**5**	**Pen 98**	N.D.	299326	4.99	377	31941	7482	9.57
2	**5**	**Pen 103**	N.D.	293125	6.69	488	40108	8212	7.06
3	**5**	**Pen 113**	N.D.	300119	4.96	322	23692	6876	5.37
4	**5**	**Pen 121**	N.D.	287800	1.69	367	31117	7246	5.62
5	**5**	**Pen 131**	N.D.	298611	1.08	335	28508	7501	4.78
6	**5**	**Pen 144**	N.D.	286403	1.07	308	26324	6997	4.88
7	**5**	**Pen 154**	N.D.	330771	4.97	399	39338	8428	7.80
8	**5**	**Pen 160**	N.D.	350823	3.40	318	21874	7280	6.80
9	**5**	**Pen 168**	N.D.	327700	2.28	418	28821	7963	7.11
10	**5**	**Pen 177**	N.D.	345338	5.21	352	22881	8218	7.11
11	**5**	**Pen 181**	N.D.	347565	7.34	339	24319	8425	7.54
12	**5**	**Pen 193**	N.D.	328002	6.13	426	32226	8558	6.73
Averages			**NA**	**316299**	**4.15**	**371**	**29262**	**7766**	**6.70**
Standard Deviations			**NA**	**24485.3**	**2.19**	**54**	**6021**	**602**	**1.37**
CVs			**NA**	**7.74%**	**52.74%**	**14.45%**	**20.57%**	**7.75%**	**20.41%**
1	**6**	**Pen 99**	N.D.	292887	2.36	319	29098	7484	6.27
2	**6**	**Pen 107**	N.D.	300439	2.06	371	30941	7449	7.96
3	**6**	**Pen 109**	N.D.	305334	1.39	316	24091	7413	6.20
4	**6**	**Pen 119**	N.D.	296321	1.62	341	25624	7161	5.70
5	**6**	**Pen 132**	N.D.	292955	1.23	374	22575	7143	6.72
6	**6**	**Pen 143**	N.D.	283001	1.85	358	27373	7425	5.81
7	**6**	**Pen 155**	N.D.	341003	2.90	463	23266	8036	7.84
8	**6**	**Pen 159**	N.D.	342698	4.13	400	29439	8152	6.29
9	**6**	**Pen 167**	N.D.	363337	5.39	414	23943	8234	5.81
10	**6**	**Pen 179**	N.D.	343191	3.46	395	23888	8079	7.15
11	**6**	**Pen 183**	N.D.	337375	7.66	362	28652	8163	7.14
12	**6**	**Pen 192**	N.D.	341906	2.09	352	21667	8008	5.92
Averages			**NA**	**320037**	**3.01**	**372**	**25880**	**7729**	**6.57**
Standard Deviations			**NA**	**27216.1**	**1.91**	**41**	**3090**	**417**	**0.79**
CVs			**NA**	**8.50%**	**63.39%**	**11.14%**	**11.94%**	**5.40%**	**12.03%**
1	**7**	**Pen 97**	N.D.	319302	2.17	342	27856	7893	7.11

2	**7**	**Pen 105**	N.D.	309007	4.67	328	19796	7179	6.45
3	**7**	**Pen 116**	N.D.	294664	0.00	303	22523	7219	5.48
4	**7**	**Pen 124**	N.D.	291660	1.53	377	31787	7917	4.96
5	**7**	**Pen 125**	N.D.	299177	3.19	285	22260	7066	6.15
6	**7**	**Pen 146**	N.D.	350605	4.75	329	22615	7721	6.40
7	**7**	**Pen 153**	N.D.	341713	1.49	351	24349	8225	7.98
8	**7**	**Pen 166**	N.D.	318674	2.38	471	38732	9149	7.77
9	**7**	**Pen 170**	N.D.	342505	4.22	314	22098	8053	7.96
10	**7**	**Pen 178**	N.D.	341051	4.80	376	22286	7962	7.06
11	**7**	**Pen 182**	N.D.	341496	3.51	372	25031	8277	7.75
12	**7**	**Pen 190**	N.D.	330305	2.04	395	28922	8234	7.54
Averages			**NA**	**323347**	**2.90**	**354**	**25688**	**7908**	**6.88**
Standard Deviations			**NA**	**20874.9**	**1.54**	**50**	**5352**	**577**	**1.00**
CVs			**NA**	**6.46%**	**53.27%**	**14.06%**	**20.84%**	**7.29%**	**14.56%**
1	**8**	**Pen 100**	N.D.	298423	2.41	369	32440	7655	7.09
2	**8**	**Pen 106**	N.D.	305171	1.74	373	23931	7435	5.98
3	**8**	**Pen 111**	N.D.	298258	4.38	336	27352	7031	4.95
4	**8**	**Pen 117**	N.D.	298202	13.6	371	20851	6962	5.86
5	**8**	**Pen 127**	N.D.	296682	N.D.	297	22096	7395	6.13
6	**8**	**Pen 142**	N.D.	286143	1.33	307	24127	7086	5.74
7	**8**	**Pen 156**	N.D.	338489	5.33	348	23747	8014	7.49
8	**8**	**Pen 165**	N.D.	358955	2.67	350	22136	8133	6.81
9	**8**	**Pen 172**	N.D.	331800	5.21	313	33883	8448	9.18
10	**8**	**Pen 140**	N.D.	282675	3.21	303	28879	7442	5.91
11	**8**	**Pen 184**	N.D.	331881	0.52	377	31720	8289	6.15
12	**8**	**Pen 194**	N.D.	331148	0.69	338	23456	8113	4.83
Averages			**NA**	**313152**	**3.73**	**340**	**26218**	**7667**	**6.34**
Standard Deviations			**NA**	**24154.5**	**3.67**	**29**	**4491**	**518**	**1.18**
CVs			**NA**	**7.71%**	**98.22%**	**8.63%**	**17.13%**	**6.76%**	**18.62%**

Na ppm	P ppm	S ppm	Zn ppm	Ash %	Block	Trt	Sample ID	Al ppm
							Day 42	
20264	136926	11163	402	22.5	1	1	Pen 135	N.D.
21703	137775	12549	380	23.4	2	1	Pen 108	N.D.
17420	138241	11452	399	21.9	3	1	Pen 114	N.D.
21194	141588	11890	433	22.5	4	1	Pen 120	N.D.
17165	142203	9396	384	21.6	5	1	Pen 126	N.D.
22799	161632	13433	480	22.9	6	1	Pen 148	N.D.
21782	158042	13756	445	24.9	7	1	Pen 149	N.D.
24384	159237	14195	497	21.9	8	1	Pen 162	N.D.
23875	157413	13854	475	23.7	9	1	Pen 169	N.D.
25441	140534	13566	470	19.5	10	1	Pen 138	N.D.
21123	161391	12485	459	19.5	11	1	Pen 187	N.D.
20259	155222	11624	449	23.3	12	1	Pen 195	N.D.
21451	**149184**	**12447**	**439**	**22.3**	**Averages**			**NA**
2523	**10309**	**1412**	**40**	**1.6**	**Standard Deviations**			**NA**
11.76%	**6.91%**	**11.34%**	**9.05%**	**7.19%**	**CVs**			**NA**
16579	148092	8488	361	25.0	1	2	Pen 133	N.D.
15765	149786	9674	362	26.4	2	2	Pen 102	N.D.
14060	146630	9178	347	25.1	3	2	Pen 110	N.D.
17802	146180	9376	362	26.3	4	2	Pen 122	N.D.
17109	144732	8986	374	23.4	5	2	Pen 128	N.D.
17500	144299	8763	350	26.1	6	2	Pen 141	N.D.
18238	168957	10071	408	27.2	7	2	Pen 152	N.D.
18987	169879	10789	404	27.3	8	2	Pen 161	N.D.
18650	171435	10258	466	23.1	9	2	Pen 174	N.D.
16631	171683	9750	430	22.6	10	2	Pen 180	N.D.
18099	170192	9793	394	27.5	11	2	Pen 188	N.D.
19170	161778	10644	393	27.9	12	2	Pen 196	N.D.
17383	**157804**	**9648**	**388**	**25.7**	**Averages**			**NA**
1469	**12022**	**722**	**36**	**1.8**	**Standard Deviations**			**NA**
8.45%	**7.62%**	**7.49%**	**9.19%**	**7.08%**	**CVs**			**NA**
19555	149693	9889	452	23.9	1	3	Pen 136	N.D.
16574	148636	9859	411	23.0	2	3	Pen 101	N.D.
17652	150160	9525	417	26.2	3	3	Pen 115	N.D.
18598	142186	9577	414	25.1	4	3	Pen 123	N.D.
17112	143935	8604	403	24.2	5	3	Pen 130	N.D.
19380	165971	11131	450	27.3	6	3	Pen 145	N.D.
18116	166998	10509	476	23.4	7	3	Pen 150	N.D.
18625	166262	10671	461	23.9	8	3	Pen 164	N.D.
21833	180851	12482	498	26.2	9	3	Pen 173	N.D.
18958	141652	9814	388	24.4	10	3	Pen 139	N.D.
19635	162306	11649	444	27.6	11	3	Pen 186	N.D.
19820	162459	11027	467	26.2	12	3	Pen 189	N.D.
18822	**156759**	**10395**	**440**	**25.1**	**Averages**			**NA**
1399	**12388**	**1065**	**33**	**1.5**	**Standard Deviations**			**NA**
7.43%	**7.90%**	**10.24%**	**7.58%**	**6.11%**	**CVs**			**NA**

19559	144201	9809	429	21.6	**1**	**4**	**Pen 134**	N.D.
18764	145767	10828	427	27.2	**2**	**4**	**Pen 104**	N.D.
17036	146882	9345	446	22.3	**3**	**4**	**Pen 112**	N.D.
16234	147022	9086	399	26.1	**4**	**4**	**Pen 118**	N.D.
18298	145560	9414	427	25.4	**5**	**4**	**Pen 129**	N.D.
19596	170557	11135	521	25.4	**6**	**4**	**Pen 147**	N.D.
19139	164982	10888	508	22.9	**7**	**4**	**Pen 151**	N.D.
18977	169180	10732	503	22.8	**8**	**4**	**Pen 163**	N.D.
19931	170821	10990	468	26.5	**9**	**4**	**Pen 171**	N.D.
17229	143047	9031	432	26.9	**10**	**4**	**Pen 137**	N.D.
19498	163580	10873	486	26.7	**11**	**4**	**Pen 185**	N.D.
20859	164998	11442	442	26.3	**12**	**4**	**Pen 191**	N.D.
18760	**156383**	**10298**	**457**	**25.0**	**Averages**			**NA**
1340	**11705**	**886**	**39**	**2.0**	**Standard Deviations**			**NA**
7.14%	**7.48%**	**8.61%**	**8.53%**	**8.07%**	**CVs**			**NA**
15995	142987	9538	424	25.4	**1**	**5**	**Pen 98**	N.D.
18379	147488	10596	481	22.5	**2**	**5**	**Pen 103**	N.D.
16828	144479	9205	395	26.3	**3**	**5**	**Pen 113**	N.D.
18758	146654	9707	432	21.9	**4**	**5**	**Pen 121**	N.D.
19481	149874	9549	442	22.1	**5**	**5**	**Pen 131**	N.D.
16849	141073	9009	410	25.2	**6**	**5**	**Pen 144**	N.D.
20148	170849	10244	544	21.1	**7**	**5**	**Pen 154**	N.D.
16833	165055	9856	458	24.5	**8**	**5**	**Pen 160**	N.D.
17543	164531	9942	466	23.4	**9**	**5**	**Pen 168**	N.D.
18176	169174	9778	451	26.2	**10**	**5**	**Pen 177**	N.D.
19077	168823	10511	492	25.7	**11**	**5**	**Pen 181**	N.D.
19309	165571	10364	455	21.7	**12**	**5**	**Pen 193**	N.D.
18115	**156380**	**9858**	**454**	**23.8**	**Averages**			**NA**
1299	**11776**	**501**	**40**	**1.9**	**Standard Deviations**			**NA**
7.17%	**7.53%**	**5.08%**	**8.77%**	**8.06%**	**CVs**			**NA**
15766	139985	7983	432	22.9	**1**	**6**	**Pen 99**	N.D.
15627	146619	9316	437	24.1	**2**	**6**	**Pen 107**	N.D.
16415	143947	9061	424	26.4	**3**	**6**	**Pen 109**	N.D.
18115	146705	9826	397	25.2	**4**	**6**	**Pen 119**	N.D.
18200	144508	9377	392	26.8	**5**	**6**	**Pen 132**	N.D.
18281	140999	9404	427	24.4	**6**	**6**	**Pen 143**	N.D.
19536	164634	11002	490	26.9	**7**	**6**	**Pen 155**	N.D.
18377	168381	10769	501	23.1	**8**	**6**	**Pen 159**	N.D.
19177	177707	10426	489	26.2	**9**	**6**	**Pen 167**	N.D.
18590	166743	10190	484	25.2	**10**	**6**	**Pen 179**	N.D.
20601	165637	11325	463	25.5	**11**	**6**	**Pen 183**	N.D.
18641	168099	9959	433	26.8	**12**	**6**	**Pen 192**	N.D.
18111	**156164**	**9887**	**447**	**25.3**	**Averages**			**NA**
1493	**13439**	**935**	**37**	**1.4**	**Standard Deviations**			**NA**
8.25%	**8.61%**	**9.45%**	**8.30%**	**5.57%**	**CVs**			**NA**
16018	153735	9669	423	27.2	**1**	**7**	**Pen 97**	N.D.

15998	146795	8465	426	27.5	**2**	**7**		**Pen 105**	N.D.
17650	145581	9329	402	26.9	**3**	**7**		**Pen 116**	N.D.
18484	149215	9110	464	22.4	**4**	**7**		**Pen 124**	N.D.
17216	145811	8895	414	26.2	**5**	**7**		**Pen 125**	N.D.
17692	167591	10012	518	27.0	**6**	**7**		**Pen 146**	N.D.
18541	168056	9990	475	27.1	**7**	**7**		**Pen 153**	N.D.
22695	167579	12356	529	21.2	**8**	**7**		**Pen 166**	N.D.
18129	169166	9480	488	26.3	**9**	**7**		**Pen 170**	N.D.
18692	165413	10102	461	25.9	**10**	**7**		**Pen 178**	N.D.
18189	167369	9571	474	24.9	**11**	**7**		**Pen 182**	N.D.
17839	166554	10440	473	22.3	**12**	**7**		**Pen 190**	N.D.
18095	**159405**	**9785**	**462**	**25.4**	**Averages**				**NA**
1700	**10115**	**981**	**40**	**2.2**	**Standard Deviations**				**NA**
9.39%	**6.35%**	**10.02%**	**8.60%**	**8.71%**	**CVs**				**NA**
14307	145330	8934	437	25.8	**1**	**8**		**Pen 100**	N.D.
17071	145528	9082	431	27.5	**2**	**8**		**Pen 106**	N.D.
18009	145633	9378	450	25.0	**3**	**8**		**Pen 111**	N.D.
17512	145453	9376	393	27.9	**4**	**8**		**Pen 117**	N.D.
16909	145330	8815	423	26.7	**5**	**8**		**Pen 127**	N.D.
18737	144373	9359	361	25.1	**6**	**8**		**Pen 142**	N.D.
19639	163662	10689	455	25.9	**7**	**8**		**Pen 156**	N.D.
18224	174189	10144	493	28.4	**8**	**8**		**Pen 165**	N.D.
20015	168528	11288	495	21.3	**9**	**8**		**Pen 172**	N.D.
18496	145019	9331	452	24.5	**10**	**8**		**Pen 140**	N.D.
17715	166165	10274	464	23.4	**11**	**8**		**Pen 184**	N.D.
17853	161715	9430	439	25.6	**12**	**8**		**Pen 194**	N.D.
17874	**154244**	**9675**	**441**	**25.6**	**Averages**				**NA**
1459	**11510**	**757**	**38**	**2.0**	**Standard Deviations**				**NA**
8.16%	**7.46%**	**7.83%**	**8.55%**	**7.71%**	**CVs**				**NA**

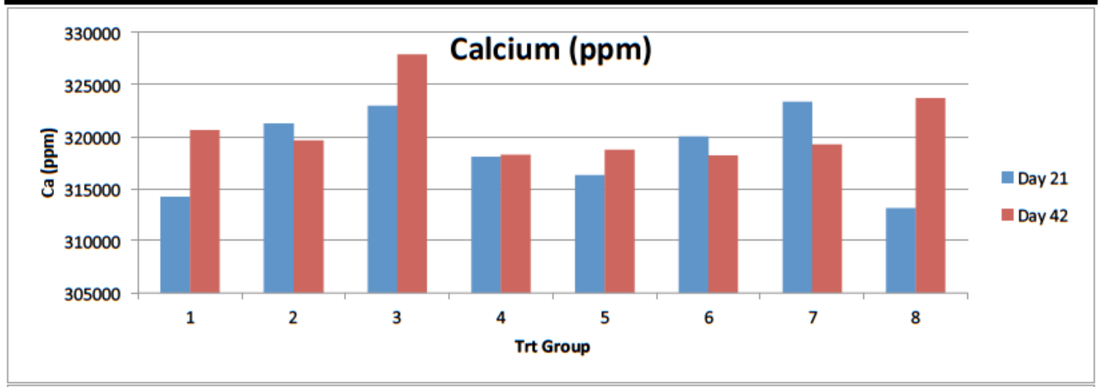
Ca ppm	Cu ppm	Fe ppm	K ppm	Mg ppm	Mn ppm	Na ppm	P ppm	S ppm	Zn ppm	Ash %
319150	1.57	493	20605	7036	7.54	16629	150907	9464	318	29.6
326711	2.13	427	19836	7012	6.72	14871	151415	8794	325	27.2
326014	2.93	479	27180	7104	7.76	17015	155717	9718	360	24.2
323974	0.92	589	23507	7054	5.58	16639	151383	9315	329	27.1
324650	2.94	479	23909	7239	6.57	14902	153399	8455	322	25.1
317105	3.06	564	23748	7459	7.07	16617	151792	9903	346	27.8
313062	4.32	504	27934	7732	9.79	17196	152408	9871	345	23.3
313646	2.69	440	24947	6871	7.41	14649	147859	8107	300	24.5
376740	2.39	638	33613	8730	8.77	19605	172888	11465	395	24.7
309311	0.00	422	23204	6865	7.82	16794	147924	9623	337	28.1
302833	1.08	451	19121	7006	4.68	14928	143540	8630	296	29.5
294205	1.19	501	20277	7056	2.83	15201	135632	9008	285	30.7
320617	**2.10**	**499**	**23990**	**7264**	**6.88**	**16254**	**151239**	**9363**	**330**	**26.8**
20238.2	**1.19**	**67**	**4116**	**524**	**1.85**	**1433**	**8637**	**882**	**30**	**2.4**
6.31%	**56.69%**	**13.45%**	**17.16%**	**7.21%**	**26.85%**	**8.82%**	**5.71%**	**9.42%**	**9.11%**	**9.07%**
313339	1.24	401	18339	7390	7.61	16832	153428	9359	350	26.7
331234	3.25	466	24476	8193	7.18	16564	160941	8847	332	27.1
329425	2.34	368	17386	7435	7.27	15996	158459	7919	318	27.6
328755	1.45	364	17674	7728	5.07	15378	159340	8082	297	31.3
335534	1.68	322	15795	7817	5.81	13846	160289	7231	301	32.6
320341	1.49	391	18746	7489	6.10	15089	157034	7773	303	31.9
314134	0.39	355	21699	7705	4.54	14941	161851	8606	307	28.9
319033	2.93	392	16812	7379	4.61	14589	154463	7144	297	33.1
309567	0.88	352	19341	7393	5.60	14281	151147	7334	283	27.3
321642	3.75	418	25311	7967	7.34	15223	158210	8121	314	25.2
314469	3.60	477	20055	7450	4.12	15434	148710	7848	314	31.0
298056	2.02	374	20517	7386	3.97	15062	143574	7889	307	28.7
319627	**2.08**	**390**	**19679**	**7611**	**5.77**	**15270**	**155621**	**8013**	**310**	**29.3**
10595.1	**1.09**	**46**	**2939**	**270**	**1.33**	**871**	**5548**	**661**	**17**	**2.6**
3.31%	**52.54%**	**11.70%**	**14.93%**	**3.55%**	**23.11%**	**5.70%**	**3.56%**	**8.25%**	**5.61%**	**8.88%**
317218	2.98	501	20485	7519	7.60	16007	154132	8457	337	29.4
333436	2.93	358	20671	7341	7.18	15540	158283	8005	356	25.5
333601	2.08	420	19728	7005	7.32	15235	154455	8137	359	29.8
331464	1.58	432	18917	7323	6.78	15556	159712	7844	346	27.7
331068	2.74	405	18966	7391	6.70	15353	156763	8222	340	29.9
322137	4.97	420	18135	7659	8.48	15358	157857	8723	336	31.9
306386	0.00	436	22249	7313	5.43	15365	154053	8589	360	27.3
399284	2.60	501	26163	9182	7.10	18855	178932	9321	430	30.9
316080	0.38	392	18454	7150	6.56	14974	151262	8044	323	29.3
331396	1.66	432	22174	7798	6.85	16088	160673	8918	340	29.2
308429	N.D.	446	19789	7174	6.12	14292	149518	8219	300	34.2
304374	3.40	448	22849	7232	5.39	15396	149551	7880	336	26.5
327906	**2.30**	**432**	**20715**	**7507**	**6.79**	**15668**	**157099**	**8363**	**347**	**29.3**
25002.3	**1.39**	**41**	**2309**	**571**	**0.87**	**1104**	**7816**	**451**	**31**	**2.4**
7.62%	**60.59%**	**9.37%**	**11.15%**	**7.61%**	**12.84%**	**7.04%**	**4.98%**	**5.40%**	**8.90%**	**8.14%**

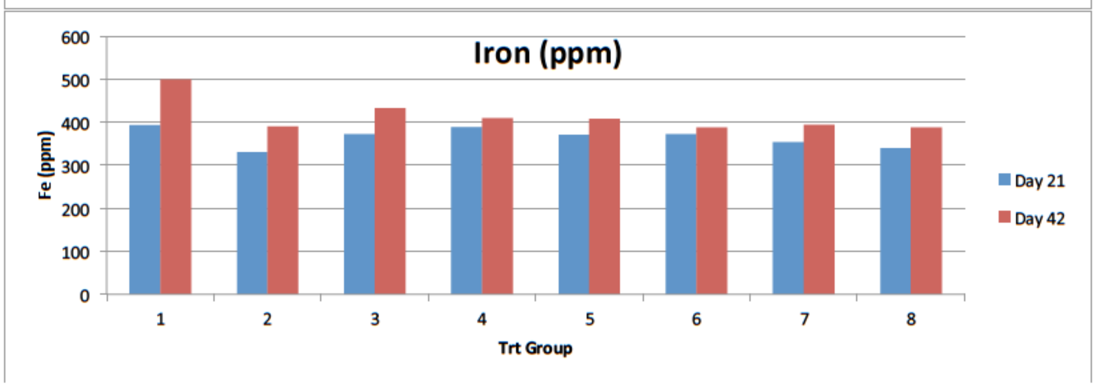
315450	2.78	445	22937	7599	7.56	16947	156811	9178	382	27.2
324104	2.00	408	20707	7139	8.40	15734	154772	8175	360	26.3
330948	3.43	423	20554	7196	7.82	15698	155925	8315	334	26.6
316248	3.45	380	20851	7292	5.81	15728	153942	7889	332	25.6
336955	2.03	333	20689	7967	7.77	14156	161361	7615	343	28.8
325430	0.43	394	17649	7831	7.95	14383	159902	8217	363	34.3
313567	2.89	403	18106	7266	5.97	15546	157858	8374	337	30.7
316209	2.93	377	19991	7418	4.98	14443	155214	7925	349	29.0
310000	1.67	464	17663	7082	7.61	15146	146718	8106	292	33.1
321891	6.16	416	21339	7470	7.15	15812	154884	8275	352	26.8
309120	3.29	412	18120	7210	4.81	15018	148069	7757	322	30.9
299274	2.15	457	22735	7155	7.53	15252	142650	7908	320	28.0
318266	**2.77**	**409**	**20112**	**7385**	**6.95**	**15322**	**154009**	**8145**	**340**	**29.0**
10267.5	**1.38**	**37**	**1855**	**284**	**1.22**	**772**	**5522**	**402**	**23**	**2.8**
3.23%	**49.83%**	**8.98%**	**9.23%**	**3.84%**	**17.60%**	**5.04%**	**3.59%**	**4.93%**	**6.87%**	**9.63%**
323868	4.16	418	20903	7190	7.87	15514	153717	7987	375	26.9
334196	5.24	451	18444	7456	6.22	15616	156314	8471	359	30.7
331549	1.19	406	19008	7349	8.56	15371	159275	7914	365	30.1
325846	1.57	354	17180	7288	7.47	13751	155395	7515	341	30.5
329062	2.33	358	16397	7488	5.47	14854	158844	7601	356	30.4
306092	2.09	439	23032	7485	7.48	15882	153851	8408	360	27.5
301964	3.90	507	22169	7414	7.47	18036	154274	9198	353	27.4
314418	1.85	402	17763	7077	5.22	13543	152777	7035	326	31.6
317891	1.85	384	15944	7279	7.07	14250	150933	7239	330	35.1
326912	2.57	365	15208	7575	7.53	13767	152964	7852	316	35.2
308209	2.23	352	16047	7097	5.19	14766	148955	7241	340	30.3
304888	0.73	454	18549	6966	5.14	15398	145584	7852	293	32.9
318741	**2.48**	**407**	**18387**	**7305**	**6.72**	**15062**	**153574**	**7859**	**343**	**30.7**
11348.5	**1.32**	**49**	**2522**	**191**	**1.21**	**1233**	**3871**	**612**	**23**	**2.7**
3.56%	**53.16%**	**11.92%**	**13.72%**	**2.61%**	**17.99%**	**8.19%**	**2.52%**	**7.79%**	**6.84%**	**8.84%**
330080	2.11	367	18729	7382	8.65	14524	155801	7703	384	28.1
327235	3.76	390	20051	7587	6.68	17071	158071	8532	356	28.0
328479	3.42	390	19195	7467	7.54	15620	159139	8102	356	29.5
329360	0.01	316	15287	7349	4.84	14204	155844	7411	342	30.0
322773	0.84	422	19180	7651	7.11	17247	155216	9639	366	30.7
329980	0.00	419	18761	7772	6.07	15194	158310	8304	362	33.3
303263	1.27	418	23065	7295	6.30	15523	153970	8596	348	25.6
316670	0.00	413	18527	7479	6.70	15136	154737	7887	371	29.5
309967	1.65	372	18951	7373	6.48	13374	152587	7316	336	31.5
304801	0.17	375	17244	7235	5.53	13827	149543	7259	302	30.5
303513	1.63	392	20970	7202	7.30	14337	148288	7455	313	27.3
312315	3.06	379	23622	7475	5.31	15730	151502	8258	316	26.0
318203	**1.49**	**388**	**19465**	**7439**	**6.54**	**15149**	**154417**	**8039**	**346**	**29.2**
11019.7	**1.37**	**30**	**2288**	**169**	**1.05**	**1192**	**3423**	**690**	**25**	**2.3**
3.46%	**91.63%**	**7.67%**	**11.75%**	**2.28%**	**16.04%**	**7.87%**	**2.22%**	**8.58%**	**7.29%**	**7.76%**
331955	0.37	387	17254	7761	7.30	13321	156653	7448	363	33.2

325007	5.23	482	19379	7501	7.30	15099	157391	7968	351	30.0
324220	0.94	349	20326	7417	6.88	15728	157395	7996	357	28.0
328316	2.48	346	19481	7652	6.47	15030	159249	7874	357	26.7
325734	2.42	381	18898	7545	5.80	15262	158692	7964	353	30.4
323962	2.35	367	17786	7753	7.78	14703	161569	7715	351	32.2
310632	2.60	460	18223	7897	6.16	14474	157497	7992	341	34.5
309490	0.31	402	14622	7387	6.13	13901	148165	7012	350	33.7
315301	0.82	432	24725	7838	6.60	16155	150323	7942	344	26.2
314920	1.37	356	16088	7028	4.95	13993	149121	7074	331	32.6
312188	1.74	373	20495	7388	7.12	14989	155145	7626	308	26.5
309459	0.96	394	15417	7229	5.28	14362	149376	7530	299	36.1
319265	**1.80**	**394**	**18558**	**7533**	**6.48**	**14751**	**155048**	**7678**	**342**	**30.8**
8063.96	**1.36**	**43**	**2704**	**260**	**0.86**	**799**	**4573**	**352**	**20**	**3.4**
2.53%	**75.77%**	**11.02%**	**14.57%**	**3.45%**	**13.24%**	**5.41%**	**2.95%**	**4.58%**	**5.81%**	**10.98%**

338111	2.42	368	20356	7887	7.45	15539	159454	8103	387	27.7
336063	0.00	340	13932	7606	7.24	12999	158098	7308	352	37.2
331282	2.78	402	18049	7566	6.76	15122	158220	7552	373	30.2
350691	2.60	379	17319	7986	8.15	14947	165974	7762	355	31.8
361556	0.00	448	17912	8104	6.28	15483	168153	8039	373	32.7
306242	2.91	454	20581	7442	7.72	15194	152583	7221	349	27.4
304599	0.71	377	16899	7541	6.37	14544	151924	8021	323	33.5
308140	1.58	398	17281	7633	6.01	14803	150856	7210	289	32.1
315949	0.63	359	20385	7333	4.88	13985	151806	7389	341	26.0
315194	3.06	398	18691	7581	5.79	14994	156081	7695	372	31.1
311065	0.25	303	14724	6972	6.77	13528	148152	6814	328	32.7
305135	2.82	425	20464	7579	4.41	15590	148399	7878	318	30.4
323669	**1.65**	**388**	**18049**	**7603**	**6.49**	**14727**	**155808**	**7583**	**347**	**31.1**
19372.1	**1.24**	**44**	**2214**	**299**	**1.11**	**825**	**6465**	**402**	**28**	**3.0**
5.99%	**75.62%**	**11.22%**	**12.26%**	**3.93%**	**17.13%**	**5.60%**	**4.15%**	**5.30%**	**8.20%**	**9.80%**

Trt Group	Al ppm		Ca ppm		Cu ppm		Fe ppm		K ppm	
	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42
1	NA	NA	314208	320617	5.37	2.10	393	499	31520	23990
2	NA	NA	321274	319627	2.89	2.08	330	390	24545	19679
3	NA	NA	322960	327906	4.27	2 30	373	432	25881	20715
4	NA	NA	318041	318266	4.36	2.77	388	409	27363	20112
5	NA	NA	316299	318741	4.15	2.48	371	407	29262	18387
6	NA	NA	320037	318203	3.01	1.49	372	388	25880	19465
7	NA	NA	323347	319265	2.90	1 80	354	394	25688	18558
8	NA	NA	313152	323669	3.73	1 65	340	388	26218	18049





Trt Group	Al ppm		Ca ppm		Cu ppm		Fe ppm		K ppm	
	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42
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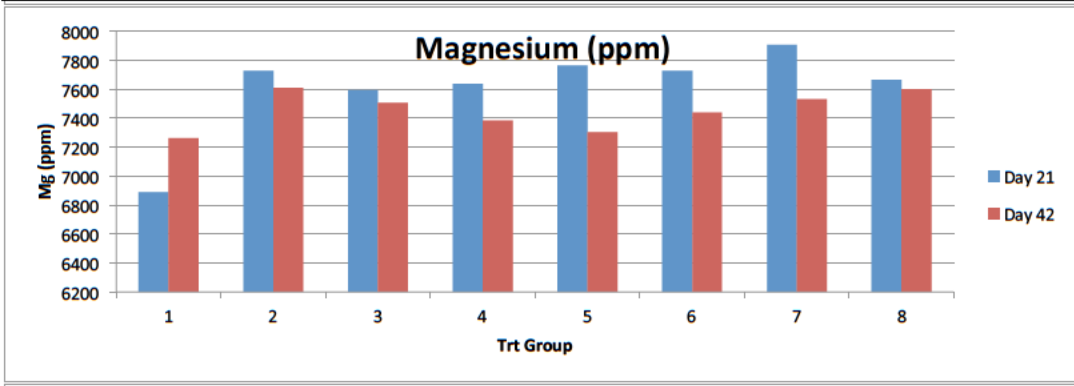

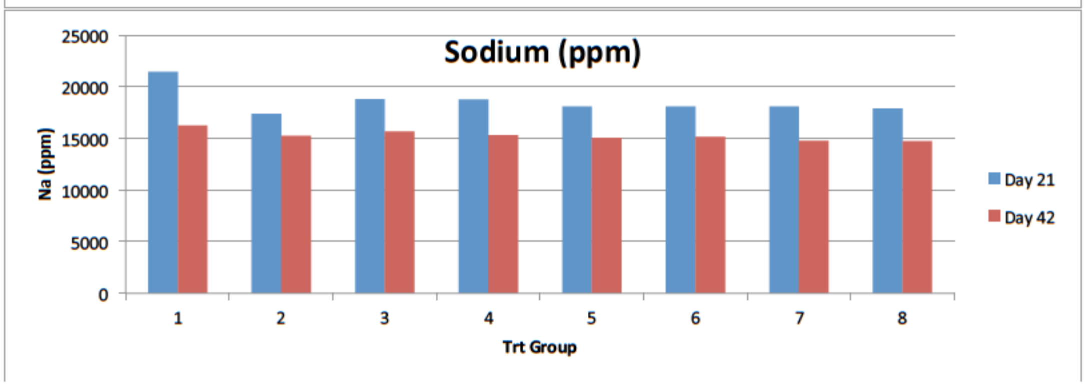

Trt Group	Al ppm		Ca ppm		Cu ppm		Fe ppm		K ppm	
	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42
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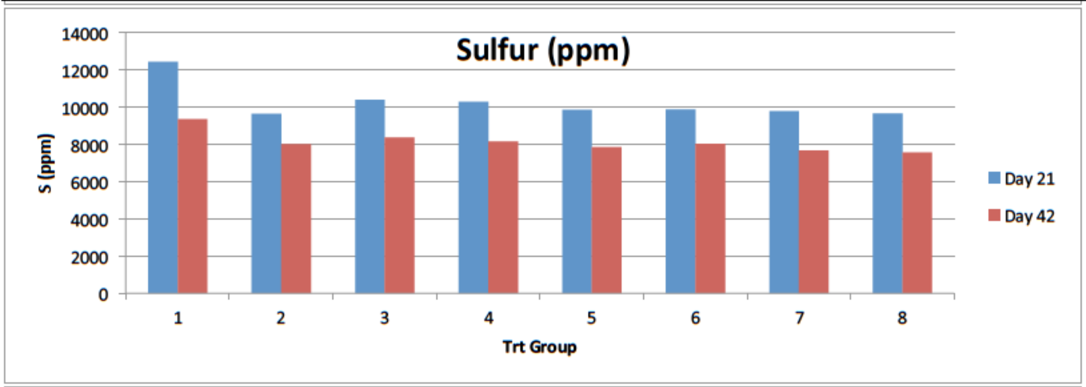
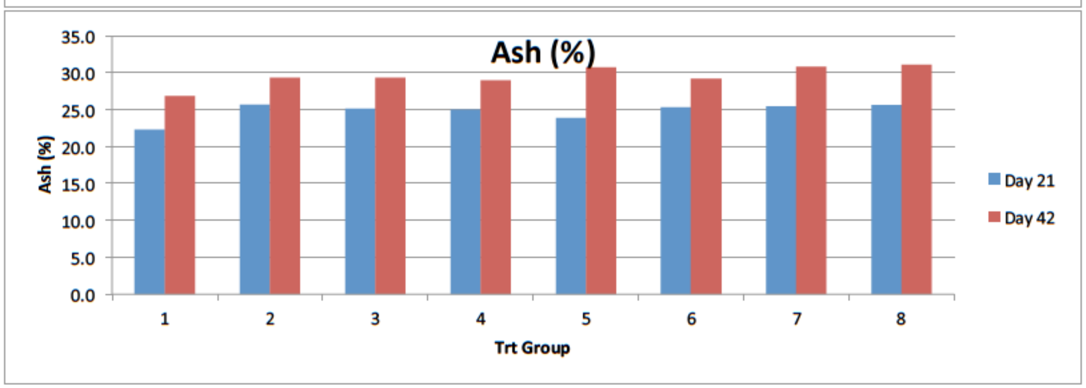
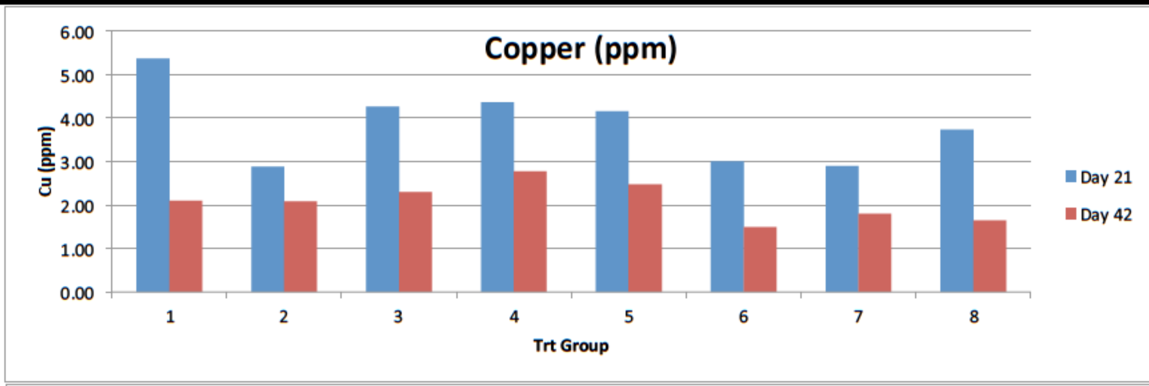
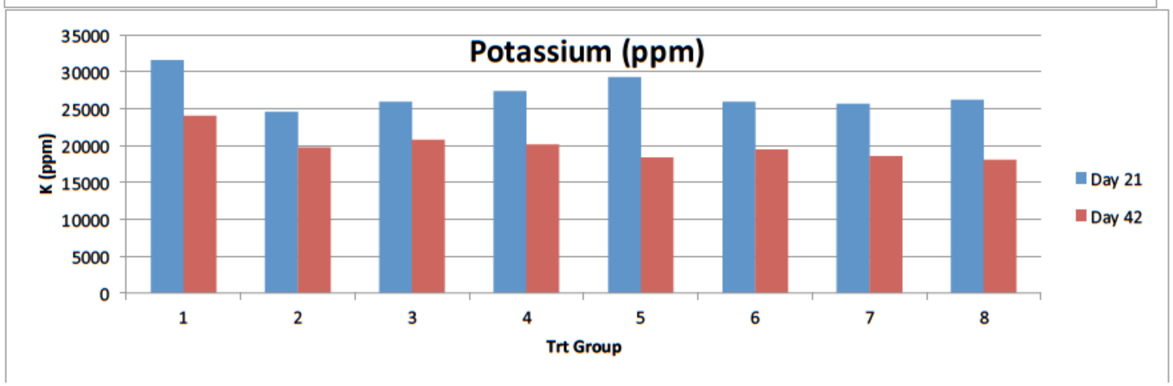




Mg ppm		Mn ppm		Na ppm		P ppm		S ppm		Zn ppm		Ash %	
Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42
6889	7264	6.60	6.88	21451	16254	149184	151239	12447	9363	439	330	22.3	26.8
7728	7611	5.07	5.77	17383	15270	157804	155621	9648	8013	388	310	25.7	29.3
7594	7507	7.88	6.79	18822	15668	156759	157099	10395	8363	440	347	25.1	29.3
7638	7385	6.67	6.95	18760	15322	156383	154009	10298	8145	457	340	25.0	29.0
7766	7305	6.70	6.72	18115	15062	156380	153574	9858	7859	454	343	23.8	30.7
7729	7439	6.57	6.54	18111	15149	156164	154417	9887	8039	447	346	25.3	29.2
7908	7533	6.88	6.48	18095	14751	159405	155048	9785	7678	462	342	25.4	30.8
7667	7603	6.34	6.49	17874	14727	154244	155808	9675	7583	441	347	25.6	31.1





Mg ppm		Mn ppm		Na ppm		P ppm		S ppm		Zn ppm		Ash %	
Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42
6889	7264	6.60	6.88	21451	16254	149184	151239	12447	9363	439	330	22.3	26.8
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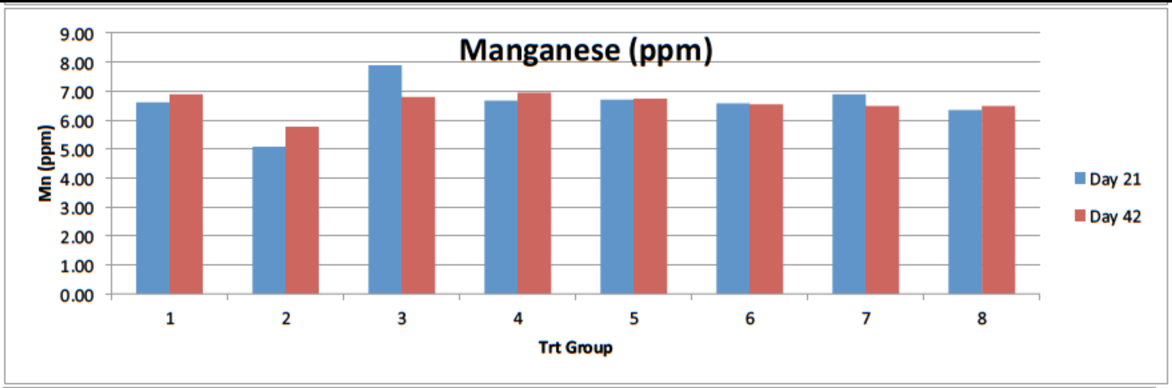

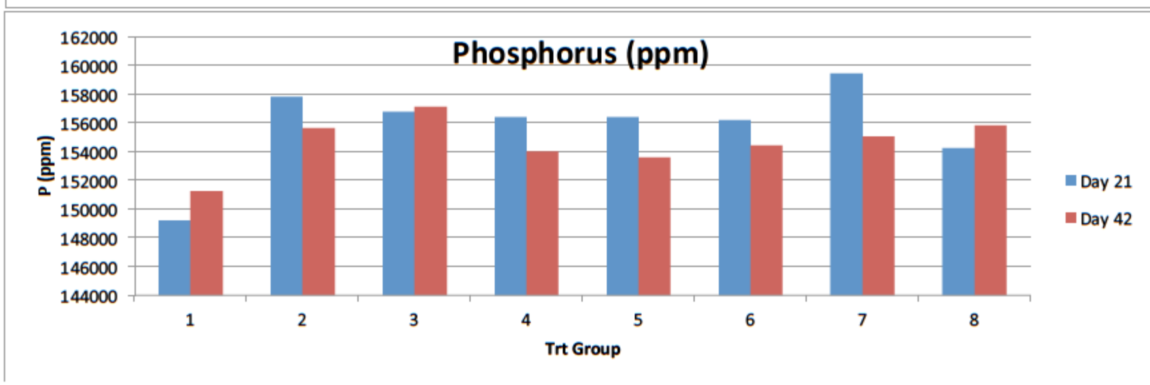

Mg ppm		Mn ppm		Na ppm		P ppm		S ppm		Zn ppm		Ash %	
Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42	Day 21	Day 42
6889	7264	6.60	6.88	21451	16254	149184	151239	12447	9363	439	330	22.3	26.8
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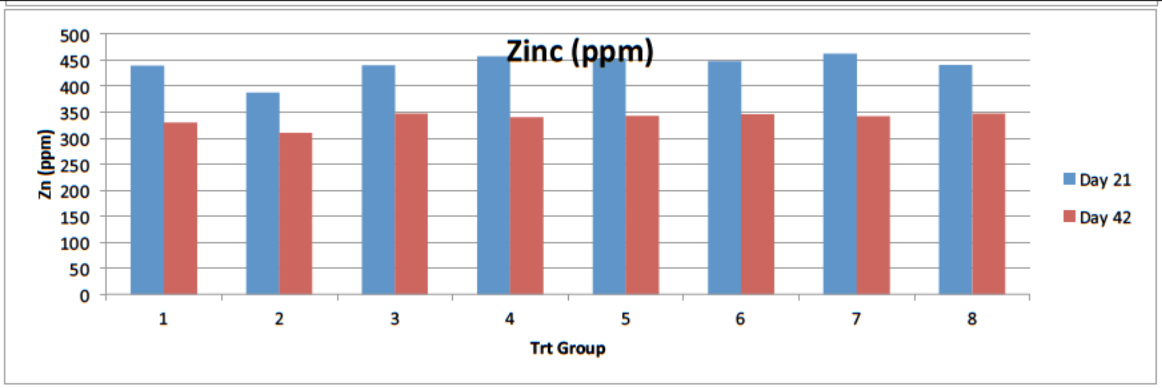

Appendix 9

GraINzyme Phytase Phy02 Dose Response in Poultry

Project No. AGV-15-3

Conducted by Colorado Quality Research, Ft. Collins, CO

Final Study Report Pages 1 - 86

COLORADO QUALITY RESEARCH FINAL REPORT

GraINzyme Phytase Phy02 Dose Response in Poultry

Project No. AGV-15-3

SPONSOR

Agrivida Inc.
200 Boston Ave, Suite 2975
Medford, MA 02155

TEST FACILITY

COLORADO QUALITY RESEARCH, INC.
400 East County Road 72
Wellington, Colorado 80549

January 2016

CQR FINAL REPORT
Project No. AGV-15-3

I. GraINzyme Phytase Phy02 Dose Response in Poultry

SPONSOR MONITORS:

Jim Ligon, Ph.D.
VP Regulatory Affairs and Stewardship
Agrivida Inc.
200 Boston Ave, Suite 2975
Mobile: (b) (6)
Email: jim.ligon@agrivida.com

INVESTIGATOR:

Dan Moore, PhD.
Colorado Quality Research, Inc.
400 East County Road 72
Wellington, Colorado 80549
Office : 970-568-7738
Fax : 970-568-7719
Email: dan@coloradoqualityresearch.com

STUDY EVENT SCHEDULE:

Event	Study Day	Calendar Date
Received, weighed birds by pen, vaccinated for NCB, and placed 17 chicks/pen. Administered Starter 1 diets	0	30JUL15
Weighed birds; Weighed back Starter 1 diets; Administered Starter 2 diets	14	13AUG15
Weighed birds by pen; Weighed back Starter 2 diets and changed to Grower/Finisher diets; Removed3 birds/pen; collected ileal and tibia samples	21	20AUG15
Weighed birds by pen; Weighed back Grower/Finisher diets; Collected tibia and fecal samples from 3 birds/pen; Ended live phase	42	10SEP15

OBJECTIVE

The objective of this study was to demonstrate the effectiveness over a range of doses of Phy02, a phytase enzyme product that is being developed by Agrivida, Inc. as a feed additive for poultry diets.

III. MATERIALS AND METHODS

A. TESTING/SUPPORT FACILITIES

Study Investigator	
Dan Moore, PhD (CV: on file, available upon request)	Colorado Quality Research, Inc. 400 E. County Road 72 Wellington, CO 80549 W: 970-568-7738 F: 970-568-7719 dan@coloradoqualityresearch.com
Sponsor Representative	
Jim Ligon, PhD (CV: on file, available upon request)	Agrivida, Inc. VP Business Development 200 Boston Ave, Suite 2975 Medford, MA 02155 M: (b) (4) (b) (4)@gmail.com
Enzyme Analysis	
Phillip A. Lessard, Ph.D. (CV: on file, available upon request)	Agrivida, Inc. 200 Boston Ave., Suite 2975 Medford, MA 02155 Philip.lessard@agrivida.com
Contributing Scientist – Tibia Ash Parameters	
Linda Kirby (CV: on file, available upon request)	University of Arkansas Central Analytical Lab 1260 W. Maple Street Fayetteville, AR 72701 lkirby@uark.edu
Contributing Scientist – Ileal Phosphorus Digestibility, Feed Analysis	
Thomas P. Mawhinney (CV: on file, available upon request)	Experimental Station Chemical Laboratories Room 4, Agricultural Building University of Missouri Columbia, MO 65211-7170 mawhinneyt@missouri.edu
Contributing Scientist – Proximate Analysis of Basal Feeds	
Bryan Brock (CV: on file, available upon request)	MVTL Laboratories 2 N. German Street New Ulm, MN 56072 W: (800) 782-3557 bbrock@mvtl.com

B. TEST ARTICLES, CONTROL ARTICLES, AND FEED ADDITIVES

Test Articles

GraINzyme Phytase Phy02	Lot No. TAVPHY02_0018 Expiration 17OCT15
Concentration	(b) (4) FTU/g
Dosage Form	Via complete feed
Level	250 Units Phytase (Treatment Group 3) 500 Units Phytase (Treatment Group 4) 750 Units Phytase (Treatment Group 5) 1000 Units Phytase (Treatment Group 6) 3000 Units Phytase (Treatment Group 7)
Duration	*Ad libitum* Day 0 – Study End
Source	Agrivida, Inc.

Control Articles

Phytase 2500 TPT Premix	Lot No. 11184002 Expiration November 2016
Concentration	2,500 FTU/g
Dosage Form	Via complete feed
Level	0.02% of Finished Feed (Treatment Group 8)
Duration	*Ad libitum* Day 0 – Study End

Feed Additives

Biocox 60	Lot No. HSK20483
(Salinomycin)	Expiration October 2015
Concentration	60 g/lb
Dosage Form	Via Complete Feed
Level	50 g/ton
Duration	*Ad libitum* in Starter 1 and Starter 2 diets
Source	Alpharma, Inc.

Titanium Dioxide	Lot No. TIOKFP40050PBGN
Dosage Form	Via Complete Feed
Level	0.3% in Basal Feed
Duration	*Ad libitum* in Starter 2 and Grower/Finisher diets
Source	Included in Study Records

Storage:	Secured, temperature monitored, dry area
Method of administration:	Oral via complete feed
Accounting:	All quantities of the test articles, control articles, and feed additives received and used in this study were documented

C. BASAL AND EXPERIMENTAL DIETS

Diets were formulated by CQR. Diets met and conformed with the commercial standards for feed used based on breed and age range of broilers. Copies of the diet formulations were included in the study records and Final Report.

There were two different basal diet formulations. Low Phosphate (LP) diets were formulated to contain 0.3% AvP in the Starter 1 and Starter 2 diets and 0.25% AvP in the Grower/Finisher diets. The High Phosphate (HP) diets were formulated to contain 0.45% AvP in the Starter 1 and Starter 2 diets and 0.4% AvP in the Grower/Finisher diets.

Basal diets were manufactured at CQR and stored in bulk mash form. The treatment diets were mixed at the CQR feed mill. A 500 pound capacity vertical mixer, a 4000 pound capacity vertical mixer, or a 14,000 lb horizontal mixer and a California Pellet Mill system were used to prepare the starter and grower/finisher diets. Feed was pelleted using a ~5-mm die and the starter 1 diet was further processed into crumbles while the starter 2 diet was left as pellets. The pelleting temperature was ~65 ºC. Mixed feed was stored in bulk storage bins labeled with study number, treatment letter code, and diet type. Complete records of diet mixing were included in the study records.

Approximate Feeding Program:

Diet	Form	Period	~Lbs Feed Mixed per Trt
Starter 1	Crumbled	0 – 14 Days	300
Starter 2	Pelleted	14 – 21 Days	390
Grower/Finisher	Pelleted	21 – 42 Days	1680

Test article and control article were added to the basal feed in the following approximate quantities in order to achieve the targeted levels of phytase in the treatment feeds:

Trt Group	Product	Starter 1	Starter 2	Grower/Finisher
1	NA	NA	NA	NA
2	NA	NA	NA	NA
3	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted] (b) (4)
4	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
5	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
6	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
7	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
8	Phytase 2500 TPT Premix[2]	0.060 lb	0.078 lb	0.336 lb

[1] Concentration of GraINzyme Phytase Phy02 as determined analytically by Agrivida was [redacted] (b) (4) FTU/g.
[2] Concentration of Phytase 2500 TPT Premix as indicated on the label was 2,500 FTU/g.

D. SAMPLES AND ASSAYS

Prior to the pelleting process, an ~500g sample was taken of all treatment diets.

Following pelleting, treatment feeds were sampled (~500 g sample size) in duplicate according to CQR standard operating procedures (SOP FM-4 rev04). Five to ten samples of approximately equal size were collected from evenly distributed points as the feed was exiting the mixer/pelleter. These samples were combined into a representative composite sample which was then split into two duplicate samples in a manner appropriate to ensure minimal risk of cross-contamination. One sample was submitted to Agrivida for enzyme (phytase) analysis. The second sample of the treatment feeds was retained by CQR until notification from the Sponsor was received that the back-up samples were no longer needed. All samples were labeled with the CQR project number, sample description, and date of collection.

Basal feeds were sampled (~500 g sample size) in triplicate according to CQR standard operating procedures. One sample was submitted to MVTL for proximate analysis [See the following: AOAC 942.05; AOAC 930.15; AOAC (18) 2005 985.01; AOAC 968.08 (D.(a)); AOAC 990.03; AOAC 2003.06; AOAC 2003.05; ISO 11085-2008; AN 3414 (2005-03-02) Revision 4.1; AOAC (18) 2005 Method 994.12; and AOCS B1 6a-05], one sample was submitted to Agrivida for enzyme (phytase) analysis, and the third sample was retained by CQR until notification from the Sponsor was received that the back-up sample was no longer needed. All samples were labeled with the CQR project number, sample description, and date of collection.

E. TEST SYSTEM

Species	Commercial Broiler Chickens
Strain	Cobb 500
Supplier	Simmons Foods Hatchery Siloam Springs, AR
Sex	Males
Age	~1 day of age upon receipt (Day 0) ~42 days at final weights
Identification	Pen cards
Number of birds/pen	17
Number of treatments	8
Number of pens/treatment	12
Number of birds/treatment	204
Total number of pens	96
Total number of birds	1632

IV. EXPERIMENTAL DESIGN

A. TEST GROUPS

The test facility (Building #8W) was divided into 12 blocks of 8 pens each block. Treatments were assigned to the pens using a complete randomized block design. Birds were assigned to the pens randomly according to CQR SOP B-10. Specific treatment groups were as follows:

Low Phosphate diets were formulated to contain:
Starter: 0.3% AvP
Grower/Finisher: 0.25% AvP

High Phosphate diets were formulated to contain:
Starter: 0.45% AvP
Grower/Finisher: 0.4% AvP

Trt Group	Description	No. Pens	No. Birds/Pen	No. Birds/Trt
1	Low Phosphate (LP)	12	17	204
2	High Phosphate (HP)	12	17	204
3	250 Units Phytase (LP)	12	17	204
4	500 Units Phytase (LP)	12	17	204
5	750 Units Phytase (LP)	12	17	204
6	1000 Units Phytase (LP)	12	17	204
7	3000 Units Phytase (LP)	12	17	204
8	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)	12	17	204
Totals		**96**	**NA**	**1632**

B. HOUSING AND MANAGEMENT

<u>Housing</u>

Assignment of treatments to pens was conducted using Microsoft Excel. The computer-generated assignment was as follows:

	T1	T2	T3	T4	T5	T6	T7	T8
Block 1	6	10	9	5	7	11	4	8
Block 2	16	14	15	18	17	13	12	19
Block 3	25	27	24	26	23	28	22	29
Block 4	37	36	35	32	34	33	30	31
Block 5	46	48	44	45	47	42	43	41
Block 6	53	54	52	49	55	50	51	56
Block 7	60	65	62	59	63	61	66	64
Block 8	71	70	68	73	74	72	67	69
Block 9	79	78	84	81	80	82	83	85
Block 10	90	91	89	88	93	87	92	86
Block 11	100	102	96	98	101	97	103	99
Block 12	109	111	108	104	107	106	110	105

Birds were housed in concrete floor pens (~ 3' x 5') within an environmentally controlled facility (Facility #8W, diagram attached). All birds were placed in clean pens containing clean pine shavings as bedding. Additional shavings were added to pens if they became too damp for comfortable conditions for the test birds during the study. Lighting was via incandescent lights and a commercial lighting program was used. Hours of light for every 24-hour period were as follows:

Approximate Bird Age (days)	Approximate Hours of Continuous Light per 24 hr period	~Light Intensity (foot candles)
0 – 4	24	1.0 – 1.3
5 – 10	10	1.0 – 1.3
11 – 18	12	0.2 – 0.3
19 – Study End	16	0.2 – 0.3

Environmental conditions for the birds (floor space & bird density [~0.88 ft^2/bird], temperature, lighting, feeder and water space) were similar for all treatment groups at placement. In order to prevent bird migration, each pen was checked to ensure that no openings greater than 1 inch existed for approximately 12 inches in height between pens. To achieve this, a wood or plastic solid partition was in place for approximately the first 12 inches from the floor between each pen.

Vaccinations:

Birds were vaccinated for Mareks at the hatchery. Newcastle Disease (Poulvac Aero ND; B1 Type, B1 Strain, Live Virus; Zoetis, Inc, Kalamazoo, MI; Serial No. 1407910; Expiration 24MAR17) and Infectious Bronchitis (Bronchitis Vaccine; Mass. Type, Live Virus; Pfizer Animal health, Exton, PA; Serial No. 1308001; Expiration 14SEP15) vaccines were administered using a spray cabinet upon receipt of chicks. No other vaccinations or treatments (except as indicated above), were administered during the study unless approved by the Sponsor.

Water:

Water was provided *ad libitum* throughout the study via one automatic nipple drinker (5 nipples per drinker) per pen. Drinkers were checked twice daily and cleaned as needed to ensure a clean and constant water supply to the birds.

Feed:

Feed was provided *ad libitum* throughout the study via one hanging, ~17 inch diameter tube feeder per pen. One chick feeder tray was placed in each pen for approximately the first four days. Birds were placed on their respective treatment diets on Day 0 and as per the experimental design. Feed added and removed from pens from Day 0 to study end was weighed and recorded.

Daily observations:

The test facility, pens, and birds were observed at least twice daily for general flock condition, lighting, water, feed, ventilation and unanticipated events. If abnormal conditions or abnormal behavior was noted at any of the twice-daily observations they were documented and documentation was included with the study records. The minimum-maximum temperature of the test facility was recorded once daily.

Mortality and Culls:

Starting on study day 0, any bird that was found dead or was removed and sacrificed was weighed and necropsied. Cull birds that were unable to reach feed or water were sacrificed, weighed, and documented. The weight and probable cause of death and necropsy findings were recorded on the pen mortality record.

Veterinary Care, Intervention and Euthanasia:

Birds that developed clinically significant concurrent disease unrelated to the test procedures were, at the discretion of the Study Investigator or a designee, removed from the study and euthanized in accordance with site SOPs. In addition, moribund or injured birds whose condition may have affected the outcome of the study were euthanized upon the authority of a Site Veterinarian or a qualified technician. The reason for withdrawal was documented. If an animal died, or was removed and euthanized for humane reasons, it was recorded on the mortality sheet for the pen and a necropsy performed and filed to document the reason for removal.

If euthanasia was deemed necessary by the Study Investigator or a qualified technician, animals were euthanized by cervical dislocation.

Body Weights and Feed Intake:

Birds were weighed by pen on Study Days 0, 14, 21, and 42. The weights of all mortalities and culls over the course of the study were recorded on the Mortality & Necropsy Records for the appropriate pens. Average bird weight on a pen basis, on each weigh day, was summarized.

The feed remaining in each pen's feeder was weighed and the amount of feed consumed per pen was calculated by subtracting the feed weighed out of the pen from the total amount of feed weighed into the pen. Feeders were weighed on or before Study Day 0 and on Study Days 14, 21, and 42.

Weight Gains and Feed Conversion:

Average feed conversion was calculated for Days 0 – 14, 14 – 21, 0 – 21, 21 – 42, and 0 – 42 by dividing the total feed intake for that pen by the weight of the surviving birds in that pen.

Adjusted feed conversion were calculated for Days 0 – 14, 14 – 21, 0 – 21, 21 – 42, and 0 – 42 by dividing the total feed intake for that pen by the weight of the surviving birds in that pen and the weight of the birds that died or were removed from that pen.

Scales:

Scales used in the weighing of feed, feed additives, and birds were licensed by the State of Colorado. At each use the scales were checked using standard weights according to CQR Standard Operating Procedures.

C. BONE PARMETERS AND ILEAL PHOSPHORUS DIGESTIBILITY:

TiO_2 was placed in all feeds starting at Study Day 14.

At Days 21 and 42, three birds were randomly collected from each pen, sacrificed, and ileal and left tibia samples were collected. The tibia samples were pooled in one bag per pen (3 tibias per pen in a bag). Adhering muscle was carefully removed from each tibia to get them mostly clean and then they were frozen and retained until Sponsor either instructed disposal or shipment to the laboratory for the determination of mineral weight and % ash (AOAC 923.03).

The ileal samples were also pooled in one plastic vial per pen (3 ileal samples per pen in a vial) and were frozen retained until Sponsor either instructed disposal or shipment to the laboratory for the determination of ileal phosphorus digestibility [AOAC 934.01; Journal of Animal Science (2004) 82: 179 – 183; AOAC 966.01 respectively]. From each bird starting at the Meckel's Diverticulum, the contents of the ileum were squeezed into the plastic bags.

D. STATISTICAL DESIGN

Data generated from the study was statistically analyzed by the Sponsor using the General Linear Model system (SAS, Inc., Cary, NC).

V. DATA COLLECTED

- Bird weights by pen, on approximately Days 0, 14, 21, and 42.
- Feed amounts added and removed from each pen from day 0 to study end (day 42).
- Mortality: sex, weight and probable cause of death day 0 to study end.
- Removed birds: reason for culling, sex and weight day 0 to study end.
- Daily observation of facility and birds, daily facility temperature.
- Feed conversion by pen and treatment group for days 0 – 14, 14 – 21, 0 – 21, 21 – 42, and 0 – 42.
- Tibia ash and ileal phosphorus digestibility days 21 and 42

VI. DISPOSITIONS

Excess Test Articles

An accounting was maintained of the test articles received and used for this study. Excess test articles were retained in the CQR general inventory until instruction from the Sponsor was received regarding the disposal or shipment of them. Documentation was provided with the study records.

Feed

An accounting was maintained of all treatment diets. The amount mixed, used and discarded was documented. Unused feed was discarded to the landfill at study end. Retention feed samples may be discarded to the landfill upon receipt of permission from the Sponsor. Disposition was documented in the study records.

Test Animals

An accounting was maintained of all birds received for the study. All mortalities, birds culled or sacrificed were disposed of by dumpster and commercial landfill. Disposal of mortalities, birds culled or birds sacrificed during the study and at study end were by dumpster and commercial landfill. Surviving birds were euthanized and disposed of dumpster and commercial landfill as they were not suitable for human consumption. Documentation of disposition was provided with the study records.

VII. RECORDS AND REPORT

A final report and the original study records were provided to the Sponsor following study completion. The Sponsor was provided with an electronic copy of the data in excel CQR spreadsheet format, with individual replicates represented in rows, and measurements made and identifying criteria (such as treatment, pen, block) in columns. No statistics were included in the final report unless provided by the Sponsor. A copy of the report, data and study records will be kept in CQR archives for a period of 5 years.

VIII. PERSONNEL

Key personnel involved in this study were as follows:

Agrivida, Inc.	
Sponsor Representative	Jim Ligon
CQR	
Investigator	Dan Moore, PhD.
Test Facility Management	Stephen W. Davis, DVM, Dip. ACPV
Data Manager	Shoshana Gray, B.A.
Feed Mill Manager	Ken Johlke, B.S.
Farm Manager	Kyle Kline, B.S.
Research Technician	Jamie Menuey, B.S.

IX. INVESTIGATOR'S STATEMENT

There were no known circumstances that may have affected the data quality or integrity during this study.

Summary tables and graphs of bird performance have been prepared and are attached to this report (See Tables 1 – 12 and Graphs 1 – 5).

Overall mortality and moribund removal was as expected for study conditions and ranged from 2.941% (Treatment Group 2) to 5.882% (Treatment Group 7). See Tables 13 and 14 for mortality and removal information.

Performance during the trial was as expected for study conditions with body weight ranging from 2.451 Kg for the low phosphate group (Treatment Group 1) to 2.954 Kg for the highest phytase dose (Treatment Group 7), and feed conversion ranging from 1.525 (Treatment group 4) to 1.564 (Treatment Group 2) at 42D. The high phosphate control group had higher body weight gain compared to the low phosphate control group for all time points tested and improved feed conversion from 0-14D and 0-21D..All phytase treatments outperformed the low phosphate control for all time periods for both body weight gain and feed conversion. From 0-14D, 0-21D, 0-42D and 14-21D increasing levels of phytase resulted in increased body weight gain.

The high phosphate control and all phytase supplemented treatment groups had increased tibia ash and phosphorus digestibility at both 21D and 42D when compared to the low phosphate control group. See Tables 16 – 20 and Graphs 6 – 7 for tibia and phosphorus digestibility information.

There was a single protocol amendment over the course of the study. It was as follows:

Amendment Number	Protocol Section Affected	Purpose of Amendment	Impact on Study Outcome
1	PROPOSED STUDY EVENT SCHEDULE; III.D. SAMPLES AND ASSAYS; IV.B. Body Weights and Feed Intake; IV.B. Weight Gains and Feed Conversion; IV.C. BONE PARAMETERS AND ILEAL PHOSPHORUS DIGESTIBILITY; V. DATA TO BE COLLECTED	Addition of pen weights on Day 14; additional feed analyses; change in ileal sample container type.	Positive. Attainment of additional data.

There were no protocol deviations over the course of the study.

The report and data herein submitted to the Sponsor for CQR Project No. AGV-15-3 are accurate in that they represent the actual results of the study, were collected in a manner which did not misrepresent the true effects of the test articles and were complete in that all data obtained in this study was submitted to the Sponsor.

14 JAN 16

Dan Moore, Ph.D.
Investigator

Date

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Bird receipt, accounting, vaccination, disposition
Daily logs/house observation/temperature records, scale checks, notes to file
Personnel, protocol, correspondence

FEED FORMULATIONS

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER

Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151SP AGV-15-1 BS PC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1135.89	56.795	164.64	113.20	295.20			
1914	SBM , CQR	716.19	35.810	508.00	261.40	843.60			
1542	Soy Oil	38.93	1.947	600.00	224.40	2008.40			
1554	DICALCIUM PHOS	36.42	1.821	255.24		25253.0			
1553	Sand	28.02	1.401	15.00		29.40		1.6000	
1552	Limestone, CQR	19.87	0.994	30.00	15.00	29505.6			
1544	SALT, PLAIN (N	8.81	0.440	29.34	15.00	145444.			
1549	DL-METHIONINE,	5.98	0.299	2637.89	15.00	23294.8			
1548	CQR Choline	3.92	0.196	2534.00	15.00	48090.4			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1545	Salinomycin (6	0.820	0.041	0.00			0.0410	0.0410	
1551	Threonine, CQR	0.169	0.008	1849.00	15.00	15136.0			
1550	L-LYSINE, CQR	0.166	0.008	1725.00	15.00	8300.60			

Total Batch: 2000.00 Lbs at 309.15 $/Ton 15.458 $/100Lb 0.1546 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.5661	0.10 PCT
5	FAT, CRUDE	PCT	0.4283	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4130	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
35	THREONINE	PCT	0.1853	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.74	
3	MOISTURE		10.26	
4	PROTEIN, CRUDE	22.00	22.00	
5	FAT, CRUDE	4.50	4.50	
6	FIBER, CRUDE		2.23	
7	CALCIUM	0.93	0.9300	
8	PHOS. TOTAL	0.71	0.7205	
9	ASH		5.50	
10	PHOS., AVAILAB	0.45	0.4500	0.45
18	ADF		0.0000	
19	M.E. POULTRY	1378.00	1378.00	
21	M.E. SWINE		1485.49	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.55	0.6413	
32	CYSTINE		0.3487	
33	LYSINE	1.31	1.31	
34	TRYPTOPHAN		0.2980	
35	THREONINE	0.92	0.9200	
36	ISOLEUCINE		1.13	
37	HISTIDINE		0.6218	
38	VALINE		1.24	
39	LEUCINE		1.98	
40	ARGININE		1.52	
41	PHENYLALANINE		1.24	
42	TSAA	0.99	0.9900	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5274	
47	VITAMIN A		1265.17	
48	VITAMIN E		12.30	
49	THIAMIN		1.95	
50	RIBOFLAVIN		2.68	
51	PANTOTHENIC AC		8.67	
52	BIOTIN		156.14	
53	FOLIC ACID		446.81	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.21	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.9437	
63	MAGNESIUM		0.1613	
64	SULPHUR		0.2044	
65	MANGANESE		107.18	
66	IRON		371.60	
67	COPPER		19.98	
68	ZINC		89.49	
69	SELENIUM		0.3028	
70	COBALT		0.0000	
71	FLOURINE		0.0033	
72	CHLORIDE	0.28	0.2979	
73	SALT		0.4405	
74	IODINE		0.5957	
76	Dig Methionine		0.6129	
77	Dig Cystine		0.2885	
78	Dig Lysine		1.18	
79	Dig Tryptophan		0.2168	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151SP AGV-15-1 BS PC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.8039	
81	Dig Isoleucine		1.04	
82	Dig Histidine		0.5584	
83	Dig Valine		1.12	
84	Dig Leucine		1.83	
85	Dig Arginine		1.39	
86	Dig Phenylalan		1.43	
87	Dig TSAA		0.9018	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		0.8943	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 16
Product: AGV151SN AGV-15-1 BS NC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1135.89	56.795	164.64		295.20			
1914	SBM , CQR	716.19	35.810	508.00	261.40	*******			
1542	Soy Oil	38.93	1.947	600.00	224.40				
1553	Sand	33.48	1.674	15.00		29.40		1.6800	-0.14
1552	Limestone, CQR	30.68	1.534	30.00	15.00	29505.6			
1554	DICALCIUM PHOS	20.11	1.006	255.24		29394.8			
1544	SALT, PLAIN (N	8.84	0.442	29.34	15.00	404093.			
1549	DL-METHIONINE,	5.98	0.299	2637.89	15.00	23294.8			
1548	CQR Choline	3.92	0.196	2534.00	15.00	74427.2			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1545	Salinomycin (6	0.820	0.041	0.00			0.0410	0.0410	
1551	Threonine, CQR	0.169	0.008	1849.00	15.00	15136.0			
1550	L-LYSINE, CQR	0.166	0.008	1725.00	15.00	8300.60			

Total Batch: 2000.00 Lbs at 307.27 $/Ton 15.364 $/100Lb 0.1536 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.5661	0.10 PCT
5	FAT, CRUDE	PCT	0.4283	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4130	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
35	THREONINE	PCT	0.1853	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.74	
3	MOISTURE		10.26	
4	PROTEIN, CRUDE	22.00	22.00	
5	FAT, CRUDE	4.50	4.50	
6	FIBER, CRUDE		2.23	
7	CALCIUM	0.93	0.9290	0.93
8	PHOS. TOTAL	0.56	0.5705	
9	ASH		5.32	
10	PHOS., AVAILAB	0.30	0.3000	0.30
18	ADF		0.0000	
19	M.E. POULTRY	1378.00	1378.00	1378.00
21	M.E. SWINE		1485.49	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.55	0.6413	
32	CYSTINE		0.3487	
33	LYSINE	1.31	1.31	
34	TRYPTOPHAN		0.2980	
35	THREONINE	0.92	0.9200	
36	ISOLEUCINE		1.13	
37	HISTIDINE		0.6218	
38	VALINE		1.24	
39	LEUCINE		1.98	
40	ARGININE		1.52	
41	PHENYLALANINE		1.24	
42	TSAA	0.99	0.9900	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5274	
47	VITAMIN A		1265.17	
48	VITAMIN E		12.30	
49	THIAMIN		1.95	
50	RIBOFLAVIN		2.68	
51	PANTOTHENIC AC		8.67	
52	BIOTIN		156.14	
53	FOLIC ACID		446.81	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.21	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	0.20
62	POTASSIUM		0.9431	
63	MAGNESIUM		0.1564	
64	SULPHUR		0.2044	
65	MANGANESE		104.73	
66	IRON		290.08	
67	COPPER		19.33	
68	ZINC		87.70	
69	SELENIUM		0.2979	
70	COBALT		0.0000	
71	FLOURINE		0.0018	
72	CHLORIDE	0.28	0.2990	
73	SALT		0.4421	
74	IODINE		0.5957	
76	Dig Methionine		0.6129	
77	Dig Cystine		0.2885	
78	Dig Lysine		1.18	
79	Dig Tryptophan		0.2168	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Formulated By: Single Product Formulation
Trial Version: 16
Product: AGV151SN AGV-15-1 BS NC
Using Costs: Plant 1 Owning Costs
Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.8039	
81	Dig Isoleucine		1.04	
82	Dig Histidine		0.5584	
83	Dig Valine		1.12	
84	Dig Leucine		1.83	
85	Dig Arginine		1.39	
86	Dig Phenylalan		1.43	
87	Dig TSAA		0.9018	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		1.38	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PROSUSER

Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 16
Product: AGV151GP AGV-15-1 BG PC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	-- Range -- Low	High	-- Restriction --- Min Pct	Max Pct	Rcost
1913	Corn, CQR	1252.29	62.615	164.64	113.60	295.60			
1914	SBM , CQR	629.58	31.479	508.00	227.40	841.60			
1542	Soy Oil	41.69	2.084	600.00	223.40	1999.80			
1554	DICALCIUM PHOS	31.53	1.576	255.24		25099.8			
1552	Limestone, CQR	18.88	0.944	30.00	15.00	33574.0			
1544	SALT, PLAIN (N	8.85	0.442	29.34	15.00	144552.			
1549	DL-METHIONINE,	4.23	0.212	2637.89	15.00	26146.0			
1548	CQR Choline	4.13	0.206	2534.00	15.00	47811.2			
1553	Sand	3.58	0.179	15.00		29.40		1.5000	
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1550	L-LYSINE, CQR	0.441	0.022	1725.00	15.00	9208.20			

Total Batch: 2000.00 Lbs at 294.77 $/Ton 14.738 $/100Lb 0.1474 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.6442	0.10 PCT
5	FAT, CRUDE	PCT	0.4294	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4106	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Unused Ingredients

Ingr Code	Ingredient Name	Current $/Ton	At $/Ton	Would Use	Minimum Pct	Maximum Pct	Rcost
1551	Threonine, CQR	1849.00	15.00				18.34

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.47	
3	MOISTURE		10.53	
4	PROTEIN, CRUDE	20.30	20.30	
5	FAT, CRUDE	4.80	4.80	
6	FIBER, CRUDE		2.20	
7	CALCIUM	0.84	0.8400	
8	PHOS. TOTAL	0.66	0.6607	
9	ASH		5.03	
10	PHOS., AVAILAB	0.40	0.4000	0.40
18	ADF		0.0000	
19	M.E. POULTRY	1425.00	1425.00	
21	M.E. SWINE		1518.02	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.51	0.5332	
32	CYSTINE		0.3268	
33	LYSINE	1.20	1.20	
34	TRYPTOPHAN		0.2709	
35	THREONINE	0.83	0.8395	
36	ISOLEUCINE		1.03	
37	HISTIDINE		0.5784	
38	VALINE		1.14	
39	LEUCINE		1.87	
40	ARGININE		1.39	
41	PHENYLALANINE		1.14	
42	TSAA	0.86	0.8600	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5815	
47	VITAMIN A		1311.15	
48	VITAMIN E		12.86	
49	THIAMIN		1.99	
50	RIBOFLAVIN		2.66	
51	PANTOTHENIC AC		8.50	
52	BIOTIN		151.84	
53	FOLIC ACID		435.80	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.37	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.8718	
63	MAGNESIUM		0.1519	
64	SULPHUR		0.1900	
65	MANGANESE		104.89	
66	IRON		341.03	
67	COPPER		19.27	
68	ZINC		87.99	
69	SELENIUM		0.3017	
70	COBALT		0.0000	
71	FLOURINE		0.0028	
72	CHLORIDE	0.26	0.3006	
73	SALT		0.4424	
74	IODINE		0.5944	
76	Dig Methionine		0.5065	
77	Dig Cystine		0.2709	
78	Dig Lysine		1.08	
79	Dig Tryptophan		0.1987	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Trial Version: 16
Prod'n Version: 0
Page: 2

Plant: 1 Silver Springs
roduct: AGV151GP AGV-15-1 BG PC

Formulated By: Single Product Formulation
Using Costs: Plant 1 Owning Costs

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.7313	
81	Dig Isoleucine		0.9463	
82	Dig Histidine		0.5214	
83	Dig Valine		1.03	
84	Dig Leucine		1.73	
85	Dig Arginine		1.27	
86	Dig Phenylalan		1.37	
87	Dig TSAA		0.7777	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		0.8494	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PROSUSER
Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151GN AGV-15-1 BG NC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Max Pct	Rcost
1913	Corn, CQR	1252.29	62.615	164.64	113.60	295.60			
1914	SBM , CQR	629.58	31.479	508.00	227.40	841.60			
1542	Soy Oil	41.69	2.084	600.00	223.40	1999.80			
1552	Limestone, CQR	29.75	1.487	30.00	15.00	33574.0			
1554	DICALCIUM PHOS	15.22	0.761	255.24		25099.8			
1553	Sand	8.98	0.449	15.00		29.40		1.5000	
1544	SALT, PLAIN (N	8.88	0.444	29.34	15.00	144552.			
1549	DL-METHIONINE,	4.23	0.212	2637.89	15.00	26146.0			
1548	CQR Choline	4.13	0.206	2534.00	15.00	47811.2			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1550	L-LYSINE, CQR	0.441	0.022	1725.00	15.00	9208.20			

Total Batch: 2000.00 Lbs at 292.89 $/Ton 14.645 $/100Lb 0.1464 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.6442	0.10 PCT
5	FAT, CRUDE	PCT	0.4294	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4106	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Unused Ingredients

Ingr Code	Ingredient Name	Current $/Ton	At $/Ton	Would Use	Minimum Pct	Maximum Pct	Rcost
1551	Threonine, CQR	1849.00	15.00				18.34

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.47	
3	MOISTURE		10.53	
4	PROTEIN, CRUDE	20.30	20.30	
5	FAT, CRUDE	4.80	4.80	
6	FIBER, CRUDE		2.20	
7	CALCIUM	0.84	0.8400	
8	PHOS. TOTAL	0.51	0.5107	
9	ASH		4.85	
10	PHOS., AVAILAB	0.25	0.2500	0.25
18	ADF		0.0000	
19	M.E. POULTRY	1425.00	1425.00	
21	M.E. SWINE		1518.02	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.51	0.5332	
32	CYSTINE		0.3268	
33	LYSINE	1.20	1.20	
34	TRYPTOPHAN		0.2709	
35	THREONINE	0.83	0.8395	
36	ISOLEUCINE		1.03	
37	HISTIDINE		0.5784	
38	VALINE		1.14	
39	LEUCINE		1.87	
40	ARGININE		1.39	
41	PHENYLALANINE		1.14	
42	TSAA	0.86	0.8600	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5815	
47	VITAMIN A		1311.15	
48	VITAMIN E		12.86	
49	THIAMIN		1.99	
50	RIBOFLAVIN		2.66	
51	PANTOTHENIC AC		8.50	
52	BIOTIN		151.84	
53	FOLIC ACID		435.80	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.37	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.8713	
63	MAGNESIUM		0.1470	
64	SULPHUR		0.1900	
65	MANGANESE		102.44	
66	IRON		259.51	
67	COPPER		18.62	
68	ZINC		86.19	
69	SELENIUM		0.2968	
70	COBALT		0.0000	
71	FLOURINE		0.0014	
72	CHLORIDE	0.26	0.3016	
73	SALT		0.4441	
74	IODINE		0.5944	
76	Dig Methionine		0.5065	
77	Dig Cystine		0.2709	
78	Dig Lysine		1.08	
79	Dig Tryptophan		0.1987	

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                                                                                           Date Optimized: 05/11/2015
                                                                                             Optimized By: PROSUSER
  Plant: 1         Silver Springs                          Formulated By: Single Product Formulation     Trial Version: 17
Product: AGV151GN AGV-15-1 BG NC                            Using Costs: Plant 1 Owning Costs           Prod'n Version: 0
                                                                                                   Page: 2
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Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.7313	
81	Dig Isoleucine		0.9463	
82	Dig Histidine		0.5214	
83	Dig Valine		1.03	
84	Dig Leucine		1.73	
85	Dig Arginine		1.27	
86	Dig Phenylalan		1.37	
87	Dig TSAA		0.7777	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		1.34	

Table 2. Day 0 Pen Weights (30JUL15) Summarized by Treatment
AGV-15-3
Building 8W

Block	Treatment	Pen	No. of Birds	Day 0 Pen Wt (kg)	Avg. Day 0 Bird Wt (kg)
1	1	6	17	0.742	0.044
2	1	16	17	0.722	0.042
3	1	25	17	0.736	0.043
4	1	37	18	0.725	0.040
5	1	46	17	0.715	0.042
6	1	53	17	0.710	0.042
7	1	60	17	0.702	0.041
8	1	71	17	0.724	0.043
9	1	79	17	0.726	0.043
10	1	90	17	0.705	0.041
11	1	100	17	0.718	0.042
12	1	109	17	0.701	0.041
Total & Averages			**205**	**0.719**	**0.042**
Standard Deviations				**0.013**	**0.001**
CVs				**1.801%**	**2.243%**
1	2	10	17	0.734	0.043
2	2	14	17	0.732	0.043
3	2	27	17	0.723	0.043
4	2	36	17	0.722	0.042
5	2	48	17	0.718	0.042
6	2	54	17	0.703	0.041
7	2	65	17	0.706	0.042
8	2	70	17	0.719	0.042
9	2	78	17	0.725	0.043
10	2	91	17	0.716	0.042
11	2	102	17	0.720	0.042
12	2	111	17	0.703	0.041
Total & Averages			**204**	**0.718**	**0.042**
Standard Deviations				**0.010**	**0.001**
CVs				**1.419%**	**1.419%**
1	3	9	17	0.750	0.044
2	3	15	17	0.741	0.044
3	3	24	17	0.733	0.043
4	3	35	17	0.703	0.041
5	3	44	17	0.714	0.042
6	3	52	17	0.701	0.041
7	3	62	17	0.720	0.042
8	3	68	17	0.704	0.041
9	3	84	17	0.722	0.042
10	3	89	17	0.713	0.042
11	3	96	17	0.712	0.042
12	3	108	17	0.712	0.042
Total & Averages			**204**	**0.719**	**0.042**
Standard Deviations				**0.015**	**0.001**
CVs				**2.145%**	**2.145%**

Table 2. Day 0 Pen Weights (30JUL15) Summarized by Treatment
AGV-15-3
Building 8W

Block	Treatment	Pen	No. of Birds	Day 0 Pen Wt (kg)	Avg. Day 0 Bird Wt (kg)
1	4	5	17	0.724	0.043
2	4	18	17	0.725	0.043
3	4	26	17	0.740	0.044
4	4	32	17	0.712	0.042
5	4	45	17	0.727	0.043
6	4	49	17	0.703	0.041
7	4	59	17	0.725	0.043
8	4	73	17	0.722	0.042
9	4	81	17	0.710	0.042
10	4	88	17	0.706	0.042
11	4	98	17	0.710	0.042
12	4	104	17	0.700	0.041
Total & Averages			**204**	**0.717**	**0.042**
Standard Deviations				**0.012**	**0.001**
CVs				**1.661%**	**1.661%**

1	5	7	17	0.731	0.043
2	5	17	17	0.742	0.044
3	5	23	17	0.724	0.043
4	5	34	17	0.708	0.042
5	5	47	17	0.703	0.041
6	5	55	17	0.701	0.041
7	5	63	17	0.730	0.043
8	5	74	17	0.727	0.043
9	5	80	17	0.720	0.042
10	5	93	17	0.710	0.042
11	5	101	17	0.700	0.041
12	5	107	17	0.709	0.042
Total & Averages			**204**	**0.717**	**0.042**
Standard Deviations				**0.014**	**0.001**
CVs				**1.919%**	**1.919%**

1	6	11	17	0.733	0.043
2	6	13	17	0.735	0.043
3	6	28	17	0.720	0.042
4	6	33	17	0.710	0.042
5	6	42	17	0.706	0.042
6	6	50	17	0.703	0.041
7	6	61	17	0.715	0.042
8	6	72	17	0.701	0.041
9	6	82	17	0.720	0.042
10	6	87	17	0.725	0.043
11	6	97	17	0.717	0.042
12	6	106	17	0.703	0.041
Total & Averages			**204**	**0.716**	**0.042**
Standard Deviations				**0.012**	**0.001**
CVs				**1.611%**	**1.611%**

Table 2. Day 0 Pen Weights (30JUL15) Summarized by Treatment
AGV-15-3
Building 8W

Block	Treatment	Pen	No. of Birds	Day 0 Pen Wt (kg)	Avg. Day 0 Bird Wt (kg)
1	7	4	17	0.723	0.043
2	7	12	17	0.720	0.042
3	7	22	17	0.725	0.043
4	7	30	17	0.734	0.043
5	7	43	17	0.700	0.041
6	7	51	17	0.715	0.042
7	7	66	17	0.730	0.043
8	7	67	17	0.713	0.042
9	7	83	17	0.706	0.042
10	7	92	17	0.721	0.042
11	7	103	17	0.707	0.042
12	7	110	17	0.705	0.041
Total & Averages			**204**	**0.717**	**0.042**
Standard Deviations				**0.011**	**0.001**
CVs				**1.491%**	**1.491%**

1	8	8	17	0.723	0.043
2	8	19	17	0.721	0.042
3	8	29	17	0.723	0.043
4	8	31	17	0.724	0.043
5	8	41	17	0.702	0.041
6	8	56	17	0.703	0.041
7	8	64	17	0.716	0.042
8	8	69	17	0.729	0.043
9	8	85	17	0.715	0.042
10	8	86	17	0.728	0.043
11	8	99	17	0.718	0.042
12	8	105	17	0.720	0.042
Total & Averages			**204**	**0.719**	**0.042**
Standard Deviations				**0.009**	**0.001**
CVs				**1.195%**	**1.195%**

Table 4. Bird Weights and Feed Conversion Days 0 - 14 (13AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D14	D14 Pen Wt (kg)	D14 Avg Bird Wt (kg)	D0-14 Avg Bird Gain (kg)	Feed Conversion D0-14	Adj. Feed Conversion D0-14
1	1	6	17	0	0	0	17	6.060	0.356	0.313	1.392	1.392
2	1	16	17	0	0	0	17	5.720	0.336	0.294	1.325	1.325
3	1	25	17	0	0	0	17	5.480	0.322	0.279	1.404	1.404
4	1	37	18	0	0	0	18	6.560	0.364	0.324	1.285	1.285
5	1	46	17	0	0	0	17	5.520	0.325	0.283	1.349	1.349
6	1	53	17	0	0	0	17	5.360	0.315	0.274	1.342	1.342
7	1	60	17	0	0	0	17	5.200	0.306	0.265	1.338	1.338
8	1	71	17	0	0	0	17	5.580	0.328	0.286	1.524	1.524
9	1	79	17	1	0	0	16	6.020	0.376	0.334	1.439	1.407
10	1	90	17	1	0	0	16	5.260	0.329	0.287	1.409	1.359
11	1	100	17	1	0	0	16	5.400	0.338	0.295	1.418	1.328
12	1	109	17	0	0	0	17	6.520	0.384	0.342	1.481	1.481
Totals & Averages			**205**	**3**	**0**	**0**	**202**	**5.723**	**0.340**	**0.298**	**1.392**	**1.378**
Standard Deviations								**0.465**	**0.025**	**0.025**	**0.069**	**0.069**
CVs								**8.131%**	**7.249%**	**8.303%**	**4.936%**	**4.973%**
1	2	10	17	0	0	0	17	6.600	0.388	0.345	1.275	1.275
2	2	14	17	0	0	0	17	6.700	0.394	0.351	1.297	1.297
3	2	27	17	0	0	0	17	6.720	0.395	0.353	1.284	1.284
4	2	36	17	0	0	1	16	6.720	0.420	0.378	1.314	1.281
5	2	48	17	0	0	0	17	6.340	0.373	0.331	1.259	1.259
6	2	54	17	0	0	0	17	5.940	0.349	0.308	1.283	1.283
7	2	65	17	1	0	0	16	5.840	0.365	0.323	1.325	1.309
8	2	70	17	0	0	0	17	6.780	0.399	0.357	1.287	1.287
9	2	78	17	0	0	1	16	6.820	0.426	0.384	1.322	1.303
10	2	91	17	1	0	0	16	6.080	0.380	0.338	1.350	1.318
11	2	102	17	1	0	0	16	6.580	0.411	0.369	1.300	1.290
12	2	111	17	0	0	0	17	7.140	0.420	0.379	1.398	1.398
Totals & Averages			**204**	**3**	**0**	**2**	**199**	**6.522**	**0.393**	**0.351**	**1.308**	**1.299**
Standard Deviations								**0.392**	**0.024**	**0.024**	**0.038**	**0.035**
CVs								**6.009%**	**6.040%**	**6.709%**	**2.884%**	**2.697%**
1	3	9	17	2	0	0	15	5.600	0.373	0.329	1.348	1.281
2	3	15	17	1	0	0	16	5.880	0.368	0.324	1.253	1.223
3	3	24	17	0	0	0	17	5.840	0.344	0.300	1.304	1.304
4	3	35	17	1	0	0	16	6.240	0.390	0.349	1.293	1.279
5	3	44	17	0	0	0	17	6.340	0.373	0.331	1.294	1.294
6	3	52	17	0	0	0	17	6.080	0.358	0.316	1.294	1.294
7	3	62	17	2	0	0	15	5.600	0.373	0.331	1.316	1.281
8	3	68	17	0	0	0	17	6.240	0.367	0.326	1.304	1.304
9	3	84	17	0	0	0	17	6.680	0.393	0.350	1.279	1.279
10	3	89	17	1	0	0	16	5.800	0.363	0.321	1.321	1.305
11	3	96	17	0	0	0	17	6.100	0.359	0.317	1.303	1.303
12	3	108	17	1	0	0	16	6.680	0.418	0.376	1.381	1.369
Totals & Averages			**204**	**8**	**0**	**0**	**196**	**6.090**	**0.373**	**0.331**	**1.308**	**1.293**
Standard Deviations								**0.366**	**0.019**	**0.020**	**0.033**	**0.033**
CVs								**6.012%**	**5.205%**	**5.919%**	**2.491%**	**2.539%**

Table 4. Bird Weights and Feed Conversion Days 0 - 14 (13AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D14	D14 Pen Wt (kg)	D14 Avg Bird Wt (kg)	D0-14 Avg Bird Gain (kg)	Feed Conversion D0-14	Adj. Feed Conversion D0-14
1	4	5	17	0	0	0	17	6.680	0.393	0.350	1.306	1.306
2	4	18	17	1	0	0	16	5.900	0.369	0.326	1.287	1.257
3	4	26	17	0	0	0	17	6.120	0.360	0.316	1.312	1.312
4	4	32	17	0	0	0	17	6.600	0.388	0.346	1.284	1.284
5	4	45	17	0	0	0	17	5.320	0.313	0.270	1.337	1.337
6	4	49	17	0	0	0	17	6.300	0.371	0.329	1.247	1.247
7	4	59	17	0	0	0	17	6.220	0.366	0.323	1.288	1.288
8	4	73	17	0	0	0	17	6.340	0.373	0.330	1.314	1.314
9	4	81	17	1	0	0	16	6.220	0.389	0.347	1.310	1.296
10	4	88	17	2	1	0	14	5.160	0.369	0.327	1.405	1.325
11	4	98	17	1	0	0	16	5.880	0.368	0.326	1.408	1.392
12	4	104	17	0	0	0	17	6.480	0.381	0.340	1.277	1.277
Totals & Averages			**204**	**5**	**1**	**0**	**198**	**6.102**	**0.370**	**0.328**	**1.315**	**1.303**
Standard Deviations								**0.471**	**0.021**	**0.021**	**0.049**	**0.038**
CVs								**7.716%**	**5.605%**	**6.412%**	**3.695%**	**2.950%**
1	5	7	17	0	0	0	17	7.140	0.420	0.377	1.245	1.245
2	5	17	17	1	0	0	16	6.100	0.381	0.338	1.284	1.270
3	5	23	17	0	0	0	17	6.260	0.368	0.326	1.275	1.275
4	5	34	17	0	0	0	17	6.220	0.366	0.324	1.274	1.274
5	5	47	17	0	0	0	17	6.320	0.372	0.330	1.264	1.264
6	5	55	17	0	1	0	16	5.660	0.354	0.313	1.303	1.280
7	5	63	17	0	0	0	17	6.140	0.361	0.318	1.250	1.250
8	5	74	17	0	0	0	17	6.400	0.376	0.334	1.308	1.308
9	5	80	17	0	0	0	17	7.020	0.413	0.371	1.387	1.387
10	5	93	17	0	0	0	17	6.000	0.353	0.311	1.278	1.278
11	5	101	17	0	0	0	17	6.380	0.375	0.334	1.285	1.285
12	5	107	17	0	0	0	17	6.300	0.371	0.329	1.256	1.256
Totals & Averages			**204**	**1**	**1**	**0**	**202**	**6.328**	**0.376**	**0.334**	**1.284**	**1.281**
Standard Deviations								**0.405**	**0.021**	**0.021**	**0.038**	**0.038**
CVs								**6.400%**	**5.549%**	**6.152%**	**2.944%**	**2.928%**
1	6	11	17	0	0	0	17	6.340	0.373	0.330	1.248	1.248
2	6	13	17	0	0	0	17	6.580	0.387	0.344	1.280	1.280
3	6	28	17	0	0	0	17	6.700	0.394	0.352	1.271	1.271
4	6	33	17	0	0	0	17	6.500	0.382	0.341	1.254	1.254
5	6	42	17	0	0	0	17	7.140	0.420	0.378	1.262	1.262
6	6	50	17	1	0	0	16	6.100	0.381	0.340	1.271	1.263
7	6	61	17	1	0	0	16	5.600	0.350	0.308	1.290	1.274
8	6	72	17	1	0	0	16	5.900	0.369	0.328	1.408	1.335
9	6	82	17	1	0	0	16	6.620	0.414	0.371	1.305	1.290
10	6	87	17	1	0	0	16	6.040	0.378	0.335	1.287	1.266
11	6	97	17	0	0	0	17	6.380	0.375	0.333	1.278	1.278
12	6	106	17	0	0	0	17	6.800	0.400	0.359	1.283	1.283
Totals & Averages			**204**	**5**	**0**	**0**	**199**	**6.392**	**0.385**	**0.343**	**1.286**	**1.275**
Standard Deviations								**0.427**	**0.019**	**0.020**	**0.041**	**0.022**
CVs								**6.673%**	**5.053%**	**5.700%**	**3.216%**	**1.757%**

Table 4. Bird Weights and Feed Conversion Days 0 - 14 (13AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D14	D14 Pen Wt (kg)	D14 Avg Bird Wt (kg)	D0-14 Avg Bird Gain (kg)	Feed Conversion D0-14	Adj. Feed Conversion D0-14
1	7	4	17	2	0	0	15	6.400	0.427	0.384	1.314	1.275
2	7	12	17	0	0	0	17	6.580	0.387	0.345	1.253	1.253
3	7	22	17	2	0	0	15	5.620	0.375	0.332	1.291	1.245
4	7	30	17	0	0	0	17	6.720	0.395	0.352	1.226	1.226
5	7	43	17	0	0	0	17	6.660	0.392	0.351	1.268	1.268
6	7	51	17	1	0	0	16	6.280	0.393	0.350	1.247	1.236
7	7	66	17	1	0	0	16	6.180	0.386	0.343	1.266	1.251
8	7	67	17	0	0	0	17	6.520	0.384	0.342	1.230	1.230
9	7	83	17	0	0	0	17	6.980	0.411	0.369	1.253	1.253
10	7	92	17	1	0	0	16	6.020	0.376	0.334	1.272	1.249
11	7	103	17	0	0	0	17	6.740	0.396	0.355	1.270	1.270
12	7	110	17	1	0	0	16	7.040	0.440	0.399	1.310	1.273
Totals & Averages			**204**	**8**	**0**	**0**	**196**	**6.478**	**0.397**	**0.355**	**1.267**	**1.252**
Standard Deviations								**0.407**	**0.020**	**0.020**	**0.028**	**0.017**
CVs								**6.279%**	**4.977%**	**5.632%**	**2.204%**	**1.330%**

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D14	D14 Pen Wt (kg)	D14 Avg Bird Wt (kg)	D0-14 Avg Bird Gain (kg)	Feed Conversion D0-14	Adj. Feed Conversion D0-14
1	8	8	17	1	0	0	16	5.780	0.361	0.319	1.345	1.326
2	8	19	17	0	0	0	17	6.460	0.380	0.338	1.289	1.289
3	8	29	17	0	0	0	17	6.660	0.392	0.349	1.277	1.277
4	8	31	17	0	0	0	17	7.000	0.412	0.369	1.275	1.275
5	8	41	17	1	0	0	16	6.440	0.403	0.361	1.283	1.269
6	8	56	17	0	0	0	17	6.520	0.384	0.342	1.227	1.227
7	8	64	17	0	0	0	17	6.320	0.372	0.330	1.299	1.299
8	8	69	17	0	0	0	17	6.460	0.380	0.337	1.267	1.267
9	8	85	17	0	0	0	17	6.600	0.388	0.346	1.278	1.278
10	8	86	17	0	0	0	17	7.080	0.416	0.374	1.247	1.247
11	8	99	17	0	0	0	17	6.320	0.372	0.330	1.296	1.296
12	8	105	17	0	0	0	17	6.720	0.395	0.353	1.253	1.253
Totals & Averages			**204**	**2**	**0**	**0**	**202**	**6.530**	**0.388**	**0.346**	**1.278**	**1.275**
Standard Deviations								**0.337**	**0.017**	**0.017**	**0.030**	**0.026**
CVs								**5.162%**	**4.289%**	**4.808%**	**2.316%**	**2.036%**

Graph 1. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 14) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.298	1.378	Low Phosphate (LP)
2	0.351	1.299	High Phosphate (HP)
3	0.331	1.293	250 Units Phytase (LP)
4	0.328	1.303	500 Units Phytase (LP)
5	0.334	1.281	750 Units Phytase (LP)
6	0.343	1.275	1000 Units Phytase (LP)
7	0.355	1.252	3000 Units Phytase (LP)
8	0.346	1.275	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)

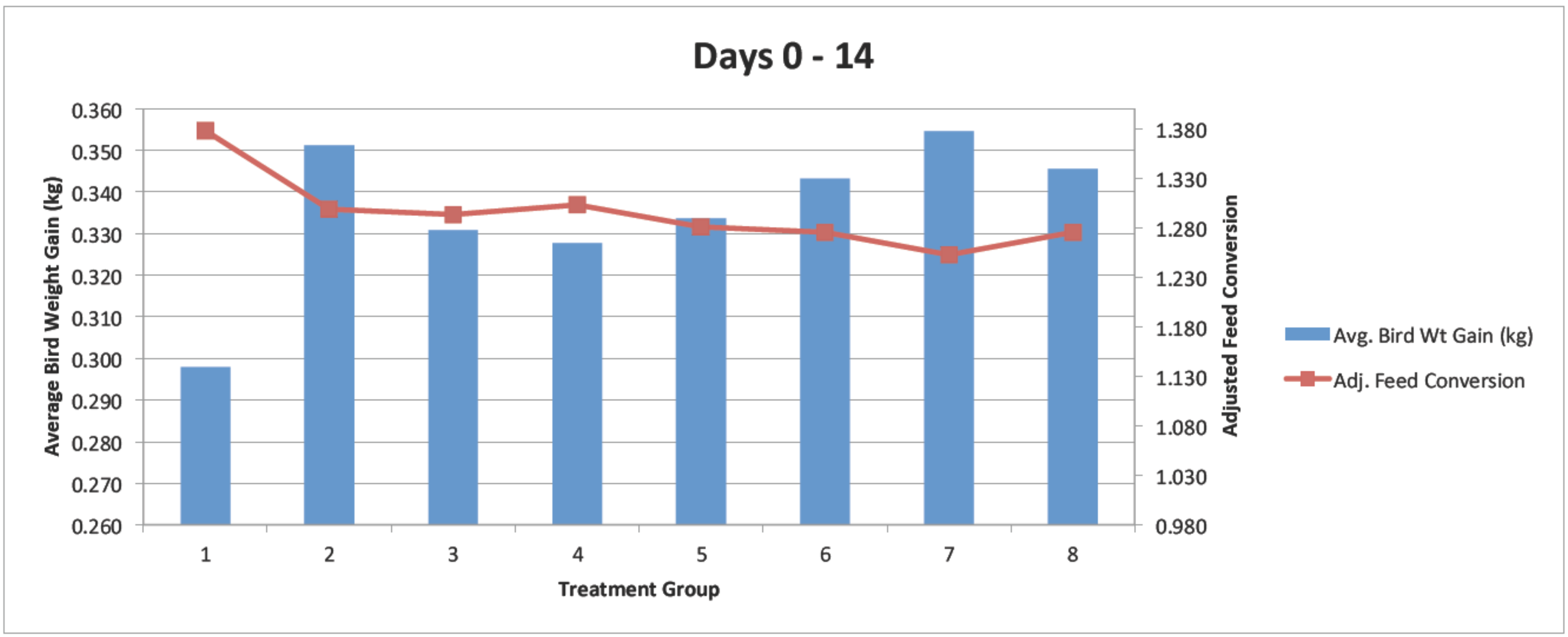


Table 6. Bird Weights and Feed Conversion Days 0 - 21 (20AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	1	6	17	0	0	0	17	12.000	0.706	0.662	1.368	1.368
2	1	16	17	0	0	0	17	11.600	0.682	0.640	1.361	1.361
3	1	25	17	0	0	0	17	11.080	0.652	0.608	1.382	1.382
4	1	37	18	0	0	0	18	12.900	0.717	0.676	1.339	1.339
5	1	46	17	0	0	0	17	10.800	0.635	0.593	1.351	1.351
6	1	53	17	0	0	0	17	10.460	0.615	0.574	1.389	1.389
7	1	60	17	0	0	0	17	10.180	0.599	0.558	1.348	1.348
8	1	71	17	0	1	0	16	10.340	0.646	0.604	1.500	1.465
9	1	79	17	1	1	0	15	10.760	0.717	0.675	1.447	1.396
10	1	90	17	1	0	0	16	10.520	0.658	0.616	1.388	1.364
11	1	100	17	1	0	0	16	10.580	0.661	0.619	1.399	1.356
12	1	109	17	0	0	0	17	12.960	0.762	0.721	1.416	1.416
Totals & Averages			**205**	**3**	**2**	**0**	**200**	**11.182**	**0.671**	**0.629**	**1.391**	**1.378**
Standard Deviation								**0.969**	**0.047**	**0.048**	**0.046**	**0.035**
CVs								**8.665%**	**7.073%**	**7.556%**	**3.314%**	**2.568%**
1	2	10	17	0	0	0	17	13.740	0.808	0.765	1.333	1.333
2	2	14	17	1	0	0	16	12.840	0.803	0.759	1.417	1.341
3	2	27	17	0	0	0	17	14.380	0.846	0.803	1.343	1.343
4	2	36	17	0	0	1	16	13.720	0.858	0.815	1.359	1.343
5	2	48	17	0	0	0	17	13.300	0.782	0.740	1.311	1.311
6	2	54	17	0	0	0	17	11.780	0.693	0.652	1.336	1.336
7	2	65	17	1	0	0	16	11.900	0.744	0.702	1.367	1.360
8	2	70	17	0	0	0	17	13.760	0.809	0.767	1.336	1.336
9	2	78	17	0	0	1	16	13.580	0.849	0.806	1.363	1.353
10	2	91	17	1	0	0	16	12.560	0.785	0.743	1.368	1.353
11	2	102	17	1	0	0	16	13.500	0.844	0.801	1.351	1.345
12	2	111	17	0	0	0	17	14.880	0.875	0.834	1.377	1.377
Totals & Averages			**204**	**4**	**0**	**2**	**198**	**13.328**	**0.808**	**0.766**	**1.355**	**1.344**
Standard Deviation								**0.924**	**0.052**	**0.052**	**0.027**	**0.016**
CVs								**6.929%**	**6.457%**	**6.784%**	**1.990%**	**1.189%**
1	3	9	17	2	0	0	15	11.940	0.796	0.752	1.362	1.332
2	3	15	17	1	0	0	16	12.480	0.780	0.736	1.254	1.241
3	3	24	17	0	0	0	17	12.280	0.722	0.679	1.335	1.335
4	3	35	17	2	0	0	15	11.680	0.779	0.737	1.379	1.323
5	3	44	17	0	0	0	17	13.200	0.776	0.734	1.313	1.313
6	3	52	17	0	1	0	16	12.180	0.761	0.720	1.340	1.317
7	3	62	17	2	0	0	15	11.520	0.768	0.726	1.348	1.332
8	3	68	17	0	0	0	17	12.580	0.740	0.699	1.342	1.342
9	3	84	17	0	0	0	17	13.640	0.802	0.760	1.322	1.322
10	3	89	17	1	0	0	16	11.980	0.749	0.707	1.331	1.324
11	3	96	17	0	0	0	17	12.980	0.764	0.722	1.338	1.338
12	3	108	17	1	0	0	16	13.260	0.829	0.787	1.388	1.383
Totals & Averages			**204**	**9**	**1**	**0**	**194**	**12.477**	**0.772**	**0.730**	**1.338**	**1.325**
Standard Deviation								**0.672**	**0.029**	**0.029**	**0.034**	**0.032**
CVs								**5.385%**	**3.720%**	**3.921%**	**2.559%**	**2.423%**

Table 6. Bird Weights and Feed Conversion Days 0 - 21 (20AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	4	5	17	1	0	0	16	12.780	0.799	0.756	1.375	1.340
2	4	18	17	1	0	0	16	12.400	0.775	0.732	1.314	1.300
3	4	26	17	0	0	0	17	13.180	0.775	0.732	1.320	1.320
4	4	32	17	0	0	0	17	13.800	0.812	0.770	1.314	1.314
5	4	45	17	0	1	0	16	11.400	0.713	0.670	1.329	1.309
6	4	49	17	0	0	0	17	13.420	0.789	0.748	1.280	1.280
7	4	59	17	0	0	0	17	13.580	0.799	0.756	1.298	1.298
8	4	73	17	0	0	0	17	13.060	0.768	0.726	1.315	1.315
9	4	81	17	1	0	0	16	13.040	0.815	0.773	1.322	1.315
10	4	88	17	2	1	0	14	10.760	0.769	0.727	1.371	1.335
11	4	98	17	1	0	0	16	12.280	0.768	0.726	1.366	1.358
12	4	104	17	0	0	0	17	13.940	0.820	0.779	1.317	1.317
Totals & Averages			**204**	**6**	**2**	**0**	**196**	**12.803**	**0.783**	**0.741**	**1.327**	**1.317**
Standard Deviation								**0.959**	**0.029**	**0.030**	**0.029**	**0.021**
CVs								**7.489%**	**3.755%**	**4.009%**	**2.208%**	**1.563%**
1	5	7	17	0	0	0	17	14.640	0.861	0.818	1.303	1.303
2	5	17	17	1	0	0	16	12.800	0.800	0.756	1.334	1.327
3	5	23	17	0	0	0	17	13.600	0.800	0.757	1.319	1.319
4	5	34	17	0	0	0	17	13.060	0.768	0.727	1.308	1.308
5	5	47	17	1	0	0	16	12.220	0.764	0.722	1.391	1.312
6	5	55	17	0	1	0	16	11.800	0.738	0.696	1.324	1.314
7	5	63	17	0	1	0	16	12.040	0.753	0.710	1.358	1.321
8	5	74	17	0	0	0	17	13.500	0.794	0.751	1.303	1.303
9	5	80	17	0	0	0	17	14.380	0.846	0.804	1.354	1.354
10	5	93	17	0	1	0	16	12.140	0.759	0.717	1.339	1.315
11	5	101	17	1	1	0	15	12.540	0.836	0.795	1.387	1.341
12	5	107	17	0	0	0	17	13.300	0.782	0.741	1.290	1.290
Totals & Averages			**204**	**3**	**4**	**0**	**197**	**13.002**	**0.792**	**0.750**	**1.334**	**1.317**
Standard Deviation								**0.917**	**0.039**	**0.039**	**0.033**	**0.017**
CVs								**7.056%**	**4.943%**	**5.187%**	**2.470%**	**1.320%**
1	6	11	17	0	1	0	16	12.820	0.801	0.758	1.342	1.312
2	6	13	17	0	0	0	17	13.980	0.822	0.779	1.318	1.318
3	6	28	17	0	0	0	17	14.080	0.828	0.786	1.320	1.320
4	6	33	17	0	0	0	17	13.300	0.782	0.741	1.306	1.306
5	6	42	17	0	0	0	17	14.740	0.867	0.826	1.303	1.303
6	6	50	17	1	0	0	16	13.000	0.813	0.771	1.303	1.299
7	6	61	17	1	1	0	15	11.420	0.761	0.719	1.338	1.308
8	6	72	17	1	0	0	16	12.360	0.773	0.731	1.348	1.316
9	6	82	17	1	0	0	16	13.540	0.846	0.804	1.329	1.322
10	6	87	17	1	1	0	15	12.140	0.809	0.767	1.358	1.311
11	6	97	17	0	0	0	17	13.440	0.791	0.748	1.311	1.311
12	6	106	17	0	0	0	17	14.380	0.846	0.805	1.306	1.306
Totals & Averages			**204**	**5**	**3**	**0**	**196**	**13.267**	**0.812**	**0.770**	**1.323**	**1.311**
Standard Deviation								**0.975**	**0.032**	**0.032**	**0.019**	**0.007**
CVs								**7.350%**	**3.951%**	**4.168%**	**1.451%**	**0.549%**

Table 6. Bird Weights and Feed Conversion Days 0 - 21 (20AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	7	4	17	2	0	0	15	13.360	0.891	0.848	1.358	1.339
2	7	12	17	0	0	0	17	13.680	0.805	0.762	1.312	1.312
3	7	22	17	2	1	0	14	11.440	0.817	0.774	1.335	1.290
4	7	30	17	0	0	0	17	14.180	0.834	0.791	1.296	1.296
5	7	43	17	0	0	0	17	13.960	0.821	0.780	1.287	1.287
6	7	51	17	1	0	0	16	13.220	0.826	0.784	1.297	1.292
7	7	66	17	1	0	0	16	12.880	0.805	0.762	1.307	1.300
8	7	67	17	0	0	0	17	12.500	0.781	0.739	1.351	1.313
9	7	83	17	0	0	0	17	14.560	0.856	0.815	1.293	1.293
10	7	92	17	1	0	0	16	12.140	0.759	0.716	1.319	1.308
11	7	103	17	0	0	0	17	13.780	0.811	0.769	1.303	1.303
12	7	110	17	2	0	0	15	13.740	0.916	0.875	1.381	1.320
Totals & Averages			**204**	**9**	**1**	**0**	**194**	**13.287**	**0.827**	**0.785**	**1.320**	**1.304**
Standard Deviation								**0.904**	**0.044**	**0.044**	**0.030**	**0.015**
CVs								**6.806%**	**5.288%**	**5.590%**	**2.256%**	**1.157%**

1	8	8	17	2	1	0	14	11.260	0.804	0.762	1.414	1.332
2	8	19	17	0	0	0	17	13.900	0.818	0.775	1.317	1.317
3	8	29	17	0	0	0	17	14.320	0.842	0.800	1.315	1.315
4	8	31	17	0	0	0	17	14.920	0.878	0.835	1.317	1.317
5	8	41	17	1	1	0	15	12.680	0.845	0.804	1.346	1.310
6	8	56	17	1	0	0	16	12.220	0.764	0.722	1.382	1.327
7	8	64	17	0	0	0	17	13.320	0.784	0.741	1.309	1.309
8	8	69	17	1	0	0	16	12.760	0.798	0.755	1.322	1.296
9	8	85	17	0	0	0	17	13.760	0.809	0.767	1.320	1.320
10	8	86	17	0	0	0	17	14.280	0.840	0.797	1.308	1.308
11	8	99	17	0	0	0	17	13.240	0.779	0.737	1.316	1.316
12	8	105	17	0	0	0	17	14.540	0.855	0.813	1.295	1.295
Totals & Averages			**204**	**5**	**2**	**0**	**197**	**13.433**	**0.818**	**0.776**	**1.330**	**1.314**
Standard Deviation								**1.067**	**0.035**	**0.034**	**0.035**	**0.011**
CVs								**7.945%**	**4.222%**	**4.434%**	**2.596%**	**0.836%**

Graph 2. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 21) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.629	1.378	Low Phosphate (LP)
2	0.766	1.344	High Phosphate (HP)
3	0.730	1.325	250 Units Phytase (LP)
4	0.741	1.317	500 Units Phytase (LP)
5	0.750	1.317	750 Units Phytase (LP)
6	0.770	1.311	1000 Units Phytase (LP)
7	0.785	1.304	3000 Units Phytase (LP)
8	0.776	1.314	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)

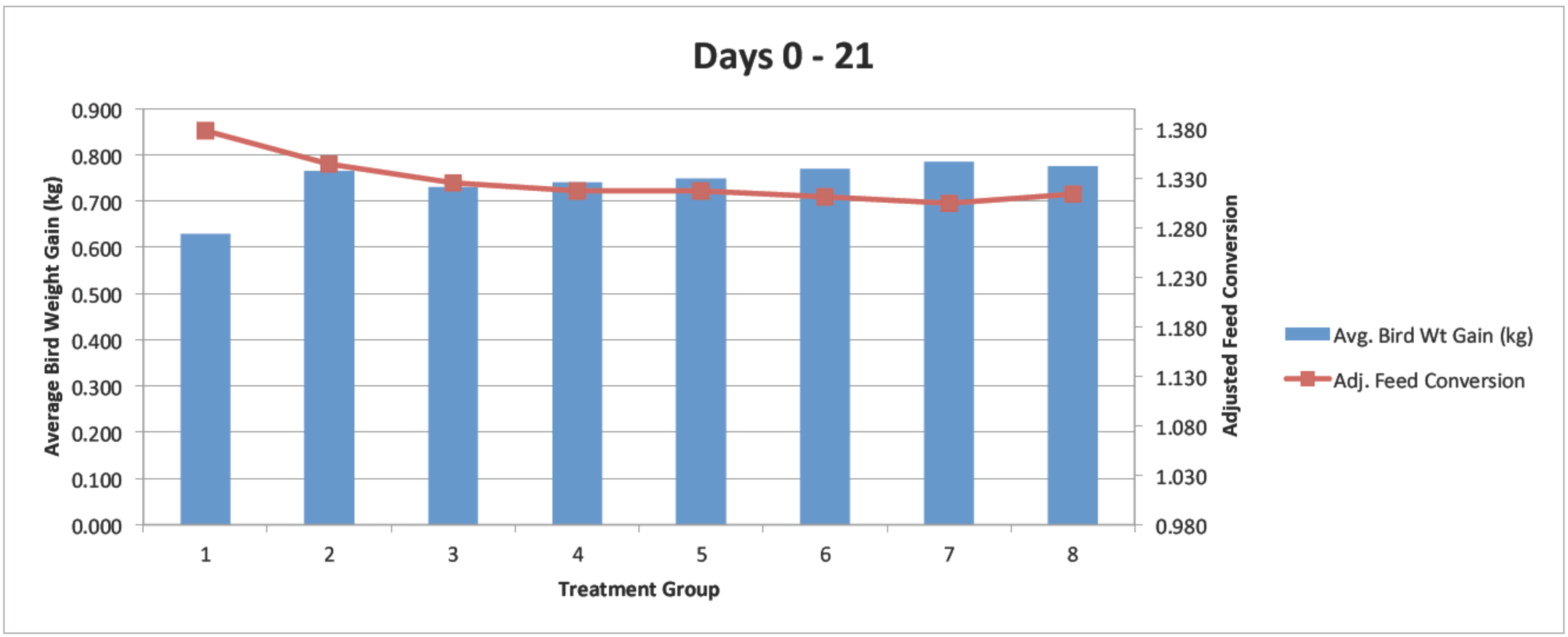


Table 8. Bird Weights and Feed Conversion Days 14 - 21 (20AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D014-21	Adj. Feed Conversion D14-21
1	1	6	17	0	0	0	17	12.000	0.706	0.349	1.347	1.347
2	1	16	17	0	0	0	17	11.600	0.682	0.346	1.391	1.391
3	1	25	17	0	0	0	17	11.080	0.652	0.329	1.364	1.364
4	1	37	18	0	0	0	18	12.900	0.717	0.352	1.388	1.388
5	1	46	17	0	0	0	17	10.800	0.635	0.311	1.352	1.352
6	1	53	17	0	0	0	17	10.460	0.615	0.300	1.431	1.431
7	1	60	17	0	0	0	17	10.180	0.599	0.293	1.357	1.357
8	1	71	17	0	1	0	16	10.340	0.646	0.318	1.475	1.408
9	1	79	16	0	1	0	15	10.760	0.717	0.341	1.456	1.385
10	1	90	16	0	0	0	16	10.520	0.658	0.329	1.369	1.369
11	1	100	16	0	0	0	16	10.580	0.661	0.324	1.382	1.382
12	1	109	17	0	0	0	17	12.960	0.762	0.379	1.357	1.357
Totals & Averages			**202**	**0**	**2**	**0**	**200**	**11.182**	**0.671**	**0.331**	**1.389**	**1.378**
Standard Deviation								**0.969**	**0.047**	**0.024**	**0.042**	**0.025**
CVs								**8.665%**	**7.073%**	**7.320%**	**3.055%**	**1.811%**
1	2	10	17	0	0	0	17	13.740	0.808	0.420	1.381	1.381
2	2	14	17	1	0	0	16	12.840	0.803	0.408	1.534	1.379
3	2	27	17	0	0	0	17	14.380	0.846	0.451	1.389	1.389
4	2	36	16	0	0	0	16	13.720	0.858	0.438	1.397	1.397
5	2	48	17	0	0	0	17	13.300	0.782	0.409	1.353	1.353
6	2	54	17	0	0	0	17	11.780	0.693	0.344	1.384	1.384
7	2	65	16	0	0	0	16	11.900	0.744	0.379	1.403	1.403
8	2	70	17	0	0	0	17	13.760	0.809	0.411	1.378	1.378
9	2	78	16	0	0	0	16	13.580	0.849	0.423	1.399	1.399
10	2	91	16	0	0	0	16	12.560	0.785	0.405	1.383	1.383
11	2	102	16	0	0	0	16	13.500	0.844	0.433	1.393	1.393
12	2	111	17	0	0	0	17	14.880	0.875	0.455	1.359	1.359
Totals & Averages			**199**	**1**	**0**	**0**	**198**	**13.328**	**0.808**	**0.415**	**1.396**	**1.383**
Standard Deviation								**0.924**	**0.052**	**0.031**	**0.046**	**0.015**
CVs								**6.929%**	**6.457%**	**7.417%**	**3.293%**	**1.084%**
1	3	9	15	0	0	0	15	11.940	0.796	0.423	1.372	1.372
2	3	15	16	0	0	0	16	12.480	0.780	0.413	1.255	1.255
3	3	24	17	0	0	0	17	12.280	0.722	0.379	1.360	1.360
4	3	35	16	1	0	0	15	11.680	0.779	0.389	1.467	1.365
5	3	44	17	0	0	0	17	13.200	0.776	0.404	1.329	1.329
6	3	52	17	0	1	0	16	12.180	0.761	0.404	1.380	1.337
7	3	62	15	0	0	0	15	11.520	0.768	0.395	1.375	1.375
8	3	68	17	0	0	0	17	12.580	0.740	0.373	1.375	1.375
9	3	84	17	0	0	0	17	13.640	0.802	0.409	1.359	1.359
10	3	89	16	0	0	0	16	11.980	0.749	0.386	1.340	1.340
11	3	96	17	0	0	0	17	12.980	0.764	0.405	1.366	1.366
12	3	108	16	0	0	0	16	13.260	0.829	0.411	1.395	1.395
Totals & Averages			**196**	**1**	**1**	**0**	**194**	**12.477**	**0.772**	**0.399**	**1.365**	**1.352**
Standard Deviation								**0.672**	**0.029**	**0.015**	**0.049**	**0.036**
CVs								**5.385%**	**3.720%**	**3.739%**	**3.559%**	**2.657%**

Table 8. Bird Weights and Feed Conversion Days 14 - 21 (20AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D014-21	Adj. Feed Conversion D14-21
1	4	5	17	1	0	0	16	12.780	0.799	0.406	1.443	1.371
2	4	18	16	0	0	0	16	12.400	0.775	0.406	1.335	1.335
3	4	26	17	0	0	0	17	13.180	0.775	0.415	1.326	1.326
4	4	32	17	0	0	0	17	13.800	0.812	0.424	1.339	1.339
5	4	45	17	0	1	0	16	11.400	0.713	0.400	1.322	1.288
6	4	49	17	0	0	0	17	13.420	0.789	0.419	1.306	1.306
7	4	59	17	0	0	0	17	13.580	0.799	0.433	1.304	1.304
8	4	73	17	0	0	0	17	13.060	0.768	0.395	1.315	1.315
9	4	81	16	0	0	0	16	13.040	0.815	0.426	1.331	1.331
10	4	88	14	0	0	0	14	10.760	0.769	0.400	1.343	1.343
11	4	98	16	0	0	0	16	12.280	0.768	0.400	1.331	1.331
12	4	104	17	0	0	0	17	13.940	0.820	0.439	1.349	1.349
Totals & Averages			**198**	**1**	**1**	**0**	**196**	**12.803**	**0.783**	**0.414**	**1.337**	**1.328**
Standard Deviation								**0.959**	**0.029**	**0.015**	**0.036**	**0.022**
CVs								**7.489%**	**3.755%**	**3.509%**	**2.688%**	**1.677%**
1	5	7	17	0	0	0	17	14.640	0.861	0.441	1.352	1.352
2	5	17	16	0	0	0	16	12.800	0.800	0.419	1.373	1.373
3	5	23	17	0	0	0	17	13.600	0.800	0.432	1.351	1.351
4	5	34	17	0	0	0	17	13.060	0.768	0.402	1.336	1.336
5	5	47	17	1	0	0	16	12.220	0.764	0.392	1.512	1.352
6	5	55	16	0	0	0	16	11.800	0.738	0.384	1.342	1.342
7	5	63	17	0	1	0	16	12.040	0.753	0.391	1.458	1.383
8	5	74	17	0	0	0	17	13.500	0.794	0.418	1.299	1.299
9	5	80	17	0	0	0	17	14.380	0.846	0.433	1.326	1.326
10	5	93	17	0	1	0	16	12.140	0.759	0.406	1.391	1.347
11	5	101	17	1	1	0	15	12.540	0.836	0.461	1.481	1.388
12	5	107	17	0	0	0	17	13.300	0.782	0.412	1.317	1.317
Totals & Averages			**202**	**2**	**3**	**0**	**197**	**13.002**	**0.792**	**0.416**	**1.378**	**1.347**
Standard Deviation								**0.917**	**0.039**	**0.023**	**0.069**	**0.026**
CVs								**7.056%**	**4.943%**	**5.480%**	**4.993%**	**1.944%**
1	6	11	17	0	1	0	16	12.820	0.801	0.428	1.423	1.364
2	6	13	17	0	0	0	17	13.980	0.822	0.435	1.349	1.349
3	6	28	17	0	0	0	17	14.080	0.828	0.434	1.360	1.360
4	6	33	17	0	0	0	17	13.300	0.782	0.400	1.350	1.350
5	6	42	17	0	0	0	17	14.740	0.867	0.447	1.337	1.337
6	6	50	16	0	0	0	16	13.000	0.813	0.431	1.328	1.328
7	6	61	16	0	1	0	15	11.420	0.761	0.411	1.378	1.337
8	6	72	16	0	0	0	16	12.360	0.773	0.404	1.300	1.300
9	6	82	16	0	0	0	16	13.540	0.846	0.433	1.350	1.350
10	6	87	16	0	1	0	15	12.140	0.809	0.432	1.420	1.349
11	6	97	17	0	0	0	17	13.440	0.791	0.415	1.337	1.337
12	6	106	17	0	0	0	17	14.380	0.846	0.446	1.325	1.325
Totals & Averages			**199**	**0**	**3**	**0**	**196**	**13.267**	**0.812**	**0.426**	**1.355**	**1.340**
Standard Deviation								**0.975**	**0.032**	**0.015**	**0.037**	**0.017**
CVs								**7.350%**	**3.951%**	**3.605%**	**2.704%**	**1.298%**

Table 8. Bird Weights and Feed Conversion Days 14 - 21 (20AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D014-21	Adj. Feed Conversion D14-21
1	7	4	15	0	0	0	15	13.360	0.891	0.464	1.394	1.394
2	7	12	17	0	0	0	17	13.680	0.805	0.418	1.361	1.361
3	7	22	15	0	1	0	14	11.440	0.817	0.442	1.371	1.328
4	7	30	17	0	0	0	17	14.180	0.834	0.439	1.351	1.351
5	7	43	17	0	0	0	17	13.960	0.821	0.429	1.301	1.301
6	7	51	16	0	0	0	16	13.220	0.826	0.434	1.337	1.337
7	7	66	16	0	0	0	16	12.880	0.805	0.419	1.340	1.340
8	7	67	17	0	0	0	17	12.500	0.781	0.398	1.468	1.390
9	7	83	17	0	0	0	17	14.560	0.856	0.446	1.327	1.327
10	7	92	16	0	0	0	16	12.140	0.759	0.383	1.359	1.359
11	7	103	17	0	0	0	17	13.780	0.811	0.414	1.332	1.332
12	7	110	16	1	0	0	15	13.740	0.916	0.476	1.448	1.363
Totals & Averages			**196**	**1**	**1**	**0**	**194**	**13.287**	**0.827**	**0.430**	**1.366**	**1.349**
Standard Deviation								**0.904**	**0.044**	**0.026**	**0.049**	**0.027**
CVs								**6.806%**	**5.288%**	**6.112%**	**3.595%**	**1.968%**

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D014-21	Adj. Feed Conversion D14-21
1	8	8	16	1	1	0	14	11.260	0.804	0.443	1.478	1.338
2	8	19	17	0	0	0	17	13.900	0.818	0.438	1.339	1.339
3	8	29	17	0	0	0	17	14.320	0.842	0.451	1.345	1.345
4	8	31	17	0	0	0	17	14.920	0.878	0.466	1.351	1.351
5	8	41	16	0	1	0	15	12.680	0.845	0.443	1.404	1.347
6	8	56	17	1	0	0	16	12.220	0.764	0.380	1.540	1.421
7	8	64	17	0	0	0	17	13.320	0.784	0.412	1.317	1.317
8	8	69	17	1	0	0	16	12.760	0.798	0.418	1.371	1.321
9	8	85	17	0	0	0	17	13.760	0.809	0.421	1.355	1.355
10	8	86	17	0	0	0	17	14.280	0.840	0.424	1.361	1.361
11	8	99	17	0	0	0	17	13.240	0.779	0.407	1.332	1.332
12	8	105	17	0	0	0	17	14.540	0.855	0.460	1.327	1.327
Totals & Averages			**202**	**3**	**2**	**0**	**197**	**13.433**	**0.818**	**0.430**	**1.377**	**1.346**
Standard Deviation								**1.067**	**0.035**	**0.025**	**0.067**	**0.027**
CVs								**7.945%**	**4.222%**	**5.703%**	**4.879%**	**2.004%**

Graph 3. Average Bird Weight Gain and Adjusted Feed Conversion (Days 14 - 21) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.331	1.378	Low Phosphate (LP)
2	0.415	1.383	High Phosphate (HP)
3	0.399	1.352	250 Units Phytase (LP)
4	0.414	1.328	500 Units Phytase (LP)
5	0.416	1.347	750 Units Phytase (LP)
6	0.426	1.340	1000 Units Phytase (LP)
7	0.430	1.349	3000 Units Phytase (LP)
8	0.430	1.346	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)

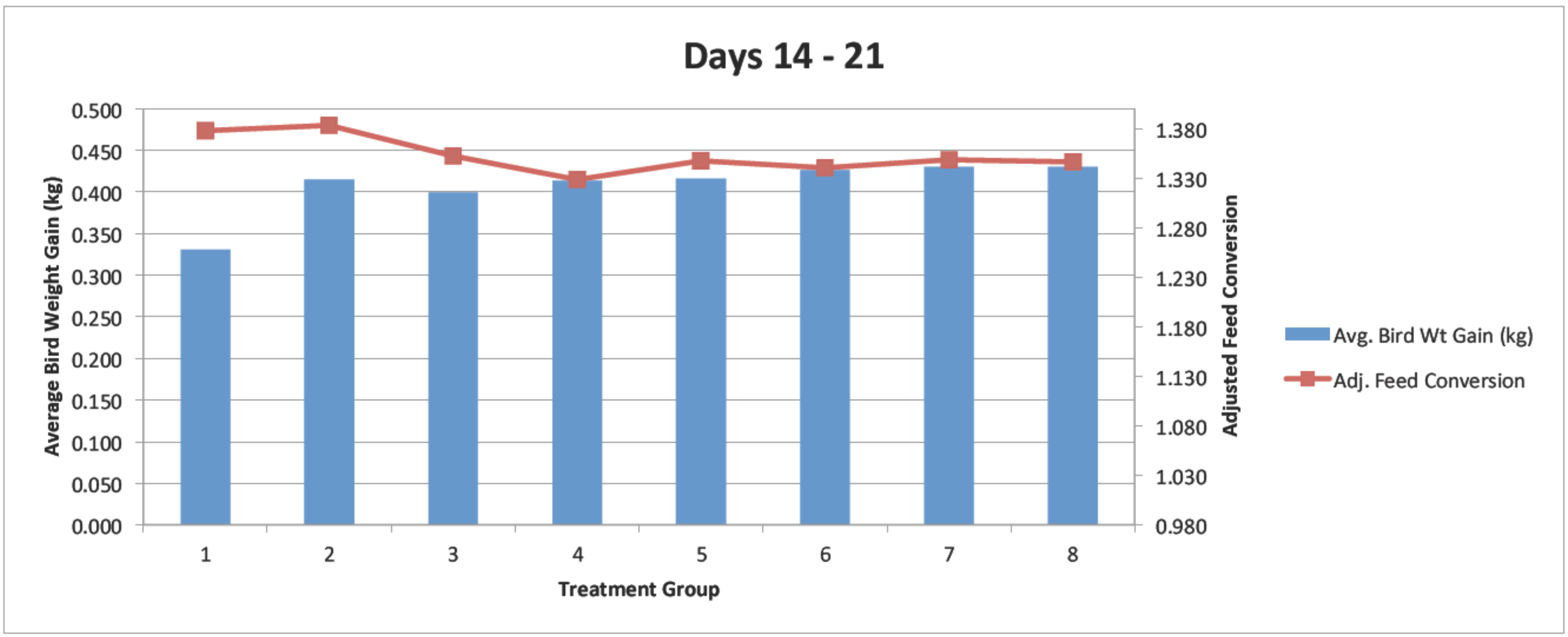


Table 10. Bird Weights and Feed Conversion Days 0 - 42 (10SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	1	6	17	1	0	3	13	32.880	2.529	2.486	1.749	1.602
2	1	16	17	0	0	3	14	34.900	2.493	2.450	1.672	1.577
3	1	25	17	2	0	3	12	29.180	2.432	2.388	1.825	1.546
4	1	37	18	1	0	4	13	32.860	2.528	2.487	1.805	1.592
5	1	46	17	1	1	3	12	28.880	2.407	2.365	1.721	1.518
6	1	53	17	0	0	3	14	32.600	2.329	2.287	1.598	1.512
7	1	60	17	0	0	3	14	31.780	2.270	2.229	1.631	1.537
8	1	71	17	0	2	3	12	28.320	2.360	2.317	1.780	1.572
9	1	79	17	1	1	3	12	31.640	2.637	2.594	1.668	1.539
10	1	90	17	1	0	3	13	30.500	2.346	2.305	1.668	1.545
11	1	100	17	1	0	3	13	31.720	2.440	2.398	1.672	1.551
12	1	109	17	0	0	3	14	37.060	2.647	2.606	1.715	1.608
Totals & Averages			**205**	**8**	**4**	**37**	**156**	**31.860**	**2.451**	**2.409**	**1.709**	**1.558**
Standard Deviation								**2.512**	**0.119**	**0.119**	**0.070**	**0.032**
CVs								**7.883%**	**4.861%**	**4.942%**	**4.101%**	**2.022%**
1	2	10	17	0	0	3	14	43.700	3.121	3.078	1.634	1.546
2	2	14	17	1	0	3	13	38.380	2.952	2.909	1.694	1.557
3	2	27	17	0	0	3	14	43.540	3.110	3.067	1.657	1.564
4	2	36	17	0	0	4	13	37.100	2.854	2.811	1.689	1.568
5	2	48	17	0	1	3	13	39.820	3.063	3.021	1.650	1.537
6	2	54	17	0	0	3	14	38.120	2.723	2.682	1.639	1.554
7	2	65	17	1	0	3	13	36.680	2.822	2.780	1.653	1.557
8	2	70	17	0	0	3	14	40.380	2.884	2.842	1.654	1.559
9	2	78	17	0	0	4	13	37.160	2.858	2.816	1.703	1.587
10	2	91	17	1	0	3	13	35.340	2.718	2.676	1.714	1.591
11	2	102	17	1	0	3	13	39.880	3.068	3.025	1.676	1.568
12	2	111	17	1	0	3	13	41.440	3.188	3.146	1.739	1.577
Totals & Averages			**204**	**5**	**1**	**38**	**160**	**39.295**	**2.947**	**2.905**	**1.675**	**1.564**
Standard Deviation								**2.661**	**0.160**	**0.160**	**0.033**	**0.016**
CVs								**6.772%**	**5.430%**	**5.504%**	**1.959%**	**1.003%**
1	3	9	17	2	0	3	12	36.460	3.038	2.994	1.636	1.521
2	3	15	17	1	0	3	13	38.720	2.978	2.935	1.612	1.507
3	3	24	17	0	0	3	14	39.040	2.789	2.745	1.628	1.529
4	3	35	17	2	0	3	12	34.140	2.845	2.804	1.638	1.514
5	3	44	17	0	0	3	14	37.940	2.710	2.668	1.656	1.553
6	3	52	17	0	1	3	13	37.160	2.858	2.817	1.624	1.527
7	3	62	17	2	0	3	12	33.180	2.765	2.723	1.635	1.521
8	3	68	17	1	0	3	13	36.200	2.785	2.743	1.728	1.540
9	3	84	17	0	0	3	14	38.640	2.760	2.718	1.649	1.551
10	3	89	17	1	0	3	13	35.300	2.715	2.673	1.649	1.538
11	3	96	17	0	0	3	14	39.720	2.837	2.795	1.669	1.579
12	3	108	17	1	0	3	13	39.840	3.065	3.023	1.622	1.520
Totals & Averages			**204**	**10**	**1**	**36**	**157**	**37.195**	**2.845**	**2.803**	**1.646**	**1.533**
Standard Deviation								**2.181**	**0.120**	**0.120**	**0.030**	**0.020**
CVs								**5.863%**	**4.227%**	**4.278%**	**1.841%**	**1.320%**

Table 10. Bird Weights and Feed Conversion Days 0 - 42 (10SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	4	5	17	1	0	3	13	39.120	3.009	2.967	1.638	1.516
2	4	18	17	1	0	3	13	38.340	2.949	2.907	1.622	1.522
3	4	26	17	0	0	3	14	40.200	2.871	2.828	1.634	1.531
4	4	32	17	0	0	3	14	41.860	2.990	2.948	1.627	1.536
5	4	45	17	0	1	3	13	36.900	2.838	2.796	1.623	1.520
6	4	49	17	0	0	3	14	40.440	2.889	2.847	1.616	1.509
7	4	59	17	0	0	3	14	39.340	2.810	2.767	1.649	1.536
8	4	73	17	0	0	3	14	39.480	2.820	2.778	1.640	1.540
9	4	81	17	1	0	3	13	38.300	2.946	2.904	1.609	1.511
10	4	88	17	2	1	3	11	31.640	2.876	2.835	1.652	1.517
11	4	98	17	1	0	3	13	38.860	2.989	2.947	1.637	1.539
12	4	104	17	0	0	3	14	42.900	3.064	3.023	1.624	1.529
Totals & Averages			**204**	**6**	**2**	**36**	**160**	**38.948**	**2.921**	**2.879**	**1.631**	**1.525**
Standard Deviation								**2.808**	**0.082**	**0.082**	**0.013**	**0.011**
CVs								**7.211%**	**2.808%**	**2.860%**	**0.794%**	**0.723%**
1	5	7	17	0	0	3	14	43.980	3.141	3.098	1.637	1.546
2	5	17	17	1	0	3	13	40.060	3.082	3.038	1.625	1.526
3	5	23	17	0	0	3	14	41.280	2.949	2.906	1.617	1.522
4	5	34	17	0	0	3	14	39.600	2.829	2.787	1.600	1.510
5	5	47	17	1	0	3	13	38.040	2.926	2.885	1.649	1.516
6	5	55	17	0	2	3	12	33.840	2.820	2.779	1.633	1.496
7	5	63	17	0	1	3	13	35.700	2.746	2.703	1.656	1.542
8	5	74	17	1	0	3	13	38.140	2.934	2.891	1.656	1.523
9	5	80	17	0	0	3	14	39.760	2.840	2.798	1.661	1.557
10	5	93	17	1	1	3	12	32.720	2.727	2.685	1.767	1.548
11	5	101	17	1	1	3	12	36.780	3.065	3.024	1.678	1.550
12	5	107	17	0	1	3	13	39.300	3.023	2.981	1.667	1.512
Totals & Averages			**204**	**5**	**6**	**36**	**157**	**38.267**	**2.923**	**2.881**	**1.654**	**1.529**
Standard Deviation								**3.151**	**0.135**	**0.135**	**0.042**	**0.019**
CVs								**8.235%**	**4.613%**	**4.673%**	**2.543%**	**1.253%**
1	6	11	17	0	1	3	13	39.960	3.074	3.031	1.639	1.530
2	6	13	17	0	0	3	14	42.740	3.053	3.010	1.623	1.521
3	6	28	17	0	0	3	14	41.500	2.964	2.922	1.634	1.538
4	6	33	17	0	0	3	14	39.360	2.811	2.770	1.611	1.517
5	6	42	17	0	0	3	14	41.820	2.987	2.946	1.639	1.538
6	6	50	17	1	0	3	13	37.940	2.918	2.877	1.631	1.516
7	6	61	17	1	1	3	12	33.280	2.773	2.731	1.645	1.527
8	6	72	17	1	0	3	13	37.040	2.849	2.808	1.648	1.535
9	6	82	17	1	0	3	13	37.900	2.915	2.873	1.644	1.533
10	6	87	17	1	1	3	12	34.700	2.892	2.849	1.638	1.503
11	6	97	17	1	0	3	13	37.420	2.878	2.836	1.683	1.530
12	6	106	17	0	0	3	14	43.340	3.096	3.054	1.633	1.530
Totals & Averages			**204**	**6**	**3**	**36**	**159**	**38.917**	**2.934**	**2.892**	**1.639**	**1.527**
Standard Deviation								**3.132**	**0.103**	**0.103**	**0.017**	**0.010**
CVs								**8.047%**	**3.516%**	**3.560%**	**1.046%**	**0.680%**

Table 10. Bird Weights and Feed Conversion Days 0 - 42 (10SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	7	4	17	2	0	3	12	35.420	2.952	2.909	1.711	1.572
2	7	12	17	0	0	3	14	42.100	3.007	2.965	1.622	1.529
3	7	22	17	2	1	3	11	32.720	2.975	2.932	1.665	1.526
4	7	30	17	0	0	3	14	41.200	2.943	2.900	1.625	1.516
5	7	43	17	0	0	3	14	39.760	2.840	2.799	1.637	1.529
6	7	51	17	1	0	3	13	38.680	2.975	2.933	1.635	1.523
7	7	66	17	1	0	3	13	38.000	2.923	2.880	1.640	1.535
8	7	67	17	1	0	3	13	36.160	2.782	2.740	1.653	1.531
9	7	83	17	1	0	3	13	38.600	2.969	2.928	1.693	1.534
10	7	92	17	1	0	3	13	35.820	2.755	2.713	1.656	1.543
11	7	103	17	0	0	3	14	42.420	3.030	2.988	1.611	1.520
12	7	110	17	2	0	3	12	39.500	3.292	3.250	1.651	1.512
Totals & Averages			**204**	**11**	**1**	**36**	**156**	**38.365**	**2.954**	**2.911**	**1.650**	**1.531**
Standard Deviation								**2.921**	**0.137**	**0.137**	**0.029**	**0.015**
CVs								**7.613%**	**4.645%**	**4.717%**	**1.765%**	**1.009%**

1	8	8	17	2	1	3	11	34.900	3.173	3.130	1.654	1.518
2	8	19	17	0	0	3	14	41.200	2.943	2.900	1.622	1.524
3	8	29	17	1	0	3	13	39.300	3.023	2.981	1.734	1.552
4	8	31	17	0	0	3	14	41.800	2.986	2.943	1.661	1.550
5	8	41	17	1	1	3	12	36.120	3.010	2.969	1.669	1.536
6	8	56	17	1	0	3	13	35.580	2.737	2.696	1.690	1.559
7	8	64	17	0	0	3	14	41.340	2.953	2.911	1.625	1.535
8	8	69	17	1	0	3	13	37.600	2.892	2.849	1.609	1.494
9	8	85	17	0	0	3	14	38.920	2.780	2.738	1.637	1.537
10	8	86	17	0	0	3	14	38.780	2.770	2.727	1.648	1.524
11	8	99	17	0	0	3	14	42.420	3.030	2.988	1.608	1.513
12	8	105	17	0	0	3	14	42.580	3.041	2.999	1.645	1.547
Totals & Averages			**204**	**6**	**2**	**36**	**160**	**39.212**	**2.945**	**2.903**	**1.650**	**1.532**
Standard Deviation								**2.714**	**0.129**	**0.129**	**0.036**	**0.019**
CVs								**6.922%**	**4.396%**	**4.457%**	**2.182%**	**1.228%**

Graph 4. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 42) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	2.409	1.558	Low Phosphate (LP)
2	2.905	1.564	High Phosphate (HP)
3	2.803	1.533	250 Units Phytase (LP)
4	2.879	1.525	500 Units Phytase (LP)
5	2.881	1.529	750 Units Phytase (LP)
6	2.892	1.527	1000 Units Phytase (LP)
7	2.911	1.531	3000 Units Phytase (LP)
8	2.903	1.532	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)

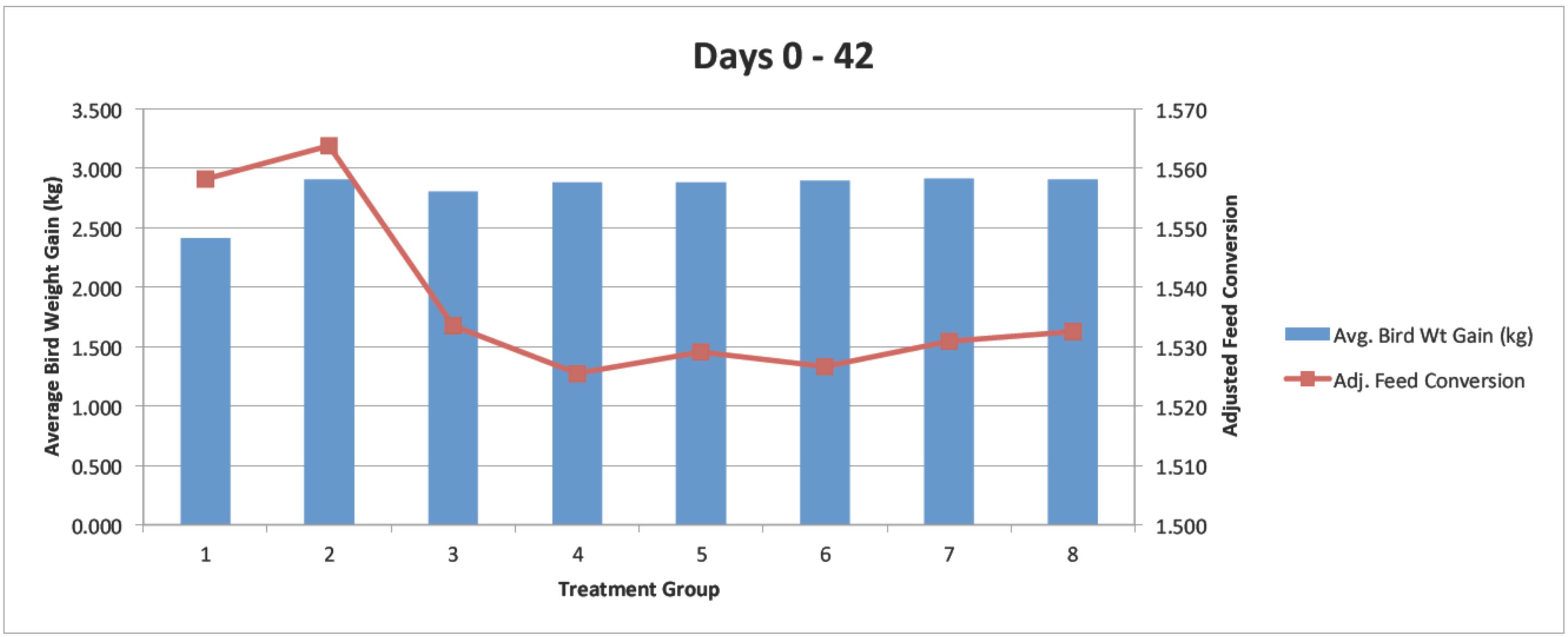


Table 12. Bird Weights and Feed Conversion Days 21 - 42 (10SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D014-21	Adj. Feed Conversion D14-21
1	1	6	17	1	0	3	13	32.880	2.529	1.823	1.955	1.712
2	1	16	17	0	0	3	14	34.900	2.493	1.811	1.817	1.670
3	1	25	17	2	0	3	12	29.180	2.432	1.780	2.078	1.619
4	1	37	18	1	0	4	13	32.860	2.528	1.811	2.089	1.719
5	1	46	17	1	1	3	12	28.880	2.407	1.771	1.927	1.595
6	1	53	17	0	0	3	14	32.600	2.329	1.713	1.690	1.563
7	1	60	17	0	0	3	14	31.780	2.270	1.671	1.756	1.613
8	1	71	16	0	1	3	12	28.320	2.360	1.714	1.930	1.621
9	1	79	15	0	0	3	12	31.640	2.637	1.919	1.774	1.604
10	1	90	16	0	0	3	13	30.500	2.346	1.689	1.806	1.626
11	1	100	16	0	0	3	13	31.720	2.440	1.779	1.799	1.636
12	1	109	17	0	0	3	14	37.060	2.647	1.885	1.866	1.696
Totals & Averages			**200**	**5**	**2**	**37**	**156**	**31.860**	**2.451**	**1.780**	**1.874**	**1.639**
Standard Deviation								**2.512**	**0.119**	**0.076**	**0.125**	**0.049**
CVs								**7.883%**	**4.861%**	**4.259%**	**6.671%**	**2.994%**
1	2	10	17	0	0	3	14	43.700	3.121	2.313	1.764	1.631
2	2	14	16	0	0	3	13	38.380	2.952	2.150	1.825	1.656
3	2	27	17	0	0	3	14	43.540	3.110	2.264	1.805	1.659
4	2	36	16	0	0	3	13	37.100	2.854	1.996	1.873	1.682
5	2	48	17	0	1	3	13	39.820	3.063	2.281	1.810	1.634
6	2	54	17	0	0	3	14	38.120	2.723	2.030	1.767	1.639
7	2	65	16	0	0	3	13	36.680	2.822	2.078	1.782	1.640
8	2	70	17	0	0	3	14	40.380	2.884	2.075	1.810	1.659
9	2	78	16	0	0	3	13	37.160	2.858	2.010	1.888	1.703
10	2	91	16	0	0	3	13	35.340	2.718	1.933	1.895	1.703
11	2	102	16	0	0	3	13	39.880	3.068	2.224	1.834	1.667
12	2	111	17	1	0	3	13	41.440	3.188	2.312	1.932	1.669
Totals & Averages			**198**	**1**	**1**	**36**	**160**	**39.295**	**2.947**	**2.139**	**1.832**	**1.662**
Standard Deviation								**2.661**	**0.160**	**0.136**	**0.054**	**0.025**
CVs								**6.772%**	**5.430%**	**6.344%**	**2.940%**	**1.480%**
1	3	9	15	0	0	3	12	36.460	3.038	2.242	1.761	1.602
2	3	15	16	0	0	3	13	38.720	2.978	2.198	1.773	1.617
3	3	24	17	0	0	3	14	39.040	2.789	2.066	1.754	1.606
4	3	35	15	0	0	3	12	34.140	2.845	2.066	1.765	1.603
5	3	44	17	0	0	3	14	37.940	2.710	1.934	1.829	1.663
6	3	52	16	0	0	3	13	37.160	2.858	2.097	1.754	1.618
7	3	62	15	0	0	3	12	33.180	2.765	1.997	1.778	1.607
8	3	68	17	1	0	3	13	36.200	2.785	2.045	1.921	1.624
9	3	84	17	0	0	3	14	38.640	2.760	1.958	1.818	1.659
10	3	89	16	0	0	3	13	35.300	2.715	1.967	1.803	1.633
11	3	96	17	0	0	3	14	39.720	2.837	2.074	1.821	1.682
12	3	108	16	0	0	3	13	39.840	3.065	2.236	1.733	1.579
Totals & Averages			**194**	**1**	**0**	**36**	**157**	**37.195**	**2.845**	**2.073**	**1.793**	**1.624**
Standard Deviation								**2.181**	**0.120**	**0.105**	**0.051**	**0.030**
CVs								**5.863%**	**4.227%**	**5.085%**	**2.833%**	**1.841%**

Table 12. Bird Weights and Feed Conversion Days 21 - 42 (10SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D014-21	Adj. Feed Conversion D14-21
1	4	5	16	0	0	3	13	39.120	3.009	2.210	1.758	1.591
2	4	18	16	0	0	3	13	38.340	2.949	2.174	1.761	1.614
3	4	26	17	0	0	3	14	40.200	2.871	2.096	1.778	1.619
4	4	32	17	0	0	3	14	41.860	2.990	2.178	1.773	1.632
5	4	45	16	0	0	3	13	36.900	2.838	2.126	1.747	1.603
6	4	49	17	0	0	3	14	40.440	2.889	2.099	1.774	1.606
7	4	59	17	0	0	3	14	39.340	2.810	2.011	1.825	1.643
8	4	73	17	0	0	3	14	39.480	2.820	2.052	1.793	1.636
9	4	81	16	0	0	3	13	38.300	2.946	2.131	1.749	1.598
10	4	88	14	0	0	3	11	31.640	2.876	2.108	1.787	1.598
11	4	98	16	0	0	3	13	38.860	2.989	2.222	1.755	1.612
12	4	104	17	0	0	3	14	42.900	3.064	2.244	1.765	1.617
Totals & Averages			**196**	**0**	**0**	**36**	**160**	**38.948**	**2.921**	**2.138**	**1.772**	**1.614**
Standard Deviatio								**2.808**	**0.082**	**0.070**	**0.022**	**0.016**
CVs								**7.211%**	**2.808%**	**3.289%**	**1.240%**	**0.999%**
1	5	7	17	0	0	3	14	43.980	3.141	2.280	1.796	1.652
2	5	17	16	0	0	3	13	40.060	3.082	2.282	1.753	1.607
3	5	23	17	0	0	3	14	41.280	2.949	2.149	1.756	1.609
4	5	34	17	0	0	3	14	39.600	2.829	2.060	1.736	1.596
5	5	47	16	0	0	3	13	38.040	2.926	2.162	1.764	1.604
6	5	55	16	0	1	3	12	33.840	2.820	2.083	1.789	1.578
7	5	63	16	0	0	3	13	35.700	2.746	1.994	1.799	1.641
8	5	74	17	1	0	3	13	38.140	2.934	2.140	1.839	1.624
9	5	80	17	0	0	3	14	39.760	2.840	1.994	1.827	1.656
10	5	93	16	1	0	3	12	32.720	2.727	1.968	2.005	1.656
11	5	101	15	0	0	3	12	36.780	3.065	2.229	1.821	1.646
12	5	107	17	0	1	3	13	39.300	3.023	2.241	1.850	1.606
Totals & Averages			**197**	**2**	**2**	**36**	**157**	**38.267**	**2.923**	**2.132**	**1.811**	**1.623**
Standard Deviatio								**3.151**	**0.135**	**0.113**	**0.071**	**0.027**
CVs								**8.235%**	**4.613%**	**5.283%**	**3.915%**	**1.642%**
1	6	11	16	0	0	3	13	39.960	3.074	2.273	1.772	1.621
2	6	13	17	0	0	3	14	42.740	3.053	2.231	1.764	1.606
3	6	28	17	0	0	3	14	41.500	2.964	2.136	1.786	1.635
4	6	33	17	0	0	3	14	39.360	2.811	2.029	1.758	1.610
5	6	42	17	0	0	3	14	41.820	2.987	2.120	1.813	1.649
6	6	50	16	0	0	3	13	37.940	2.918	2.106	1.793	1.613
7	6	61	15	0	0	3	12	33.280	2.773	2.012	1.796	1.625
8	6	72	16	0	0	3	13	37.040	2.849	2.077	1.790	1.632
9	6	82	16	0	0	3	13	37.900	2.915	2.069	1.810	1.634
10	6	87	15	0	0	3	12	34.700	2.892	2.082	1.780	1.594
11	6	97	17	1	0	3	13	37.420	2.878	2.088	1.880	1.631
12	6	106	17	0	0	3	14	43.340	3.096	2.250	1.787	1.627
Totals & Averages			**196**	**1**	**0**	**36**	**159**	**38.917**	**2.934**	**2.123**	**1.794**	**1.623**
Standard Deviatio								**3.132**	**0.103**	**0.085**	**0.032**	**0.015**
CVs								**8.047%**	**3.516%**	**4.007%**	**1.764%**	**0.934%**

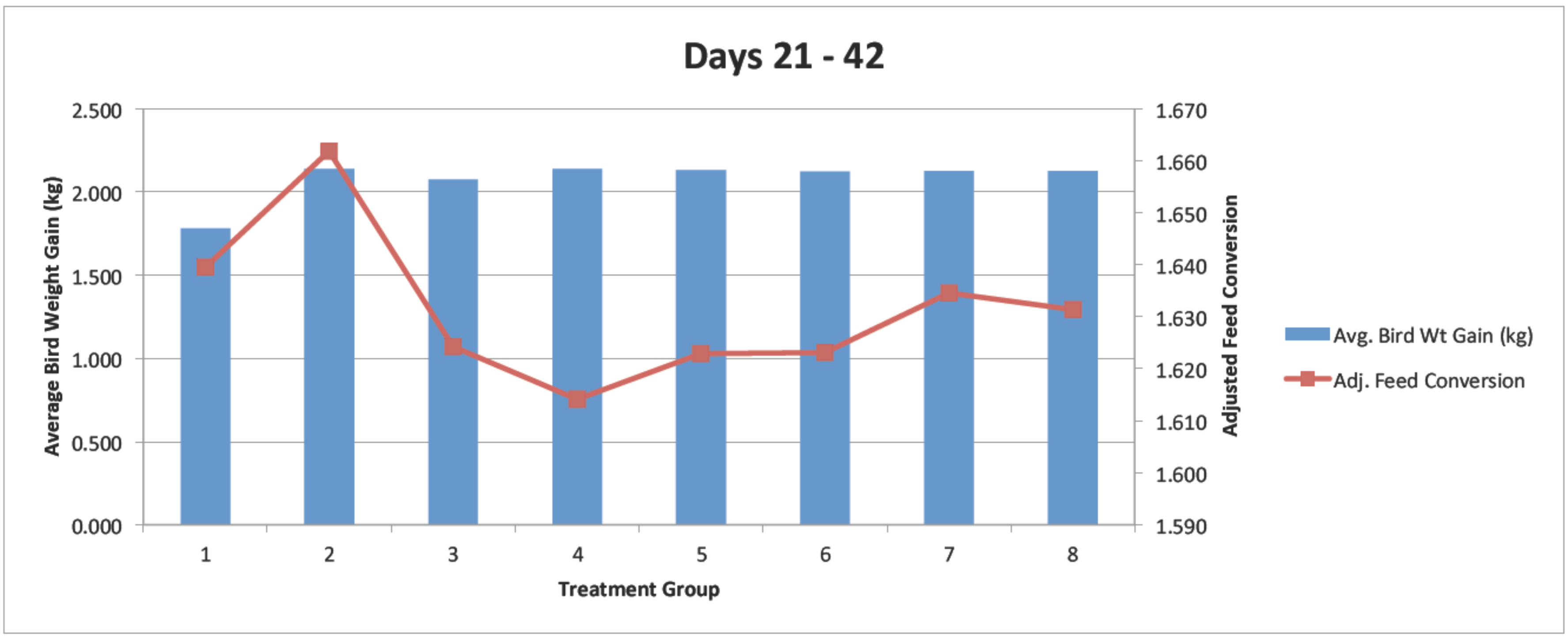
Table 12. Bird Weights and Feed Conversion Days 21 - 42 (10SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D014-21	Adj. Feed Conversion D14-21
1	7	4	15	0	0	3	12	35.420	2.952	2.061	1.914	1.691
2	7	12	17	0	0	3	14	42.100	3.007	2.202	1.763	1.621
3	7	22	14	0	0	3	11	32.720	2.975	2.157	1.832	1.636
4	7	30	17	0	0	3	14	41.200	2.943	2.109	1.789	1.615
5	7	43	17	0	0	3	14	39.760	2.840	2.019	1.817	1.642
6	7	51	16	0	0	3	13	38.680	2.975	2.149	1.800	1.626
7	7	66	16	0	0	3	13	38.000	2.923	2.118	1.801	1.638
8	7	67	16	0	0	3	13	36.160	2.782	2.000	1.804	1.632
9	7	83	17	1	0	3	13	38.600	2.969	2.113	1.923	1.653
10	7	92	16	0	0	3	13	35.820	2.755	1.997	1.819	1.646
11	7	103	17	0	0	3	14	42.420	3.030	2.219	1.751	1.612
12	7	110	15	0	0	3	12	39.500	3.292	2.376	1.788	1.602
Totals & Averages			**193**	**1**	**0**	**36**	**156**	**38.365**	**2.954**	**2.127**	**1.817**	**1.635**
Standard Deviatio								**2.921**	**0.137**	**0.108**	**0.053**	**0.023**
CVs								**7.613%**	**4.645%**	**5.056%**	**2.890%**	**1.421%**

1	8	8	14	0	0	3	11	34.900	3.173	2.368	1.761	1.598
2	8	19	17	0	0	3	14	41.200	2.943	2.125	1.768	1.615
3	8	29	17	1	0	3	13	39.300	3.023	2.181	1.962	1.661
4	8	31	17	0	0	3	14	41.800	2.986	2.108	1.842	1.660
5	8	41	15	0	0	3	12	36.120	3.010	2.165	1.834	1.642
6	8	56	16	0	0	3	13	35.580	2.737	1.973	1.842	1.667
7	8	64	17	0	0	3	14	41.340	2.953	2.169	1.767	1.629
8	8	69	16	0	0	3	13	37.600	2.892	2.095	1.748	1.582
9	8	85	17	0	0	3	14	38.920	2.780	1.971	1.801	1.640
10	8	86	17	0	0	3	14	38.780	2.770	1.930	1.836	1.630
11	8	99	17	0	0	3	14	42.420	3.030	2.251	1.733	1.591
12	8	105	17	0	0	3	14	42.580	3.041	2.186	1.818	1.661
Totals & Averages			**197**	**1**	**0**	**36**	**160**	**39.212**	**2.945**	**2.127**	**1.809**	**1.631**
Standard Deviatio								**2.714**	**0.129**	**0.125**	**0.062**	**0.029**
CVs								**6.922%**	**4.396%**	**5.873%**	**3.430%**	**1.807%**

Graph 5. Average Bird Weight Gain and Adjusted Feed Conversion (Days 21 - 42) Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	1.780	1.639	Low Phosphate (LP)
2	2.139	1.662	High Phosphate (HP)
3	2.073	1.624	250 Units Phytase (LP)
4	2.138	1.614	500 Units Phytase (LP)
5	2.132	1.623	750 Units Phytase (LP)
6	2.123	1.623	1000 Units Phytase (LP)
7	2.127	1.635	3000 Units Phytase (LP)
8	2.127	1.631	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)



Abbreviations for Causes of Mortality in Poultry Feeding Studies*

Abbrev.	Cause of Death	Abbrev.	Cause of Death
ACT	Ascites	IE	Intestinal enteritis
ACT-S	Ascites + SDS	INJ	Injury
AS	Airsacculitis	NE	Necrotic enteritis
BAC	Bacterial	PRO	Prolapsed
CAN	Cannibalism	RH	Round heart (ascites)
CC	Coccidiosis	SDS	Sudden death syndrome
CD	Cervical dislocation	SM	Smothered
DH	Dehydrated	SO	Starve-out
EC	*E. coli*	UNK	Unknown cause of death
M	Mortality; R1 = removed, bird moribund bound R2 = removed; bird not moribund bound		
Comments/Findings Codes			
Code	**Comment/Finding**	**Code**	**Comment/Finding**
BL	Bad leg	LS	Lesion score
C	Cull	NGL	No gross lesions
C-SB	Cull, small bird	RCT	Recount bird
DC	Decomposed	SMPL	Sample bird
FHN	Femoral head necrosis	SS	Sex slip

*This table was added to the Final Study Report after the report was finalized in order to define the abbreviations for causes of mortality in birds that were removed from the study. The data on bird mortality is contained in Tables 13 and 14 that follow.

Table 13. Mortality and Removal Weights (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

				Days 0 - 14 (30JUL15 - 13AUG15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
1	7	4	17	2			BAC; SDS	0.175		0.175	15
1	4	5	17							0.000	17
1	1	6	17							0.000	17
1	5	7	17							0.000	17
1	8	8	17	1			SDS	0.073		0.073	16
1	3	9	17	2			BAC; SDS	0.255		0.255	15
1	2	10	17							0.000	17
1	6	11	17							0.000	17
2	7	12	17							0.000	17
2	6	13	17							0.000	17
2	2	14	17							0.000	17
2	3	15	17	1			SDS	0.127		0.127	16
2	1	16	17							0.000	17
2	5	17	17	1			BAC	0.060		0.060	16
2	4	18	17	1			SDS	0.123		0.123	16
2	8	19	17							0.000	17
3	7	22	17	2			2 SDS	0.183		0.183	15
3	5	23	17							0.000	17
3	3	24	17							0.000	17
3	1	25	17							0.000	17
3	4	26	17							0.000	17
3	2	27	17							0.000	17
3	6	28	17							0.000	17
3	8	29	17							0.000	17
4	7	30	17							0.000	17
4	8	31	17							0.000	17
4	4	32	17							0.000	17
4	6	33	17							0.000	17
4	5	34	17							0.000	17
4	3	35	17	1			BAC	0.060		0.060	16
4	2	36	17			1	CD-C/BAC		0.154	0.154	16
4	1	37	18							0.000	18
5	8	41	17	1			BAC	0.060		0.060	16
5	6	42	17							0.000	17
5	7	43	17							0.000	17
5	3	44	17							0.000	17
5	4	45	17							0.000	17
5	1	46	17							0.000	17
5	5	47	17							0.000	17
5	2	48	17							0.000	17
6	4	49	17							0.000	17
6	6	50	17	1			UNK-DC	0.036		0.036	16
6	7	51	17	1			BAC	0.050		0.050	16
6	3	52	17							0.000	17
6	1	53	17							0.000	17
6	2	54	17							0.000	17
6	5	55	17		1		CD-C/BAC		0.088	0.088	16
6	8	56	17							0.000	17
7	4	59	17							0.000	17
7	1	60	17							0.000	17
7	6	61	17	1			SDS	0.060		0.060	16
7	3	62	17	2			2 BAC	0.133		0.133	15
7	5	63	17							0.000	17
7	8	64	17							0.000	17
7	2	65	17	1			BAC-DH	0.060		0.060	16
7	7	66	17	1			BAC	0.067		0.067	16
8	7	67	17							0.000	17
8	3	68	17							0.000	17
8	8	69	17							0.000	17
8	2	70	17							0.000	17
8	1	71	17							0.000	17
8	6	72	17	1			SDS	0.283		0.283	16
8	4	73	17							0.000	17

				Days 0 - 14 (30JUL15 - 13AUG15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
8	5	74	17							0.000	17
9	2	78	17			1	CD-C/BAC		0.093	0.093	16
9	1	79	17	1			BAC	0.123		0.123	16
9	5	80	17							0.000	17
9	4	81	17	1			BAC	0.061		0.061	16
9	6	82	17	1			BAC	0.068		0.068	16
9	7	83	17							0.000	17
9	3	84	17							0.000	17
9	8	85	17							0.000	17
10	8	86	17							0.000	17
10	6	87	17	1			BAC	0.087		0.087	16
10	4	88	17	2	1		CD-C/BAC; 2 BAC	0.176	0.094	0.270	14
10	3	89	17	1			BAC	0.063		0.063	16
10	1	90	17	1			BAC	0.168		0.168	16
10	2	91	17	1			SDS	0.129		0.129	16
10	7	92	17	1			BAC-DH	0.097		0.097	16
10	5	93	17							0.000	17
11	3	96	17							0.000	17
11	6	97	17							0.000	17
11	4	98	17	1			BAC	0.061		0.061	16
11	8	99	17							0.000	17
11	1	100	17	1			SDS	0.317		0.317	16
11	5	101	17							0.000	17
11	2	102	17	1			BAC	0.048		0.048	16
11	7	103	17							0.000	17
12	4	104	17							0.000	17
12	8	105	17							0.000	17
12	6	106	17							0.000	17
12	5	107	17							0.000	17
12	3	108	17	1			BAC	0.051		0.051	16
12	1	109	17							0.000	17
12	7	110	17	1			SDS	0.183		0.183	16
12	2	111	17							0.000	17

Table 13. Mortality and Removal Weights (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
			Days 14 - 21 (13AUG15 - 20AUG15)							
1	7	4							0 000	15
1	4	5	1			SDS	0 318		0 318	16
1	1	6							0 000	17
1	5	7							0 000	17
1	8	8	1	1		CD-BAC; SDS	0.426	0.147	0 573	14
1	3	9							0 000	15
1	2	10							0 000	17
1	6	11		1		CD-C/BAC		0.280	0 280	16
2	7	12							0 000	17
2	6	13							0 000	17
2	2	14	1			SDS	0.690		0.690	16
2	3	15							0 000	16
2	1	16							0 000	17
2	5	17							0 000	16
2	4	18							0 000	16
2	8	19							0 000	17
3	7	22		1		CD-BAC		0.188	0.188	14
3	5	23							0 000	17
3	3	24							0 000	17
3	1	25							0 000	17
3	4	26							0 000	17
3	2	27							0 000	17
3	6	28							0 000	17
3	8	29							0 000	17
4	7	30							0 000	17
4	8	31							0 000	17
4	4	32							0 000	17
4	6	33							0 000	17
4	5	34							0 000	17
4	3	35	1			BAC	0.408		0.408	15
4	2	36							0 000	16
4	1	37							0 000	18
5	8	41		1		CD-BAC		0.263	0 263	15
5	6	42							0 000	17
5	7	43							0 000	17
5	3	44							0 000	17
5	4	45		1		CD-BAC		0.160	0.160	16
5	1	46							0 000	17
5	5	47	1			SDS	0.698		0.698	16
5	2	48							0 000	17
6	4	49							0 000	17
6	6	50							0 000	16
6	7	51							0 000	16
6	3	52		1		CD-BAC		0.198	0.198	16
6	1	53							0 000	17
6	2	54							0 000	17
6	5	55							0 000	16
6	8	56	1			SDS	0.480		0.480	16
7	4	59							0 000	17
7	1	60							0 000	17
7	6	61		1		CD-BAC		0.180	0.180	15
7	3	62							0 000	15
7	5	63		1		CD-C/SB/BL		0.320	0 320	16
7	8	64							0 000	17
7	2	65							0 000	16
7	7	66							0 000	16
8	7	67	1			SDS	0 338		0 338	16
8	3	68							0 000	17
8	8	69	1			BAC	0 239		0 239	16
8	2	70							0 000	17
8	1	71		1		CD-C/BL		0.226	0 226	16
8	6	72							0 000	16
8	4	73							0 000	17

			Days 14 - 21 (13AUG15 - 20AUG15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
8	5	74							0 000	17
9	2	78							0 000	16
9	1	79		1		CD-RH		0.242	0 242	15
9	5	80							0 000	17
9	4	81							0 000	16
9	6	82							0 000	16
9	7	83							0 000	17
9	3	84							0 000	17
9	8	85							0 000	17
10	8	86							0 000	17
10	6	87		1		CD-C/SB/BAC		0.321	0 321	15
10	4	88							0 000	14
10	3	89							0 000	16
10	1	90							0 000	16
10	2	91							0 000	16
10	7	92							0 000	16
10	5	93		1		CD-BAC		0.201	0 201	16
11	3	96							0 000	17
11	6	97							0 000	17
11	4	98							0 000	16
11	8	99							0 000	17
11	1	100							0 000	16
11	5	101	1	1		BAC; CD-BAC	0 202	0.207	0.409	15
11	2	102							0 000	16
11	7	103							0 000	17
12	4	104							0 000	17
12	8	105							0 000	17
12	6	106							0 000	17
12	5	107							0 000	17
12	3	108							0 000	16
12	1	109							0 000	17
12	7	110	1			SDS	0.419		0.419	15
12	2	111							0 000	17

Table 13. Mortality and Removal Weights (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 21 - 42	No. Birds Remaining Day 42
			Days 21 - 42 (20AUG15 - 10SEP15)							
1	7	4			3	3 CD-SMPL		2.906	2 906	12
1	4	5			3	3 CD-SMPL		2.754	2.754	13
1	1	6	1		3	3 CD-SMPL; SDS	0 834	2.130	2 964	13
1	5	7			3	3 CD-SMPL		2.548	2 548	14
1	8	8			3	3 CD-SMPL		2.412	2.412	11
1	3	9			3	3 CD-SMPL		2.437	2.437	12
1	2	10			3	3 CD-SMPL		2.442	2.442	14
1	6	11			3	3 CD-SMPL		2.526	2 526	13
2	7	12			3	3 CD-SMPL		2.492	2.492	14
2	6	13			3	3 CD-SMPL		2.817	2 817	14
2	2	14			3	3 CD-SMPL		2.616	2.616	13
2	3	15			3	3 CD-SMPL		2.530	2 530	13
2	1	16			3	3 CD-SMPL		2.054	2 054	14
2	5	17			3	3 CD-SMPL		2.483	2.483	13
2	4	18			3	3 CD-SMPL		2.357	2 357	13
2	8	19			3	3 CD-SMPL		2.601	2.601	14
3	7	22			3	3 CD-SMPL		2.548	2 548	11
3	5	23			3	3 CD-SMPL		2.529	2 529	14
3	3	24			3	3 CD-SMPL		2.475	2.475	14
3	1	25	2		3	3 CD-SMPL; SDS; SDS-DC	3 027	2.106	5.133	12
3	4	26			3	3 CD-SMPL		2.651	2.651	14
3	2	27			3	3 CD-SMPL		2.562	2 562	14
3	6	28			3	3 CD-SMPL		2.542	2 542	14
3	8	29	1		3	3 CD-SMPL; UNK-DC	1.786	2.738	4 524	13
4	7	30			3	3 CD-SMPL		2.903	2 903	14
4	8	31			3	3 CD-SMPL		2.945	2 945	14
4	4	32			3	3 CD-SMPL		2.426	2.426	14
4	6	33			3	3 CD-SMPL		2.391	2 391	14
4	5	34			3	3 CD-SMPL		2.339	2 339	14
4	3	35			3	3 CD-SMPL		2.268	2 268	12
4	2	36			3	3 CD-SMPL		2.663	2.663	13
4	1	37	1		4	CD-C/SB; 3 CD-SMPL; SDS	1.471	2.828	4 299	13
5	8	41			3	3 CD-SMPL		2.740	2.740	12
5	6	42			3	3 CD-SMPL		2.690	2.690	14
5	7	43			3	3 CD-SMPL		2.753	2.753	14
5	3	44			3	3 CD-SMPL		2.472	2.472	14
5	4	45			3	3 CD-SMPL		2.286	2 286	13
5	1	46	1	1	3	ACT; CD-BAC; 3 CD-SMPL	1 253	2.512	3.765	12
5	5	47			3	3 CD-SMPL		2.566	2 566	13
5	2	48		1	3	3 CD-SMPL; CD-SS/BAC		2.852	2 852	13
6	4	49			3	3 CD-SMPL		2.822	2 822	14
6	6	50			3	3 CD-SMPL		2.789	2.789	13
6	7	51			3	3 CD-SMPL		2.728	2.728	13
6	3	52			3	3 CD-SMPL		2.108	2.108	13
6	1	53			3	3 CD-SMPL		1.807	1 807	14
6	2	54			3	3 CD-SMPL		2.056	2 056	14
6	5	55		1	3	CD-BAC; 3 CD-SMPL		2.945	2 945	12
6	8	56			3	3 CD-SMPL		2.442	2.442	13
7	4	59			3	3 CD-SMPL		2.848	2 848	14
7	1	60			3	3 CD-SMPL		1.903	1 903	14
7	6	61			3	3 CD-SMPL		2.293	2 293	12
7	3	62			3	3 CD-SMPL		2.315	2 315	12
7	5	63			3	3 CD-SMPL		2.274	2 274	13
7	8	64			3	3 CD-SMPL		2.376	2 376	14
7	2	65			3	3 CD-SMPL		2.148	2.148	13
7	7	66			3	3 CD-SMPL		2.492	2.492	13
8	7	67			3	3 CD-SMPL		2.488	2.488	13
8	3	68	1		3	BAC; 3 CD-SMPL	2 216	2.115	4 331	13
8	8	69			3	3 CD-SMPL		2.602	2.602	13
8	2	70			3	3 CD-SMPL		2.427	2.427	14
8	1	71		1	3	CD-C/BL/ACT; 3 CD-SMPL		3.428	3.428	12
8	6	72			3	3 CD-SMPL		2.394	2 394	13
8	4	73			3	3 CD-SMPL		2.536	2 536	14

			Days 21 - 42 (20AUG15 - 10SEP15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 21 - 42	No. Birds Remaining Day 42
8	5	74	1		3	3 CD-SMPL; SDS	0 857	2.405	3 262	13
9	2	78			3	3 CD-SMPL		2.555	2 555	13
9	1	79			3	3 CD-SMPL		2.217	2 217	12
9	5	80			3	3 CD-SMPL		2.610	2.610	14
9	4	81			3	3 CD-SMPL		2.386	2 386	13
9	6	82			3	3 CD-SMPL		2.609	2.609	13
9	7	83	1		3	DH-BL/FHN; 3 CD-SMPL	1.160	2.763	3 923	13
9	3	84			3	3 CD-SMPL		2.401	2.401	14
9	8	85			3	3 CD-SMPL		2.480	2.480	14
10	8	86			3	3 CD-SMPL		3.096	3 096	14
10	6	87			3	3 CD-SMPL		2.638	2.638	12
10	4	88			3	3 CD-SMPL		2.480	2.480	11
10	3	89			3	3 CD-SMPL		2.426	2.426	13
10	1	90			3	3 CD-SMPL		2.208	2 208	13
10	2	91			3	3 CD-SMPL		2.563	2 563	13
10	7	92			3	3 CD-SMPL		2.487	2.487	13
10	5	93	1		3	3 CD-SMPL; SDS	1.749	2.580	4 329	12
11	3	96			3	3 CD-SMPL		2.221	2 221	14
11	6	97	1		3	3 CD-SMPL; SDS	1 013	2.643	3.656	13
11	4	98			3	3 CD-SMPL		2.354	2 354	13
11	8	99			3	3 CD-SMPL		2.612	2.612	14
11	1	100			3	3 CD-SMPL		2.110	2.110	13
11	5	101			3	3 CD-SMPL		2.584	2 584	12
11	2	102			3	3 CD-SMPL		2.645	2.645	13
11	7	103			3	3 CD-SMPL		2.485	2.485	14
12	4	104			3	3 CD-SMPL		2.637	2.637	14
12	8	105			3	3 CD-SMPL		2.661	2.661	14
12	6	106			3	3 CD-SMPL		2.862	2 862	14
12	5	107		1	3	CD-C/BL/SB; 3 CD-SMPL		3.956	3 956	13
12	3	108			3	3 CD-SMPL		2.588	2 588	13
12	1	109			3	3 CD-SMPL		2.421	2.421	14
12	7	110			3	3 CD-SMPL		2.984	2 984	12
12	2	111	1		3	3 CD-SMPL; SDS	1 382	2.812	4.194	13

Table 14. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

				Days 0 - 14 (30JUL15 - 13AUG15)								
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D0-14	% Removal-1 D0-14	% Removal-2 D0-14	Total % M&R1 D0-14	No. Birds Remaining Day 14
1	1	6	17					0.000%	0.000%	0.000%	0.000%	17
2	1	16	17					0.000%	0.000%	0.000%	0.000%	17
3	1	25	17					0.000%	0.000%	0.000%	0.000%	17
4	1	37	18					0.000%	0.000%	0.000%	0.000%	18
5	1	46	17					0.000%	0.000%	0.000%	0.000%	17
6	1	53	17					0.000%	0.000%	0.000%	0.000%	17
7	1	60	17					0.000%	0.000%	0.000%	0.000%	17
8	1	71	17					0.000%	0.000%	0.000%	0.000%	17
9	1	79	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
10	1	90	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
11	1	100	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
12	1	109	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 1			**205**	**3**	**0**	**0**	**2 BAC; SDS**	**1.463%**	**0.000%**	**0.000%**	**1.463%**	**202**
1	2	10	17					0.000%	0.000%	0.000%	0.000%	17
2	2	14	17					0.000%	0.000%	0.000%	0.000%	17
3	2	27	17					0.000%	0.000%	0.000%	0.000%	17
4	2	36	17			1	CD-C/BAC	0.000%	0.000%	5.882%	0.000%	16
5	2	48	17					0.000%	0.000%	0.000%	0.000%	17
6	2	54	17					0.000%	0.000%	0.000%	0.000%	17
7	2	65	17	1			BAC-DH	5.882%	0.000%	0.000%	5.882%	16
8	2	70	17					0.000%	0.000%	0.000%	0.000%	17
9	2	78	17			1	CD-C/BAC	0.000%	0.000%	5.882%	0.000%	16
10	2	91	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
11	2	102	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
12	2	111	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 2			**204**	**3**	**0**	**2**	**BAC; BAC/DH; 2 CD-C/BAC; SDS**	**1.471%**	**0.000%**	**0.980%**	**1.471%**	**199**
1	3	9	17	2			BAC; SDS	11.765%	0.000%	0.000%	11.765%	15
2	3	15	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
3	3	24	17					0.000%	0.000%	0.000%	0.000%	17
4	3	35	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
5	3	44	17					0.000%	0.000%	0.000%	0.000%	17
6	3	52	17					0.000%	0.000%	0.000%	0.000%	17
7	3	62	17	2			2 BAC	11.765%	0.000%	0.000%	11.765%	15
8	3	68	17					0.000%	0.000%	0.000%	0.000%	17
9	3	84	17					0.000%	0.000%	0.000%	0.000%	17
10	3	89	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
11	3	96	17					0.000%	0.000%	0.000%	0.000%	17
12	3	108	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
Treatment Group 3			**204**	**8**	**0**	**0**	**6 BAC; 2 SDS**	**3.922%**	**0.000%**	**0.000%**	**3.922%**	**196**

				Days 0 - 14 (30JUL15 - 13AUG15)								
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D0-14	% Removal-1 D0-14	% Removal-2 D0-14	Total % M&R1 D0-14	No. Birds Remaining Day 14
1	4	5	17					0.000%	0.000%	0.000%	0.000%	17
2	4	18	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
3	4	26	17					0.000%	0.000%	0.000%	0.000%	17
4	4	32	17					0.000%	0.000%	0.000%	0.000%	17
5	4	45	17					0.000%	0.000%	0.000%	0.000%	17
6	4	49	17					0.000%	0.000%	0.000%	0.000%	17
7	4	59	17					0.000%	0.000%	0.000%	0.000%	17
8	4	73	17					0.000%	0.000%	0.000%	0.000%	17
9	4	81	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
10	4	88	17	2	1	0	CD-C/BAC; 2 BAC	11.765%	5.882%	0.000%	17.647%	14
11	4	98	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
12	4	104	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 4			**204**	**5**	**1**	**0**	**4 BAC; CD-C/BAC; SDS**	**2.451%**	**0.490%**	**0.000%**	**2.941%**	**198**
1	5	7	17					0.000%	0.000%	0.000%	0.000%	17
2	5	17	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
3	5	23	17					0.000%	0.000%	0.000%	0.000%	17
4	5	34	17					0.000%	0.000%	0.000%	0.000%	17
5	5	47	17					0.000%	0.000%	0.000%	0.000%	17
6	5	55	17		1		CD-C/BAC	0.000%	5.882%	0.000%	5.882%	16
7	5	63	17					0.000%	0.000%	0.000%	0.000%	17
8	5	74	17					0.000%	0.000%	0.000%	0.000%	17
9	5	80	17					0.000%	0.000%	0.000%	0.000%	17
10	5	93	17					0.000%	0.000%	0.000%	0.000%	17
11	5	101	17					0.000%	0.000%	0.000%	0.000%	17
12	5	107	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 5			**204**	**1**	**1**	**0**	**BAC; CD-C/BAC**	**0.490%**	**0.490%**	**0.000%**	**0.980%**	**202**
1	6	11	17					0.000%	0.000%	0.000%	0.000%	17
2	6	13	17					0.000%	0.000%	0.000%	0.000%	17
3	6	28	17					0.000%	0.000%	0.000%	0.000%	17
4	6	33	17					0.000%	0.000%	0.000%	0.000%	17
5	6	42	17					0.000%	0.000%	0.000%	0.000%	17
6	6	50	17	1			UNK-DC	5.882%	0.000%	0.000%	5.882%	16
7	6	61	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
8	6	72	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
9	6	82	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
10	6	87	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
11	6	97	17					0.000%	0.000%	0.000%	0.000%	17
12	6	106	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 6			**204**	**5**	**0**	**0**	**2 BAC; 2 SDS; UNK-DC**	**2.451%**	**0.000%**	**0.000%**	**2.451%**	**199**

				Days 0 - 14 (30JUL15 - 13AUG15)								
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D0-14	% Removal-1 D0-14	% Removal-2 D0-14	Total % M&R1 D0-14	No. Birds Remaining Day 14
1	7	4	17	2			BAC; SDS	11.765%	0.000%	0.000%	11.765%	15
2	7	12	17					0.000%	0.000%	0.000%	0.000%	17
3	7	22	17	2			2 SDS	11.765%	0.000%	0.000%	11.765%	15
4	7	30	17					0.000%	0.000%	0.000%	0.000%	17
5	7	43	17					0.000%	0.000%	0.000%	0.000%	17
6	7	51	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
7	7	66	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
8	7	67	17					0.000%	0.000%	0.000%	0.000%	17
9	7	83	17					0.000%	0.000%	0.000%	0.000%	17
10	7	92	17	1			BAC-DH	5.882%	0.000%	0.000%	5.882%	16
11	7	103	17					0.000%	0.000%	0.000%	0.000%	17
12	7	110	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
Treatment Group 7			**204**	**8**	**0**	**0**	**3 BAC; BAC-DH; 4 SDS**	**3.922%**	**0.000%**	**0.000%**	**3.922%**	**196**
1	8	8	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
2	8	19	17					0.000%	0.000%	0.000%	0.000%	17
3	8	29	17					0.000%	0.000%	0.000%	0.000%	17
4	8	31	17					0.000%	0.000%	0.000%	0.000%	17
5	8	41	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
6	8	56	17					0.000%	0.000%	0.000%	0.000%	17
7	8	64	17					0.000%	0.000%	0.000%	0.000%	17
8	8	69	17					0.000%	0.000%	0.000%	0.000%	17
9	8	85	17					0.000%	0.000%	0.000%	0.000%	17
10	8	86	17					0.000%	0.000%	0.000%	0.000%	17
11	8	99	17					0.000%	0.000%	0.000%	0.000%	17
12	8	105	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 8			**204**	**2**	**0**	**0**	**BAC; SDS**	**0.980%**	**0.000%**	**0.000%**	**0.980%**	**202**

Table 14. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Days 14 - 21 (13AUG15 - 20AUG15)								
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D14-21	% Removal-1 D14-21	% Removal-2 D14-21	Total % M&R1 D14-21	No. Birds Remaining Day 21
1	1	6					0.000%	0.000%	0.000%	0.000%	17
2	1	16					0.000%	0.000%	0.000%	0.000%	17
3	1	25					0.000%	0.000%	0.000%	0.000%	17
4	1	37					0.000%	0.000%	0.000%	0.000%	18
5	1	46					0.000%	0.000%	0.000%	0.000%	17
6	1	53					0.000%	0.000%	0.000%	0.000%	17
7	1	60					0.000%	0.000%	0.000%	0.000%	17
8	1	71		1		CD-C/BL	0.000%	5.882%	0.000%	5.882%	16
9	1	79		1		CD-RH	0.000%	6.250%	0.000%	6.250%	15
10	1	90					0.000%	0.000%	0.000%	0.000%	16
11	1	100					0.000%	0.000%	0.000%	0.000%	16
12	1	109					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 1			**0**	**2**	**0**	**CD-C/BL; CD-RH**	**0.000%**	**0.990%**	**0.000%**	**0.990%**	**200**
1	2	10					0.000%	0.000%	0.000%	0.000%	17
2	2	14	1			SDS	5.882%	0.000%	0.000%	5.882%	16
3	2	27					0.000%	0.000%	0.000%	0.000%	17
4	2	36					0.000%	0.000%	0.000%	0.000%	16
5	2	48					0.000%	0.000%	0.000%	0.000%	17
6	2	54					0.000%	0.000%	0.000%	0.000%	17
7	2	65					0.000%	0.000%	0.000%	0.000%	16
8	2	70					0.000%	0.000%	0.000%	0.000%	17
9	2	78					0.000%	0.000%	0.000%	0.000%	16
10	2	91					0.000%	0.000%	0.000%	0.000%	16
11	2	102					0.000%	0.000%	0.000%	0.000%	16
12	2	111					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 2			**1**	**0**	**0**	**SDS**	**0.503%**	**0.000%**	**0.000%**	**0.503%**	**198**
1	3	9					0.000%	0.000%	0.000%	0.000%	15
2	3	15					0.000%	0.000%	0.000%	0.000%	16
3	3	24					0.000%	0.000%	0.000%	0.000%	17
4	3	35	1			BAC	6.250%	0.000%	0.000%	6.250%	15
5	3	44					0.000%	0.000%	0.000%	0.000%	17
6	3	52		1		CD-BAC	0.000%	5.882%	0.000%	5.882%	16
7	3	62					0.000%	0.000%	0.000%	0.000%	15
8	3	68					0.000%	0.000%	0.000%	0.000%	17
9	3	84					0.000%	0.000%	0.000%	0.000%	17
10	3	89					0.000%	0.000%	0.000%	0.000%	16
11	3	96					0.000%	0.000%	0.000%	0.000%	17
12	3	108					0.000%	0.000%	0.000%	0.000%	16
Treatment Group 3			**1**	**1**	**0**	**BAC; CD-BAC**	**0.510%**	**0.510%**	**0.000%**	**1.020%**	**194**

			Days 14 - 21 (13AUG15 - 20AUG15)								
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D14-21	% Removal-1 D14-21	% Removal-2 D14-21	Total % M&R1 D14-21	No. Birds Remaining Day 21
1	4	5	1			SDS	5.882%	0.000%	0.000%	5.882%	16
2	4	18					0.000%	0.000%	0.000%	0.000%	16
3	4	26					0.000%	0.000%	0.000%	0.000%	17
4	4	32					0.000%	0.000%	0.000%	0.000%	17
5	4	45		1		CD-BAC	0.000%	5.882%	0.000%	5.882%	16
6	4	49					0.000%	0.000%	0.000%	0.000%	17
7	4	59					0.000%	0.000%	0.000%	0.000%	17
8	4	73					0.000%	0.000%	0.000%	0.000%	17
9	4	81					0.000%	0.000%	0.000%	0.000%	16
10	4	88					0.000%	0.000%	0.000%	0.000%	14
11	4	98					0.000%	0.000%	0.000%	0.000%	16
12	4	104					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 4			**1**	**1**	**0**	**CD-BAC; SDS**	**0.505%**	**0.505%**	**0.000%**	**1.010%**	**196**
1	5	7					0.000%	0.000%	0.000%	0.000%	17
2	5	17					0.000%	0.000%	0.000%	0.000%	16
3	5	23					0.000%	0.000%	0.000%	0.000%	17
4	5	34					0.000%	0.000%	0.000%	0.000%	17
5	5	47	1			SDS	5.882%	0.000%	0.000%	5.882%	16
6	5	55					0.000%	0.000%	0.000%	0.000%	16
7	5	63		1		CD-C/SB/BL	0.000%	5.882%	0.000%	5.882%	16
8	5	74					0.000%	0.000%	0.000%	0.000%	17
9	5	80					0.000%	0.000%	0.000%	0.000%	17
10	5	93		1		CD-BAC	0.000%	5.882%	0.000%	5.882%	16
11	5	101	1	1		BAC; CD-BAC	5.882%	5.882%	0.000%	11.765%	15
12	5	107					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 5			**2**	**3**	**0**	**BAC; 2 CD-BAC; CD-C/SB/BL; SDS**	**0.990%**	**1.485%**	**0.000%**	**2.475%**	**197**
1	6	11		1		CD-C/BAC	0.000%	5.882%	0.000%	5.882%	16
2	6	13					0.000%	0.000%	0.000%	0.000%	17
3	6	28					0.000%	0.000%	0.000%	0.000%	17
4	6	33					0.000%	0.000%	0.000%	0.000%	17
5	6	42					0.000%	0.000%	0.000%	0.000%	17
6	6	50					0.000%	0.000%	0.000%	0.000%	16
7	6	61		1		CD-BAC	0.000%	6.250%	0.000%	6.250%	15
8	6	72					0.000%	0.000%	0.000%	0.000%	16
9	6	82					0.000%	0.000%	0.000%	0.000%	16
10	6	87		1		CD-C/SB/BAC	0.000%	6.250%	0.000%	6.250%	15
11	6	97					0.000%	0.000%	0.000%	0.000%	17
12	6	106					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 6			**0**	**3**	**0**	**CD-BAC; CD-C/BAC; CD-C/SB/BAC**	**0.000%**	**1.508%**	**0.000%**	**1.508%**	**196**

			Days 14 - 21 (13AUG15 - 20AUG15)								
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D14-21	% Removal-1 D14-21	% Removal-2 D14-21	Total % M&R1 D14-21	No. Birds Remaining Day 21
1	7	4					0.000%	0.000%	0.000%	0.000%	15
2	7	12					0.000%	0.000%	0.000%	0.000%	17
3	7	22		1		CD-BAC	0.000%	6.667%	0.000%	6.667%	14
4	7	30					0.000%	0.000%	0.000%	0.000%	17
5	7	43					0.000%	0.000%	0.000%	0.000%	17
6	7	51					0.000%	0.000%	0.000%	0.000%	16
7	7	66					0.000%	0.000%	0.000%	0.000%	16
8	7	67	1			SDS	5.882%	0.000%	0.000%	5.882%	16
9	7	83					0.000%	0.000%	0.000%	0.000%	17
10	7	92					0.000%	0.000%	0.000%	0.000%	16
11	7	103					0.000%	0.000%	0.000%	0.000%	17
12	7	110	1			SDS	6.250%	0.000%	0.000%	6.250%	15
Treatment Group 7			**2**	**1**	**0**	**CD-BAC; 2 SDS**	**1.020%**	**0.510%**	**0.000%**	**1.531%**	**193**

1	8	8	1	1		CD-BAC; SDS	6.250%	6.250%	0.000%	12.500%	14
2	8	19					0.000%	0.000%	0.000%	0.000%	17
3	8	29					0.000%	0.000%	0.000%	0.000%	17
4	8	31					0.000%	0.000%	0.000%	0.000%	17
5	8	41		1		CD-BAC	0.000%	6.250%	0.000%	6.250%	15
6	8	56	1			SDS	5.882%	0.000%	0.000%	5.882%	16
7	8	64					0.000%	0.000%	0.000%	0.000%	17
8	8	69	1			BAC	5.882%	0.000%	0.000%	5.882%	16
9	8	85					0.000%	0.000%	0.000%	0.000%	17
10	8	86					0.000%	0.000%	0.000%	0.000%	17
11	8	99					0.000%	0.000%	0.000%	0.000%	17
12	8	105					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 8			**3**	**2**	**0**	**BAC; 2 CD-BAC; 2 SDS**	**1.485%**	**0.990%**	**0.000%**	**2.475%**	**197**

Table 14. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Days 21 - 42 (20AUG15 - 10SEP15)										Days 0 - 42		
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D21-42	% Removal-1 D21-42	% Removal-2 D21-42	Total % M&R1 D21-42	No. Birds Remaining Day 42	% Mortality D0-42	% Removal-1 D0-42	% Removal-2 D0-42
1	1	6	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%
2	1	16			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
3	1	25	2		3	3 CD-SMPL; SDS; SDS-DC	11.765%	0.000%	17.647%	11.765%	12	11.765%	0.000%	17.647%
4	1	37	1		4	CD-C/SB; 3 CD-SMPL; SDS	5.556%	0.000%	22.222%	5.556%	13	5.556%	0.000%	22.222%
5	1	46	1	1	3	ACT; CD-BAC; 3 CD-SMPL	5.882%	5.882%	17.647%	11.765%	12	5.882%	5.882%	17.647%
6	1	53			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
7	1	60			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
8	1	71		1	3	CD-C/BL/ACT; 3 CD-SMPL	0.000%	6.250%	18.750%	6.250%	12	0.000%	11.765%	17.647%
9	1	79			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	5.882%	5.882%	17.647%
10	1	90			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
11	1	100			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
12	1	109			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
Treatment Group 1			**5**	**2**	**37**	**ACT; CD-BAC; CD-C/BL/ACT; CD-C/SB; 36 CD-SMPL; 3 SDS; SDS-DC**	**2.500%**	**1.000%**	**18.500%**	**3.500%**	**156**	**3.902%**	**1.951%**	**18.049%**
1	2	10			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
2	2	14			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
3	2	27			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
4	2	36			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	0.000%	23.529%
5	2	48		1	3	3 CD-SMPL; CD-SS/BAC	0.000%	5.882%	17.647%	5.882%	14	0.000%	5.882%	17.647%
6	2	54			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
7	2	65			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
8	2	70			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
9	2	78			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	0.000%	23.529%
10	2	91			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
11	2	102			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
12	2	111	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%
Treatment Group 2			**1**	**1**	**36**	**36 CD-SMPL; SDS**	**0.505%**	**0.505%**	**18.182%**	**1.010%**	**161**	**2.451%**	**0.490%**	**18.627%**
1	3	9			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	11.765%	0.000%	17.647%
2	3	15			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
3	3	24			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
4	3	35			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	11.765%	0.000%	17.647%
5	3	44			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
6	3	52			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	5.882%	17.647%
7	3	62			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	11.765%	0.000%	17.647%
8	3	68	1		3	BAC; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%
9	3	84			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
10	3	89			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
11	3	96			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
12	3	108			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
Treatment Group 3			**1**	**0**	**36**	**BAC; 36 CD-SMPL**	**0.515%**	**0.000%**	**18.557%**	**0.515%**	**157**	**4.902%**	**0.490%**	**17.647%**

			Days 21 - 42 (20AUG15 - 10SEP15)									Days 0 - 42		
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D21-42	% Removal-1 D21-42	% Removal-2 D21-42	Total % M&R1 D21-42	No. Birds Remaining Day 42	% Mortality D0-42	% Removal-1 D0-42	% Removal-2 D0-42
1	4	5			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
2	4	18			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
3	4	26			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
4	4	32			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
5	4	45			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	5.882%	17.647%
6	4	49			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	13	0.000%	0.000%	17.647%
7	4	59			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
8	4	73			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
9	4	81			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
10	4	88			3	3 CD-SMPL	0.000%	0.000%	21.429%	0.000%	11	11.765%	5.882%	17.647%
11	4	98			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
12	4	104			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
Treatment Group 4			**0**	**0**	**36**	**36 CD-SMPL**	**0.000%**	**0.000%**	**18.367%**	**0.000%**	**159**	**2.941%**	**0.980%**	**17.647%**
1	5	7			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
2	5	17			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
3	5	23			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
4	5	34			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
5	5	47			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
6	5	55		1	3	CD-BAC; 3 CD-SMPL	0.000%	6.250%	18.750%	6.250%	12	0.000%	11.765%	17.647%
7	5	63			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	5.882%	17.647%
8	5	74	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%
9	5	80			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
10	5	93	1		3	3 CD-SMPL; SDS	6.250%	0.000%	18.750%	6.250%	12	5.882%	5.882%	17.647%
11	5	101			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	5.882%	5.882%	17.647%
12	5	107		1	3	CD-C/BL/SB; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	0.000%	5.882%	17.647%
Treatment Group 5			**2**	**2**	**36**	**CD-BAC; CD/C/BL/SB; 36 CD-SMPL; 2 SDS**	**1.015%**	**1.015%**	**18.274%**	**2.030%**	**157**	**2.451%**	**2.941%**	**17.647%**
1	6	11			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	5.882%	17.647%
2	6	13			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
3	6	28			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
4	6	33			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
5	6	42			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
6	6	50			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
7	6	61			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	5.882%	5.882%	17.647%
8	6	72			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
9	6	82			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%
10	6	87			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	5.882%	5.882%	17.647%
11	6	97	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%
12	6	106			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%
Treatment Group 6			**1**	**0**	**36**	**36 CD-SMPL; SDS**	**0.510%**	**0.000%**	**18.367%**	**0.510%**	**159**	**2.941%**	**1.471%**	**17.647%**

			Days 21 - 42 (20AUG15 - 10SEP15)									Days 0 - 42		
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D21-42	% Removal-1 D21-42	% Removal-2 D21-42	Total % M&R1 D21-42	No. Birds Remaining Day 42	% Mortality D0-42	% Removal-1 D0-42	% Removal-2 D0-42
1	7	4			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	**11.765%**	**0.000%**	**17.647%**
2	7	12			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
3	7	22			3	3 CD-SMPL	0.000%	0.000%	21.429%	0.000%	11	**11.765%**	**5.882%**	**17.647%**
4	7	30			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
5	7	43			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
6	7	51			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
7	7	66			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
8	7	67			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
9	7	83	1		3	DH-BL/FHN; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
10	7	92			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
11	7	103			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
12	7	110			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	**11.765%**	**0.000%**	**17.647%**
Treatment Group 7			**1**	**0**	**36**	**DH-BL/FHN; 36 CD-SMPL**	**0.518%**	**0.000%**	**18.653%**	**0.518%**	**156**	**5.392%**	**0.490%**	**17.647%**
1	8	8			3	3 CD-SMPL	0.000%	0.000%	21.429%	0.000%	11	**11.765%**	**5.882%**	**17.647%**
2	8	19			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
3	8	29	1		3	3 CD-SMPL; UNK-DC	5.882%	0.000%	17.647%	5.882%	13	**5.882%**	**0.000%**	**17.647%**
4	8	31			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
5	8	41			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	**5.882%**	**5.882%**	**17.647%**
6	8	56			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
7	8	64			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
8	8	69			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	**5.882%**	**0.000%**	**17.647%**
9	8	85			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
10	8	86			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
11	8	99			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
12	8	105			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	**0.000%**	**0.000%**	**17.647%**
Treatment Group 8			**1**	**0**	**36**	**36 CD-SMPL; UNK-DC**	**0.508%**	**0.000%**	**18.274%**	**0.508%**	**160**	**2.941%**	**0.980%**	**17.647%**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Starter 1 (Days 0 - 14)			Starter 2 (Days 14 - 21)		
Block	Trt	Pen No.	Feed 1 28-Jul-15	WB 13-Aug-15	D 0 - 14 Consumed	Feed 2 13-Aug-15	WB 20-Aug-15	D 0 - 21 Consumed
1	7	4	10.00	*2.54*	**7.46**	13.00	*3.30*	**9.70**
1	4	5	10.00	*2.22*	**7.78**	13.00	*4.20*	**8.80**
1	1	6	10.00	*2.60*	**7.40**	13.00	*5.00*	**8.00**
1	5	7	10.00	*2.02*	**7.98**	13.00	*2.86*	**10.14**
1	8	8	10.00	*3.20*	**6.80**	13.00	*4.90*	**8.10**
1	3	9	10.00	*3.46*	**6.54**	13.00	*4.30*	**8.70**
1	2	10	10.00	*2.52*	**7.48**	13.00	*3.14*	**9.86**
1	6	11	10.00	*3.00*	**7.00**	13.00	*3.78*	**9.22**
2	7	12	10.00	*2.66*	**7.34**	13.00	*3.34*	**9.66**
2	6	13	10.00	*2.52*	**7.48**	13.00	*3.02*	**9.98**
2	2	14	10.00	*2.26*	**7.74**	13.00	*3.58*	**9.42**
2	3	15	10.00	*3.56*	**6.44**	13.00	*4.72*	**8.28**
2	1	16	10.00	*3.38*	**6.62**	13.00	*4.82*	**8.18**
2	5	17	10.00	*3.12*	**6.88**	13.00	*3.80*	**9.20**
2	4	18	10.00	*3.34*	**6.66**	13.00	*4.32*	**8.68**
2	8	19	10.00	*2.60*	**7.40**	13.00	*3.04*	**9.96**
3	7	22	10.00	*3.68*	**6.32**	13.00	*5.02*	**7.98**
3	5	23	10.00	*2.94*	**7.06**	13.00	*3.08*	**9.92**
3	3	24	10.00	*3.34*	**6.66**	13.00	*4.24*	**8.76**
3	1	25	10.00	*3.34*	**6.66**	13.00	*5.36*	**7.64**
3	4	26	10.00	*2.94*	**7.06**	13.00	*3.64*	**9.36**
3	2	27	10.00	*2.30*	**7.70**	13.00	*2.36*	**10.64**
3	6	28	10.00	*2.40*	**7.60**	13.00	*2.96*	**10.04**
3	8	29	10.00	*2.42*	**7.58**	13.00	*2.70*	**10.30**
4	7	30	10.00	*2.66*	**7.34**	13.00	*2.92*	**10.08**
4	8	31	10.00	*2.00*	**8.00**	13.00	*2.30*	**10.70**
4	4	32	10.00	*2.44*	**7.56**	13.00	*3.36*	**9.64**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Starter 1 (Days 0 - 14)			Starter 2 (Days 14 - 21)		
Block	Trt	Pen No.	Feed 1 28-Jul-15	WB 13-Aug-15	D 0 - 14 Consumed	Feed 2 13-Aug-15	WB 20-Aug-15	D 0 - 21 Consumed
4	6	33	10.00	*2.74*	**7.26**	13.00	*3.82*	**9.18**
4	5	34	10.00	*2.98*	**7.02**	13.00	*3.86*	**9.14**
4	3	35	10.00	*2.84*	**7.16**	13.00	*5.02*	**7.98**
4	2	36	10.00	*2.12*	**7.88**	13.00	*3.22*	**9.78**
4	1	37	10.00	*2.50*	**7.50**	13.00	*4.20*	**8.80**
5	8	41	10.00	*2.64*	**7.36**	13.00	*4.24*	**8.76**
5	6	42	10.00	*1.88*	**8.12**	13.00	*2.84*	**10.16**
5	7	43	10.00	*2.44*	**7.56**	13.00	*3.50*	**9.50**
5	3	44	10.00	*2.72*	**7.28**	13.00	*3.88*	**9.12**
5	4	45	10.00	*3.86*	**6.14**	13.00	*4.96*	**8.04**
5	1	46	10.00	*3.52*	**6.48**	13.00	*5.86*	**7.14**
5	5	47	10.00	*2.90*	**7.10**	13.00	*4.08*	**8.92**
5	2	48	10.00	*2.92*	**7.08**	13.00	*3.58*	**9.42**
6	4	49	10.00	*3.02*	**6.98**	13.00	*3.70*	**9.30**
6	6	50	10.00	*3.14*	**6.86**	13.00	*3.84*	**9.16**
6	7	51	10.00	*3.06*	**6.94**	13.00	*3.72*	**9.28**
6	3	52	10.00	*3.04*	**6.96**	13.00	*4.58*	**8.42**
6	1	53	10.00	*3.76*	**6.24**	13.00	*5.70*	**7.30**
6	2	54	10.00	*3.28*	**6.72**	13.00	*4.92*	**8.08**
6	5	55	10.00	*3.54*	**6.46**	13.00	*4.76*	**8.24**
6	8	56	10.00	*2.86*	**7.14**	13.00	*4.22*	**8.78**
7	4	59	10.00	*2.92*	**7.08**	13.00	*3.40*	**9.60**
7	1	60	10.00	*3.98*	**6.02**	13.00	*6.24*	**6.76**
7	6	61	10.00	*3.70*	**6.30**	13.00	*4.98*	**8.02**
7	3	62	10.00	*3.58*	**6.42**	13.00	*4.86*	**8.14**
7	5	63	10.00	*3.24*	**6.76**	13.00	*4.40*	**8.60**
7	8	64	10.00	*2.72*	**7.28**	13.00	*3.78*	**9.22**
7	2	65	10.00	*3.20*	**6.80**	13.00	*4.50*	**8.50**
7	7	66	10.00	*3.10*	**6.90**	13.00	*4.02*	**8.98**
8	7	67	10.00	*2.86*	**7.14**	13.00	*4.22*	**8.78**
8	3	68	10.00	*2.78*	**7.22**	13.00	*4.28*	**8.72**
8	8	69	10.00	*2.74*	**7.26**	13.00	*4.36*	**8.64**
8	2	70	10.00	*2.20*	**7.80**	13.00	*3.38*	**9.62**
8	1	71	10.00	*2.60*	**7.40**	13.00	*5.98*	**7.02**
8	6	72	10.00	*2.68*	**7.32**	13.00	*4.60*	**8.40**
8	4	73	10.00	*2.62*	**7.38**	13.00	*4.16*	**8.84**
8	5	74	10.00	*2.58*	**7.42**	13.00	*3.78*	**9.22**
9	2	78	10.00	*1.94*	**8.06**	13.00	*3.54*	**9.46**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Starter 1 (Days 0 - 14)			Starter 2 (Days 14 - 21)		
Block	Trt	Pen No.	Feed 1 28-Jul-15	WB 13-Aug-15	D 0 - 14 Consumed	Feed 2 13-Aug-15	WB 20-Aug-15	D 0 - 21 Consumed
9	1	79	10.00	*2.38*	**7.62**	13.00	*6.10*	**6.90**
9	5	80	10.00	*1.26*	**8.74**	13.00	*3.24*	**9.76**
9	4	81	10.00	*2.78*	**7.22**	13.00	*3.92*	**9.08**
9	6	82	10.00	*2.30*	**7.70**	13.00	*3.66*	**9.34**
9	7	83	10.00	*2.14*	**7.86**	13.00	*2.94*	**10.06**
9	3	84	10.00	*2.38*	**7.62**	13.00	*3.54*	**9.46**
9	8	85	10.00	*2.48*	**7.52**	13.00	*3.30*	**9.70**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Starter 1 (Days 0 - 14)			Starter 2 (Days 14 - 21)		
Block	Trt	Pen No.	Feed 1 28-Jul-15	WB 13-Aug-15	D 0 - 14 Consumed	Feed 2 13-Aug-15	WB 20-Aug-15	D 0 - 21 Consumed
10	8	86	10.00	*2.08*	**7.92**	13.00	*3.20*	**9.80**
10	6	87	10.00	*3.16*	**6.84**	13.00	*4.34*	**8.66**
10	4	88	10.00	*3.74*	**6.26**	13.00	*5.48*	**7.52**
10	3	89	10.00	*3.28*	**6.72**	13.00	*4.72*	**8.28**
10	1	90	10.00	*3.58*	**6.42**	13.00	*5.80*	**7.20**
10	2	91	10.00	*2.76*	**7.24**	13.00	*4.04*	**8.96**
10	7	92	10.00	*3.26*	**6.74**	13.00	*4.68*	**8.32**
10	5	93	10.00	*3.24*	**6.76**	13.00	*4.46*	**8.54**
11	3	96	10.00	*2.98*	**7.02**	13.00	*3.60*	**9.40**
11	6	97	10.00	*2.76*	**7.24**	13.00	*3.56*	**9.44**
11	4	98	10.00	*2.72*	**7.28**	13.00	*4.48*	**8.52**
11	8	99	10.00	*2.74*	**7.26**	13.00	*3.78*	**9.22**
11	1	100	10.00	*3.36*	**6.64**	13.00	*5.84*	**7.16**
11	5	101	10.00	*2.70*	**7.30**	13.00	*3.88*	**9.12**
11	2	102	10.00	*2.38*	**7.62**	13.00	*3.36*	**9.64**
11	7	103	10.00	*2.34*	**7.66**	13.00	*3.62*	**9.38**
12	4	104	10.00	*2.62*	**7.38**	13.00	*2.94*	**10.06**
12	8	105	10.00	*2.48*	**7.52**	13.00	*2.62*	**10.38**
12	6	106	10.00	*2.18*	**7.82**	13.00	*2.96*	**10.04**
12	5	107	10.00	*2.98*	**7.02**	13.00	*3.78*	**9.22**
12	3	108	10.00	*1.76*	**8.24**	13.00	*3.82*	**9.18**
12	1	109	10.00	*1.38*	**8.62**	13.00	*4.26*	**8.74**
12	7	110	10.00	*1.70*	**8.30**	13.00	*3.30*	**9.70**
12	2	111	10.00	*1.00*	**9.00**	13.00	*2.48*	**10.52**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Grower/Finisher (Days 21 - 42)						
Block	Trt	Pen No.	Feed 3 20-Aug-15	Feed 4 26-Aug-15	Feed 5 2-Sep-15	Feed 6 4-Sep-15	Feed 7 9-Sep-15	WB 10-Sep-15	D 21 - 42 Consumed
1	7	4	20.00	13.00	12.00	8.00	0.00	*10.78*	**42.22**
1	4	5	20.00	13.00	12.00	8.00	0.00	*6.70*	**46.30**
1	1	6	20.00	13.00	12.00	8.00	0.00	*12.18*	**40.82**
1	5	7	20.00	13.00	12.00	8.00	5.00	*5.32*	**52.68**
1	8	8	20.00	13.00	12.00	8.00	0.00	*11.38*	**41.62**
1	3	9	20.00	13.00	12.00	8.00	0.00	*9.82*	**43.18**
1	2	10	20.00	13.00	12.00	8.00	5.00	*5.14*	**52.86**
1	6	11	20.00	13.00	12.00	8.00	5.00	*9.92*	**48.08**
2	7	12	20.00	13.00	12.00	8.00	5.00	*7.90*	**50.10**
2	6	13	20.00	13.00	12.00	8.00	5.00	*7.28*	**50.72**
2	2	14	20.00	13.00	12.00	8.00	0.00	*6.38*	**46.62**
2	3	15	20.00	12.88	12.00	8.00	0.00	*6.36*	**46.52**
2	1	16	20.00	13.00	12.00	8.00	0.00	*10.66*	**42.34**
2	5	17	20.00	13.00	12.00	8.00	5.00	*10.20*	**47.80**
2	4	18	20.00	13.00	12.00	8.00	0.00	*7.32*	**45.68**
2	8	19	20.00	13.00	12.00	8.00	5.00	*9.72*	**48.28**
3	7	22	20.00	13.00	12.00	8.00	0.00	*14.02*	**38.98**
3	5	23	20.00	13.00	12.00	8.00	5.00	*9.40*	**48.60**
3	3	24	20.00	13.00	12.00	8.00	0.00	*6.06*	**46.94**
3	1	25	20.00	13.00	12.00	8.00	0.00	*15.38*	**37.62**
3	4	26	20.00	13.00	12.00	8.00	5.00	*9.96*	**48.04**
3	2	27	20.00	13.00	12.00	8.00	5.00	*5.38*	**52.62**
3	6	28	20.00	13.00	12.00	8.00	5.00	*9.02*	**48.98**
3	8	29	20.00	13.00	12.00	8.00	5.00	*8.98*	**49.02**
4	7	30	20.00	13.00	12.00	8.00	5.00	*9.66*	**48.34**
4	8	31	20.00	13.00	12.00	8.00	5.00	*8.48*	**49.52**
4	4	32	20.00	13.00	12.00	8.00	5.00	*8.26*	**49.74**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Grower/Finisher (Days 21 - 42)						
Block	Trt	Pen No.	Feed 3 20-Aug-15	Feed 4 26-Aug-15	Feed 5 2-Sep-15	Feed 6 4-Sep-15	Feed 7 9-Sep-15	WB 10-Sep-15	D 21 - 42 Consumed
4	6	33	20.00	13.00	12.00	8.00	0.00	*7.18*	**45.82**
4	5	34	20.00	13.00	12.00	8.00	0.00	*6.92*	**46.08**
4	3	35	20.00	13.00	12.00	8.00	0.00	*13.36*	**39.64**
4	2	36	20.00	13.00	12.00	8.00	0.00	*9.20*	**43.80**
4	1	37	20.00	13.00	12.00	8.00	0.00	*11.30*	**41.70**
5	8	41	20.00	13.00	12.00	8.00	0.00	*10.00*	**43.00**
5	6	42	20.00	13.00	12.00	8.00	5.00	*8.90*	**49.10**
5	7	43	20.00	13.00	12.00	8.00	0.00	*6.12*	**46.88**
5	3	44	20.00	13.00	12.00	8.00	0.00	*7.74*	**45.26**
5	4	45	20.00	13.00	12.00	8.00	0.00	*8.46*	**44.54**
5	1	46	20.00	13.00	12.00	8.00	0.00	*18.16*	**34.84**
5	5	47	20.00	13.00	12.00	8.00	0.00	*7.46*	**45.54**
5	2	48	20.00	13.00	12.00	8.00	5.00	*10.00*	**48.00**
6	4	49	20.00	13.00	12.00	8.00	5.00	*10.06*	**47.94**
6	6	50	20.00	13.00	12.00	8.00	0.00	*8.28*	**44.72**
6	7	51	20.00	13.00	12.00	8.00	0.00	*7.16*	**45.84**
6	3	52	20.00	13.00	12.00	8.00	0.00	*9.18*	**43.82**
6	1	53	20.00	13.00	12.00	8.00	0.00	*15.58*	**37.42**
6	2	54	20.00	13.00	12.00	8.00	0.00	*6.46*	**46.54**
6	5	55	20.00	13.00	12.00	8.00	0.00	*13.58*	**39.42**
6	8	56	20.00	13.00	12.00	8.00	0.00	*9.98*	**43.02**
7	4	59	20.00	13.00	12.00	8.00	0.00	*6.00*	**47.00**
7	1	60	20.00	13.00	12.00	8.00	0.00	*15.08*	**37.92**
7	6	61	20.00	13.00	12.00	8.00	0.00	*13.74*	**39.26**
7	3	62	20.00	13.00	12.00	8.00	0.00	*14.48*	**38.52**
7	5	63	20.00	13.00	12.00	8.00	0.00	*10.44*	**42.56**
7	8	64	20.00	13.00	12.00	8.00	5.00	*8.48*	**49.52**
7	2	65	20.00	13.00	12.00	8.00	0.00	*8.84*	**44.16**
7	7	66	20.00	13.00	12.00	8.00	0.00	*7.76*	**45.24**
8	7	67	20.00	13.00	12.00	8.00	0.00	*10.32*	**42.68**
8	3	68	20.00	13.00	12.00	8.00	0.00	*7.62*	**45.38**
8	8	69	20.00	13.00	12.00	8.00	0.00	*9.58*	**43.42**
8	2	70	20.00	13.00	12.00	8.00	5.00	*9.82*	**48.18**
8	1	71	20.00	13.00	12.00	8.00	0.00	*18.30*	**34.70**
8	6	72	20.00	13.00	12.00	8.00	0.00	*8.82*	**44.18**
8	4	73	20.00	13.00	12.00	8.00	5.00	*10.64*	**47.36**
8	5	74	20.00	13.00	12.00	8.00	0.00	*7.68*	**45.32**
9	2	78	20.00	13.00	12.00	8.00	0.00	*8.48*	**44.52**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Grower/Finisher (Days 21 - 42)						
Block	Trt	Pen No.	Feed 3 20-Aug-15	Feed 4 26-Aug-15	Feed 5 2-Sep-15	Feed 6 4-Sep-15	Feed 7 9-Sep-15	WB 10-Sep-15	D 21 - 42 Consumed
9	1	79	20.00	13.00	12.00	8.00	0.00	*15.96*	**37.04**
9	5	80	20.00	13.00	12.00	8.00	0.00	*6.64*	**46.36**
9	4	81	20.00	13.00	12.00	8.00	0.00	*8.82*	**44.18**
9	6	82	20.00	13.00	12.00	8.00	0.00	*8.92*	**44.08**
9	7	83	20.00	13.00	12.00	8.00	5.00	*11.78*	**46.22**
9	3	84	20.00	13.00	12.00	8.00	0.00	*7.54*	**45.46**
9	8	85	20.00	13.00	12.00	8.00	0.00	*7.68*	**45.32**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-3
Facility Number 8W

			Grower/Finisher (Days 21 - 42)						
Block	Trt	Pen No.	Feed 3 20-Aug-15	Feed 4 26-Aug-15	Feed 5 2-Sep-15	Feed 6 4-Sep-15	Feed 7 9-Sep-15	WB 10-Sep-15	D 21 - 42 Consumed
10	8	86	20.00	13.00	12.00	8.00	0.00	*8.02*	**44.98**
10	6	87	20.00	13.00	12.00	8.00	0.00	*12.84*	**40.16**
10	4	88	20.00	13.00	12.00	8.00	0.00	*15.68*	**37.32**
10	3	89	20.00	13.00	12.00	8.00	0.00	*10.96*	**42.04**
10	1	90	20.00	13.00	12.00	8.00	0.00	*16.92*	**36.08**
10	2	91	20.00	13.00	12.00	8.00	0.00	*9.84*	**43.16**
10	7	92	20.00	13.00	12.00	8.00	0.00	*9.92*	**43.08**
10	5	93	20.00	13.00	12.00	8.00	0.00	*11.74*	**41.26**
11	3	96	20.00	13.00	12.00	8.00	5.00	*9.30*	**48.70**
11	6	97	20.00	13.00	12.00	8.00	0.00	*7.92*	**45.08**
11	4	98	20.00	13.00	12.00	8.00	0.00	*6.36*	**46.64**
11	8	99	20.00	13.00	12.00	8.00	5.00	*7.42*	**50.58**
11	1	100	20.00	13.00	12.00	8.00	0.00	*14.96*	**38.04**
11	5	101	20.00	13.00	12.00	8.00	0.00	*8.86*	**44.14**
11	2	102	20.00	13.00	12.00	8.00	5.00	*9.62*	**48.38**
11	7	103	20.00	13.00	12.00	8.00	5.00	*7.84*	**50.16**
12	4	104	20.00	13.00	12.00	8.00	5.00	*6.90*	**51.10**
12	8	105	20.00	13.00	12.00	8.00	5.00	*7.02*	**50.98**
12	6	106	20.00	13.00	12.00	8.00	5.00	*6.24*	**51.76**
12	5	107	20.00	13.00	12.00	8.00	5.00	*9.90*	**48.10**
12	3	108	20.00	13.00	12.00	8.00	0.00	*6.94*	**46.06**
12	1	109	20.00	13.00	12.00	8.00	0.00	*8.02*	**44.98**
12	7	110	20.00	13.00	12.00	8.00	0.00	*6.94*	**46.06**
12	2	111	20.00	13.00	12.00	8.00	5.00	*6.68*	**51.32**

Table 16. Results of Tibia Ashing on Day 21 and Day 42
CQR Study Number AGV-15-3
Facility Number 8W

Day 21			
Block	Trt	Pen No.	% Ash
1	1	6	19.7
2	1	16	24.4
3	1	25	23.1
4	1	37	23.5
5	1	46	24.1
6	1	53	21.9
7	1	60	23.0
8	1	71	23.0
9	1	79	24.1
10	1	90	21.2
11	1	100	22.5
12	1	109	24.3
Average			**22.9**
Standard Deviation			**1.4**
CV			**6.2%**
1	2	10	25.1
2	2	14	26.8
3	2	27	26.1
4	2	36	26.3
5	2	48	24.7
6	2	54	23.2
7	2	65	27.3
8	2	70	25.0
9	2	78	26.0
10	2	91	23.7
11	2	102	28.1
12	2	111	27.8
Average			**25.8**
Standard Deviation			**1.6**
CV			**6.0%**

Day 42			
Block	Trt	Pen No.	% Ash
1	1	6	30.9
2	1	16	30.5
3	1	25	30.0
4	1	37	26.2
5	1	46	29.8
6	1	53	27.7
7	1	60	29.7
8	1	71	30.0
9	1	79	29.5
10	1	90	25.7
11	1	100	31.9
12	1	109	26.2
Average			**29.0**
Standard Deviation			**2.0**
CV			**7.0%**
1	2	10	35.0
2	2	14	29.4
3	2	27	33.5
4	2	36	30.8
5	2	48	32.4
6	2	54	31.6
7	2	65	32.2
8	2	70	28.1
9	2	78	28.6
10	2	91	30.3
11	2	102	29.3
12	2	111	31.2
Average			**31.0**
Standard Deviation			**2.1**
CV			**6.6%**

1	3	9	23.3
2	3	15	24.2
3	3	24	26.3
4	3	35	22.8
5	3	44	25.4
6	3	52	25.3
7	3	62	25.3
8	3	68	25.0
9	3	84	25.6
10	3	89	24.6
11	3	96	24.6
12	3	108	26.6
Average			**24.9**
Standard Deviation			**1.1**
CV			**4.5%**

1	4	5	23.1
2	4	18	27.4
3	4	26	26.6
4	4	32	25.5
5	4	45	27.0
6	4	49	24.7
7	4	59	28.4
8	4	73	26.3
9	4	81	27.9
10	4	88	24.7
11	4	98	24.6
12	4	104	26.8
Average			**26.1**
Standard Deviation			**1.6**
CV			**6.1%**

1	5	7	23.1
2	5	17	27.6
3	5	23	25.3
4	5	34	27.1
5	5	47	26.3
6	5	55	26.6
7	5	63	25.2
8	5	74	25.0
9	5	80	27.7
10	5	93	25.0
11	5	101	25.8
12	5	107	29.1
Average			**26.2**
Standard Deviation			**1.6**
CV			**6.1%**

1	3	9	30.0
2	3	15	28.9
3	3	24	26.4
4	3	35	32.9
5	3	44	27.5
6	3	52	30.0
7	3	62	28.4
8	3	68	29.3
9	3	84	31.4
10	3	89	31.7
11	3	96	32.8
12	3	108	30.9
Average			**30.0**
Standard Deviation			**2.0**
CV			**6.8%**

1	4	5	33.8
2	4	18	32.3
3	4	26	28.6
4	4	32	30.2
5	4	45	34.1
6	4	49	33.2
7	4	59	29.0
8	4	73	30.5
9	4	81	31.6
10	4	88	31.3
11	4	98	32.0
12	4	104	27.2
Average			**31.1**
Standard Deviation			**2.1**
CV			**6.9%**

1	5	7	28.9
2	5	17	29.6
3	5	23	34.2
4	5	34	28.8
5	5	47	29.3
6	5	55	31.3
7	5	63	32.8
8	5	74	31.6
9	5	80	30.0
10	5	93	32.3
11	5	101	29.3
12	5	107	30.7
Average			**30.7**
Standard Deviation			**1.7**
CV			**5.6%**

1	6	11	23.0
2	6	13	24.9
3	6	28	27.3
4	6	33	24.7
5	6	42	26.2
6	6	50	26.9
7	6	61	26.0
8	6	72	26.6
9	6	82	27.0
10	6	87	25.6
11	6	97	26.2
12	6	106	28.1
Average			**26.0**
Standard Deviation			**1.4**
CV			**5.2%**

1	6	11	34.1
2	6	13	34.3
3	6	28	29.3
4	6	33	30.0
5	6	42	31.8
6	6	50	34.0
7	6	61	29.9
8	6	72	26.3
9	6	82	33.3
10	6	87	29.0
11	6	97	29.5
12	6	106	34.3
Average			**31.3**
Standard Deviation			**2.7**
CV			**8.5%**

1	7	4	22.9
2	7	12	24.3
3	7	22	26.7
4	7	30	25.6
5	7	43	27.5
6	7	51	26.7
7	7	66	26.8
8	7	67	27.4
9	7	83	27.1
10	7	92	26.2
11	7	103	27.2
12	7	110	27.7
Average			**26.3**
Standard Deviation			**1.4**
CV			**5.5%**

1	7	4	33.7
2	7	12	34.8
3	7	22	33.9
4	7	30	28.2
5	7	43	28.4
6	7	51	30.5
7	7	66	31.5
8	7	67	34.6
9	7	83	33.4
10	7	92	29.3
11	7	103	29.7
12	7	110	34.1
Average			**31.8**
Standard Deviation			**2.5**
CV			**7.9%**

1	8	8	25.6
2	8	19	27.3
3	8	29	27.0
4	8	31	25.2
5	8	41	27.1
6	8	56	25.4
7	8	64	27.2
8	8	69	27.3
9	8	85	26.4
10	8	86	26.4
11	8	99	26.8
12	8	105	28.7
Average			**26.7**
Standard Deviation			**1.0**
CV			**3.6%**

1	8	8	35.2
2	8	19	31.5
3	8	29	33.2
4	8	31	28.0
5	8	41	30.2
6	8	56	28.4
7	8	64	27.9
8	8	69	32.4
9	8	85	29.3
10	8	86	29.8
11	8	99	31.4
12	8	105	34.1
Average			**31.0**
Standard Deviation			**2.4**
CV			**7.8%**

Graph 6. Average % Ash of Day 21 and Day 42 Tibias Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Trt Group	D21 % Ash	D42 % Ash	Treatment Description
1	22.907	29.023	Low Phosphate (LP)
2	25.826	31.035	High Phosphate (HP)
3	24.925	30.020	250 Units Phytase (LP)
4	26.081	31.148	500 Units Phytase (LP)
5	26.153	30.739	750 Units Phytase (LP)
6	26.022	31.321	1000 Units Phytase (LP)
7	26.336	31.838	3000 Units Phytase (LP)
8	26.691	30.956	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)

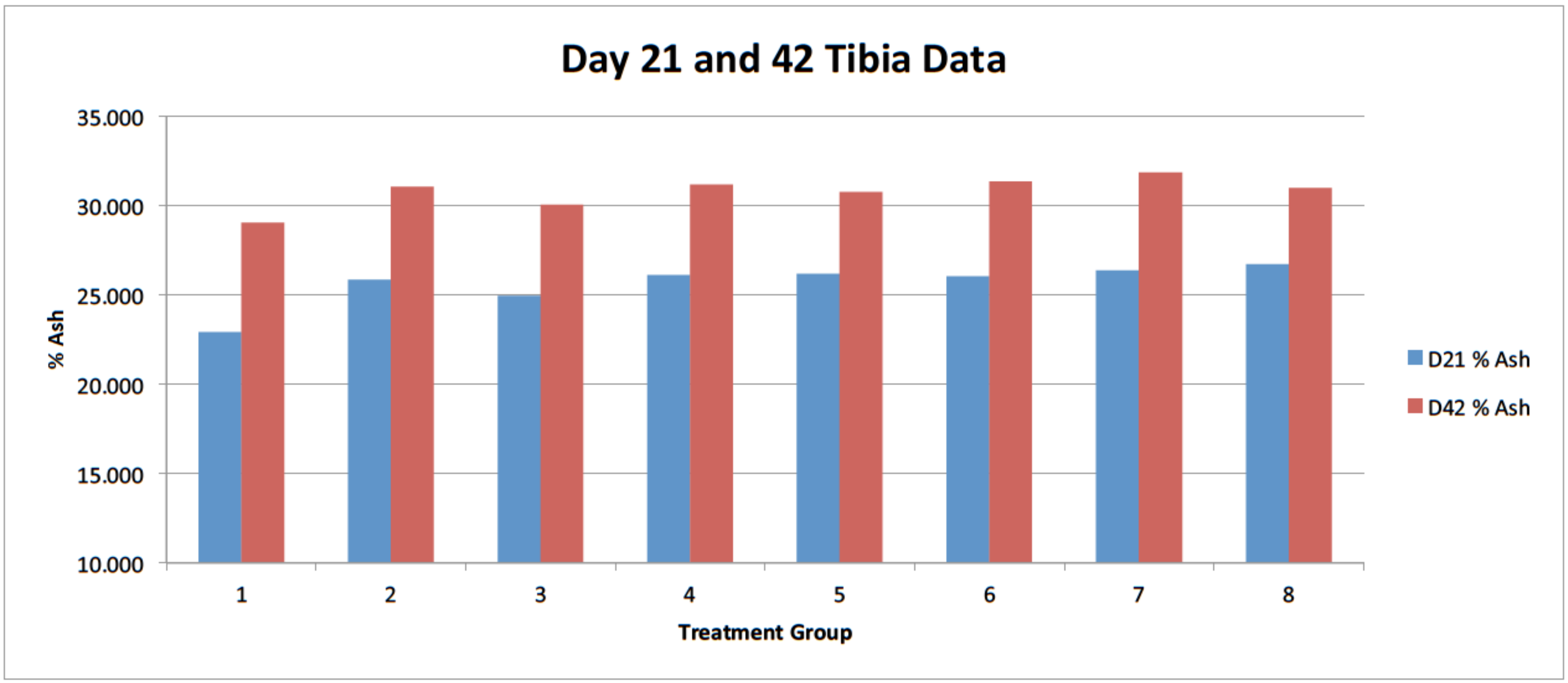


Table 17. Day 21 % Phosphorus Digestibility
CQR Study Number AGV-15-3
Facility Number 8W

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	7	4	1560	0.14	79.13	325.57	0.03	1360	0.59	1203	0.52	11.57	79.31%
1	4	5	1270	0.24	82.32	224.54	0.04	1360	0.59	1203	0.52	11.57	56.44%
1	1	6	1250	0.21	81.50	231.25	0.04	1360	0.59	1203	0.52	11.57	61.27%
1	5	7	1060	0.18	81.70	193.98	0.03	1360	0.59	1203	0.52	11.57	60.86%
1	8	8	930	0.10	83.04	157.73	0.02	1360	0.59	1203	0.52	11.57	75.21%
1	3	9	1100	0.20	83.35	183.15	0.03	1360	0.59	1203	0.52	11.57	58.09%
1	2	10	1140	0.20	82.08	204.29	0.04	1240	0.82	1097	0.73	11.57	73.47%
1	6	11	1010	0.18	80.95	192.41	0.03	1360	0.59	1203	0.52	11.57	58.92%
2	7	12	1080	0.12	82.27	191.48	0.02	1360	0.59	1203	0.52	11.57	74.39%
2	6	13	1470	0.13	82.36	259.31	0.02	1360	0.59	1203	0.52	11.57	79.61%
2	2	14	1340	0.24	81.82	243.61	0.04	1240	0.82	1097	0.73	11.57	72.92%
2	3	15	1140	0.18	79.88	229.37	0.04	1360	0.59	1203	0.52	11.57	63.60%
2	1	16	1230	0.22	82.35	217.10	0.04	1360	0.59	1203	0.52	11.57	58.77%
2	5	17	1200	0.23	81.73	219.24	0.04	1360	0.59	1203	0.52	11.57	55.82%
2	4	18	1230	0.24	81.76	224.35	0.04	1360	0.59	1203	0.52	11.57	55.02%
2	8	19	1310	0.19	82.99	222.83	0.03	1360	0.59	1203	0.52	11.57	66.57%
3	7	22	1040	0.17	83.43	172.33	0.03	1360	0.59	1203	0.52	11.57	62.32%
3	5	23	970	0.20	82.65	168.30	0.03	1360	0.59	1203	0.52	11.57	52.47%
3	3	24	1110	0.18	82.77	191.25	0.03	1360	0.59	1203	0.52	11.57	62.62%
3	1	25	1270	0.18	83.69	207.14	0.03	1360	0.59	1203	0.52	11.57	67.33%
3	4	26	1260	0.18	83.17	212.06	0.03	1360	0.59	1203	0.52	11.57	67.07%
3	2	27	1110	0.18	82.47	194.58	0.03	1240	0.82	1097	0.73	11.57	75.48%
3	6	28	1230	0.17	82.91	210.21	0.03	1360	0.59	1203	0.52	11.57	68.14%
3	8	29	1110	0.14	83.10	187.59	0.02	1360	0.59	1203	0.52	11.57	70.93%
4	7	30	1080	0.19	82.56	188.35	0.03	1360	0.59	1203	0.52	11.57	59.45%
4	8	31	1170	0.22	83.68	190.94	0.04	1360	0.59	1203	0.52	11.57	56.66%
4	4	32	1160	0.14	82.82	199.29	0.02	1360	0.59	1203	0.52	11.57	72.18%
4	6	33	1410	0.24	79.86	283.97	0.05	1360	0.59	1203	0.52	11.57	60.76%
4	5	34	1180	0.04	84.16	186.91	0.01	1360	0.59	1203	0.52	11.57	92.19%
4	3	35	1390	0.17	80.28	274.11	0.03	1360	0.59	1203	0.52	11.57	71.81%
4	2	36	1090	0.22	82.25	193.48	0.04	1240	0.82	1097	0.73	11.57	69.48%
4	1	37	1020	0.17	83.29	170.44	0.03	1360	0.59	1203	0.52	11.57	61.58%
5	8	41	1220	0.16	84.32	191.30	0.03	1360	0.59	1203	0.52	11.57	69.77%
5	6	42	1050	0.17	81.42	195.09	0.03	1360	0.59	1203	0.52	11.57	62.68%
5	7	43	1130	0.14	84.41	176.17	0.02	1360	0.59	1203	0.52	11.57	71.44%
5	3	44	1160	0.20	84.94	174.70	0.03	1360	0.59	1203	0.52	11.57	60.26%
5	4	45	1100	0.19	84.50	170.50	0.03	1360	0.59	1203	0.52	11.57	60.18%
5	1	46	1070	0.15	83.14	180.40	0.03	1360	0.59	1203	0.52	11.57	67.69%
5	5	47	1140	0.18	82.43	200.30	0.03	1360	0.59	1203	0.52	11.57	63.60%
5	2	48	1130	0.15	83.67	184.53	0.02	1240	0.82	1097	0.73	11.57	79.93%
6	4	49	1420	0.19	83.10	239.98	0.03	1360	0.59	1203	0.52	11.57	69.16%
6	6	50	1160	0.19	83.27	194.07	0.03	1360	0.59	1203	0.52	11.57	62.24%
6	7	51	1210	0.18	82.93	206.55	0.03	1360	0.59	1203	0.52	11.57	65.71%
6	3	52	1150	0.19	82.76	198.26	0.03	1360	0.59	1203	0.52	11.57	61.92%
6	1	53	1310	0.23	81.72	239.47	0.04	1360	0.59	1203	0.52	11.57	59.53%
6	2	54	1440	0.24	73.88	376.13	0.06	1240	0.82	1097	0.73	11.57	74.80%
6	5	55	1330	0.21	83.75	216.13	0.03	1360	0.59	1203	0.52	11.57	63.60%
6	8	56	1190	0.13	81.88	215.63	0.02	1360	0.59	1203	0.52	11.57	74.82%
7	4	59	1270	0.14	84.83	192.66	0.02	1360	0.59	1203	0.52	11.57	74.59%
7	1	60	1340	0.22	81.52	247.63	0.04	1360	0.59	1203	0.52	11.57	62.16%

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
7	6	61	1250	0.23	82.63	217.13	0.04	1360	0.59	1203	0.52	11.57	57.59%
7	3	62	1090	0.17	84.49	169.06	0.03	1360	0.59	1203	0.52	11.57	64.05%
7	5	63	1210	0.16	83.27	202.43	0.03	1360	0.59	1203	0.52	11.57	69.52%
7	8	64	1200	0.19	83.28	200.64	0.03	1360	0.59	1203	0.52	11.57	63.50%
7	2	65	1290	0.19	82.45	226.40	0.03	1240	0.82	1097	0.73	11.57	77.73%
7	7	66	1110	0.11	85.26	163.61	0.02	1360	0.59	1203	0.52	11.57	77.16%
8	7	67	1040	0.15	86.37	141.75	0.02	1360	0.59	1203	0.52	11.57	66.75%
8	3	68	1110	0.12	85.51	160.84	0.02	1360	0.59	1203	0.52	11.57	75.08%
8	8	69	1010	0.15	84.72	154.33	0.02	1360	0.59	1203	0.52	11.57	65.77%
8	2	70	1100	0.25	83.93	176.77	0.04	1240	0.82	1097	0.73	11.57	65.63%
8	1	71	1130	0.18	83.31	188.60	0.03	1360	0.59	1203	0.52	11.57	63.28%
8	6	72	1040	0.14	83.24	174.30	0.02	1360	0.59	1203	0.52	11.57	68.97%
8	4	73	1000	0.16	84.96	150.40	0.02	1360	0.59	1203	0.52	11.57	63.12%
8	5	74	1090	0.15	82.11	195.00	0.03	1360	0.59	1203	0.52	11.57	68.28%
9	2	78	1280	0.23	82.17	228.22	0.04	1240	0.82	1097	0.73	11.57	72.83%
9	1	79	1230	0.17	83.57	202.09	0.03	1360	0.59	1203	0.52	11.57	68.14%
9	5	80	1330	0.15	84.55	205.49	0.02	1360	0.59	1203	0.52	11.57	74.00%
9	4	81	1090	0.16	82.96	185.74	0.03	1360	0.59	1203	0.52	11.57	66.16%
9	6	82	860	0.11	84.91	129.77	0.02	1360	0.59	1203	0.52	11.57	70.52%
9	7	83	1230	0.10	84.10	195.57	0.02	1360	0.59	1203	0.52	11.57	81.26%
9	3	84	1110	0.16	82.00	199.80	0.03	1360	0.59	1203	0.52	11.57	66.77%
9	8	85	1180	0.17	84.37	184.43	0.03	1360	0.59	1203	0.52	11.57	66.79%
10	8	86	1110	0.23	82.26	196.91	0.04	1360	0.59	1203	0.52	11.57	52.24%
10	6	87	1040	0.17	82.86	178.26	0.03	1360	0.59	1203	0.52	11.57	62.32%
10	4	88	1290	0.19	84.92	194.53	0.03	1360	0.59	1203	0.52	11.57	66.05%
10	3	89	1100	0.19	82.91	187.99	0.03	1360	0.59	1203	0.52	11.57	60.18%
10	1	90	910	0.12	81.65	166.99	0.02	1360	0.59	1203	0.52	11.57	69.60%
10	2	91	970	0.19	82.35	171.21	0.03	1240	0.82	1097	0.73	11.57	70.38%
10	7	92	900	0.17	84.07	143.37	0.03	1360	0.59	1203	0.52	11.57	56.46%
10	5	93	1090	0.15	84.13	172.98	0.02	1360	0.59	1203	0.52	11.57	68.28%
11	3	96	1040	0.14	81.19	195.62	0.03	1360	0.59	1203	0.52	11.57	68.97%
11	6	97	1180	0.13	82.64	204.85	0.02	1360	0.59	1203	0.52	11.57	74.60%
11	4	98	930	0.10	81.41	172.89	0.02	1360	0.59	1203	0.52	11.57	75.21%
11	8	99	910	0.14	82.54	158.89	0.02	1360	0.59	1203	0.52	11.57	64.54%
11	1	100	1130	0.18	82.72	195.26	0.03	1360	0.59	1203	0.52	11.57	63.28%
11	5	101	910	0.18	84.27	143.14	0.03	1360	0.59	1203	0.52	11.57	54.40%
11	2	102	1070	0.19	84.12	169.92	0.03	1240	0.82	1097	0.73	11.57	73.15%
11	7	103	1170	0.10	83.59	192.00	0.02	1360	0.59	1203	0.52	11.57	80.30%
12	4	104	1050	0.14	84.01	167.90	0.02	1360	0.59	1203	0.52	11.57	69.27%
12	8	105	950	0.10	86.30	130.15	0.01	1360	0.59	1203	0.52	11.57	75.74%
12	6	106	1010	0.15	84.08	160.79	0.02	1360	0.59	1203	0.52	11.57	65.77%
12	5	107	950	0.11	85.68	136.04	0.02	1360	0.59	1203	0.52	11.57	73.31%
12	3	108	1070	0.24	84.19	169.17	0.04	1360	0.59	1203	0.52	11.57	48.30%
12	1	109	950	0.13	86.37	129.49	0.02	1360	0.59	1203	0.52	11.57	68.46%
12	7	110	1060	0.17	83.68	172.99	0.03	1360	0.59	1203	0.52	11.57	63.03%
12	2	111	1210	0.21	80.87	231.47	0.04	1240	0.82	1097	0.73	11.57	73.76%

Table 18. Day 21 % Phosphorus Digestibility Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	1	6	1250	0.21	81.50	231.25	0.04	1360	0.59	1203	0.52	11.57	61.27%
2	1	16	1230	0.22	82.35	217.10	0.04	1360	0.59	1203	0.52	11.57	58.77%
3	1	25	1270	0.18	83.69	207.14	0.03	1360	0.59	1203	0.52	11.57	67.33%
4	1	37	1020	0.17	83.29	170.44	0.03	1360	0.59	1203	0.52	11.57	61.58%
5	1	46	1070	0.15	83.14	180.40	0.03	1360	0.59	1203	0.52	11.57	67.69%
6	1	53	1310	0.23	81.72	239.47	0.04	1360	0.59	1203	0.52	11.57	59.53%
7	1	60	1340	0.22	81.52	247.63	0.04	1360	0.59	1203	0.52	11.57	62.16%
8	1	71	1130	0.18	83.31	188.60	0.03	1360	0.59	1203	0.52	11.57	63.28%
9	1	79	1230	0.17	83.57	202.09	0.03	1360	0.59	1203	0.52	11.57	68.14%
10	1	90	910	0.12	81.65	166.99	0.02	1360	0.59	1203	0.52	11.57	69.60%
11	1	100	1130	0.18	82.72	195.26	0.03	1360	0.59	1203	0.52	11.57	63.28%
12	1	109	950	0.13	86.37	129.49	0.02	1360	0.59	1203	0.52	11.57	68.46%
Averages			**1153**	**0.18**	**82.90**	**197.99**	**0.03**	**1360**	**0.59**	**1203**	**0.52**	**11.57**	**64.26%**
Standard Deviations			**142**	**0.04**	**1.37**	**33.81**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**3.78%**
CVs			**12.27%**	**19.68%**	**1.65%**	**17.08%**	**24.73%**	**NA**	**NA**	**NA**	**NA**	**NA**	**5.89%**
1	2	10	1140	0.20	82.08	204.29	0.04	1240	0.82	1097	0.73	11.57	73.47%
2	2	14	1340	0.24	81.82	243.61	0.04	1240	0.82	1097	0.73	11.57	72.92%
3	2	27	1110	0.18	82.47	194.58	0.03	1240	0.82	1097	0.73	11.57	75.48%
4	2	36	1090	0.22	82.25	193.48	0.04	1240	0.82	1097	0.73	11.57	69.48%
5	2	48	1130	0.15	83.67	184.53	0.02	1240	0.82	1097	0.73	11.57	79.93%
6	2	54	1440	0.24	73.88	376.13	0.06	1240	0.82	1097	0.73	11.57	74.80%
7	2	65	1290	0.19	82.45	226.40	0.03	1240	0.82	1097	0.73	11.57	77.73%
8	2	70	1100	0.25	83.93	176.77	0.04	1240	0.82	1097	0.73	11.57	65.63%
9	2	78	1280	0.23	82.17	228.22	0.04	1240	0.82	1097	0.73	11.57	72.83%
10	2	91	970	0.19	82.35	171.21	0.03	1240	0.82	1097	0.73	11.57	70.38%
11	2	102	1070	0.19	84.12	169.92	0.03	1240	0.82	1097	0.73	11.57	73.15%
12	2	111	1210	0.21	80.87	231.47	0.04	1240	0.82	1097	0.73	11.57	73.76%
Averages			**1181**	**0.21**	**81.84**	**216.72**	**0.04**	**1240**	**0.82**	**1097**	**0.73**	**11.57**	**73.29%**
Standard Deviations			**133**	**0.03**	**2.67**	**56.13**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**3.73%**
CVs			**11.30%**	**14.26%**	**3.27%**	**25.90%**	**25.01%**	**NA**	**NA**	**NA**	**NA**	**NA**	**5.09%**

Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Adjusted for Dry Matter: Titanium in Ileal Content Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Adjusted for Dry Matter: Titanium in Feed Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	3	9	1100	0.20	83.35	183.15	0.03	1360	0.59	1203	0.52	11.57	58.09%
2	3	15	1140	0.18	79.88	229.37	0.04	1360	0.59	1203	0.52	11.57	63.60%
3	3	24	1110	0.18	82.77	191.25	0.03	1360	0.59	1203	0.52	11.57	62.62%
4	3	35	1390	0.17	80.28	274.11	0.03	1360	0.59	1203	0.52	11.57	71.81%
5	3	44	1160	0.20	84.94	174.70	0.03	1360	0.59	1203	0.52	11.57	60.26%
6	3	52	1150	0.19	82.76	198.26	0.03	1360	0.59	1203	0.52	11.57	61.92%
7	3	62	1090	0.17	84.49	169.06	0.03	1360	0.59	1203	0.52	11.57	64.05%
8	3	68	1110	0.12	85.51	160.84	0.02	1360	0.59	1203	0.52	11.57	75.08%
9	3	84	1110	0.16	82.00	199.80	0.03	1360	0.59	1203	0.52	11.57	66.77%
10	3	89	1100	0.19	82.91	187.99	0.03	1360	0.59	1203	0.52	11.57	60.18%
11	3	96	1040	0.14	81.19	195.62	0.03	1360	0.59	1203	0.52	11.57	68.97%
12	3	108	1070	0.24	84.19	169.17	0.04	1360	0.59	1203	0.52	11.57	48.30%
Averages			**1131**	**0.18**	**82.86**	**194.44**	**0.03**	**1360**	**0.59**	**1203**	**0.52**	**11.57**	**63.47%**
Standard Deviations			**88**	**0.03**	**1.79**	**31.03**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**6.94%**
CVs			**7.79%**	**17.21%**	**2.16%**	**15.96%**	**17.77%**	**NA**	**NA**	**NA**	**NA**	**NA**	**10.93%**
1	4	5	1270	0.24	82.32	224.54	0.04	1360	0.59	1203	0.52	11.57	56.44%
2	4	18	1230	0.24	81.76	224.35	0.04	1360	0.59	1203	0.52	11.57	55.02%
3	4	26	1260	0.18	83.17	212.06	0.03	1360	0.59	1203	0.52	11.57	67.07%
4	4	32	1160	0.14	82.82	199.29	0.02	1360	0.59	1203	0.52	11.57	72.18%
5	4	45	1100	0.19	84.50	170.50	0.03	1360	0.59	1203	0.52	11.57	60.18%
6	4	49	1420	0.19	83.10	239.98	0.03	1360	0.59	1203	0.52	11.57	69.16%
7	4	59	1270	0.14	84.83	192.66	0.02	1360	0.59	1203	0.52	11.57	74.59%
8	4	73	1000	0.16	84.96	150.40	0.02	1360	0.59	1203	0.52	11.57	63.12%
9	4	81	1090	0.16	82.96	185.74	0.03	1360	0.59	1203	0.52	11.57	66.16%
10	4	88	1290	0.19	84.92	194.53	0.03	1360	0.59	1203	0.52	11.57	66.05%
11	4	98	930	0.10	81.41	172.89	0.02	1360	0.59	1203	0.52	11.57	75.21%
12	4	104	1050	0.14	84.01	167.90	0.02	1360	0.59	1203	0.52	11.57	69.27%
Averages			**1173**	**0.17**	**83.40**	**194.57**	**0.03**	**1360**	**0.59**	**1203**	**0.52**	**11.57**	**66.20%**
Standard Deviations			**142**	**0.04**	**1.24**	**26.92**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**6.55%**
CVs			**12.08%**	**23.98%**	**1.48%**	**13.83%**	**27.27%**	**NA**	**NA**	**NA**	**NA**	**NA**	**9.90%**

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	5	7	1060	0.18	81.70	193.98	0.03	1360	0.59	1203	0.52	11.57	60.86%
2	5	17	1200	0.23	81.73	219.24	0.04	1360	0.59	1203	0.52	11.57	55.82%
3	5	23	970	0.20	82.65	168.30	0.03	1360	0.59	1203	0.52	11.57	52.47%
4	5	34	1180	0.04	84.16	186.91	0.01	1360	0.59	1203	0.52	11.57	92.19%
5	5	47	1140	0.18	82.43	200.30	0.03	1360	0.59	1203	0.52	11.57	63.60%
6	5	55	1330	0.21	83.75	216.13	0.03	1360	0.59	1203	0.52	11.57	63.60%
7	5	63	1210	0.16	83.27	202.43	0.03	1360	0.59	1203	0.52	11.57	69.52%
8	5	74	1090	0.15	82.11	195.00	0.03	1360	0.59	1203	0.52	11.57	68.28%
9	5	80	1330	0.15	84.55	205.49	0.02	1360	0.59	1203	0.52	11.57	74.00%
10	5	93	1090	0.15	84.13	172.98	0.02	1360	0.59	1203	0.52	11.57	68.28%
11	5	101	910	0.18	84.27	143.14	0.03	1360	0.59	1203	0.52	11.57	54.40%
12	5	107	950	0.11	85.68	136.04	0.02	1360	0.59	1203	0.52	11.57	73.31%
Averages			**1122**	**0.16**	**83.37**	**186.66**	**0.03**	**1360**	**0.59**	**1203**	**0.52**	**11.57**	**66.36%**
Standard Deviations			**137**	**0.05**	**1.26**	**26.67**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**10.80%**
CVs			**12.25%**	**30.85%**	**1.51%**	**14.29%**	**34.56%**	**NA**	**NA**	**NA**	**NA**	**NA**	**16.28%**
1	6	11	1010	0.18	80.95	192.41	0.03	1360	0.59	1203	0.52	11.57	58.92%
2	6	13	1470	0.13	82.36	259.31	0.02	1360	0.59	1203	0.52	11.57	79.61%
3	6	28	1230	0.17	82.91	210.21	0.03	1360	0.59	1203	0.52	11.57	68.14%
4	6	33	1410	0.24	79.86	283.97	0.05	1360	0.59	1203	0.52	11.57	60.76%
5	6	42	1050	0.17	81.42	195.09	0.03	1360	0.59	1203	0.52	11.57	62.68%
6	6	50	1160	0.19	83.27	194.07	0.03	1360	0.59	1203	0.52	11.57	62.24%
7	6	61	1250	0.23	82.63	217.13	0.04	1360	0.59	1203	0.52	11.57	57.59%
8	6	72	1040	0.14	83.24	174.30	0.02	1360	0.59	1203	0.52	11.57	68.97%
9	6	82	860	0.11	84.91	129.77	0.02	1360	0.59	1203	0.52	11.57	70.52%
10	6	87	1040	0.17	82.86	178.26	0.03	1360	0.59	1203	0.52	11.57	62.32%
11	6	97	1180	0.13	82.64	204.85	0.02	1360	0.59	1203	0.52	11.57	74.60%
12	6	106	1010	0.15	84.08	160.79	0.02	1360	0.59	1203	0.52	11.57	65.77%
Averages			**1143**	**0.17**	**82.59**	**200.01**	**0.03**	**1360**	**0.59**	**1203**	**0.52**	**11.57**	**66.01%**
Standard Deviations			**177**	**0.04**	**1.36**	**41.24**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**6.61%**
CVs			**15.48%**	**23.49%**	**1.64%**	**20.62%**	**29.35%**	**NA**	**NA**	**NA**	**NA**	**NA**	**10.01%**

Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Adjusted for Dry Matter: Titanium in Ileal Content Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Adjusted for Dry Matter: Titanium in Feed Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	7	4	1560	0.14	79.13	325.57	0.03	1360	0.59	1203	0.52	11.57	79.31%
2	7	12	1080	0.12	82.27	191.48	0.02	1360	0.59	1203	0.52	11.57	74.39%
3	7	22	1040	0.17	83.43	172.33	0.03	1360	0.59	1203	0.52	11.57	62.32%
4	7	30	1080	0.19	82.56	188.35	0.03	1360	0.59	1203	0.52	11.57	59.45%
5	7	43	1130	0.14	84.41	176.17	0.02	1360	0.59	1203	0.52	11.57	71.44%
6	7	51	1210	0.18	82.93	206.55	0.03	1360	0.59	1203	0.52	11.57	65.71%
7	7	66	1110	0.11	85.26	163.61	0.02	1360	0.59	1203	0.52	11.57	77.16%
8	7	67	1040	0.15	86.37	141.75	0.02	1360	0.59	1203	0.52	11.57	66.75%
9	7	83	1230	0.10	84.10	195.57	0.02	1360	0.59	1203	0.52	11.57	81.26%
10	7	92	900	0.17	84.07	143.37	0.03	1360	0.59	1203	0.52	11.57	56.46%
11	7	103	1170	0.10	83.59	192.00	0.02	1360	0.59	1203	0.52	11.57	80.30%
12	7	110	1060	0.17	83.68	172.99	0.03	1360	0.59	1203	0.52	11.57	63.03%
Averages			**1134**	**0.15**	**83.48**	**189.15**	**0.02**	**1360**	**0.59**	**1203**	**0.52**	**11.57**	**69.80%**
Standard Deviations			**160**	**0.03**	**1.78**	**47.36**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**8.65%**
CVs			**14.12%**	**21.91%**	**2.13%**	**25.04%**	**25.28%**	**NA**	**NA**	**NA**	**NA**	**NA**	**12.39%**
1	8	8	930	0.10	83.04	157.73	0.02	1360	0.59	1203	0.52	11.57	75.21%
2	8	19	1310	0.19	82.99	222.83	0.03	1360	0.59	1203	0.52	11.57	66.57%
3	8	29	1110	0.14	83.10	187.59	0.02	1360	0.59	1203	0.52	11.57	70.93%
4	8	31	1170	0.22	83.68	190.94	0.04	1360	0.59	1203	0.52	11.57	56.66%
5	8	41	1220	0.16	84.32	191.30	0.03	1360	0.59	1203	0.52	11.57	69.77%
6	8	56	1190	0.13	81.88	215.63	0.02	1360	0.59	1203	0.52	11.57	74.82%
7	8	64	1200	0.19	83.28	200.64	0.03	1360	0.59	1203	0.52	11.57	63.50%
8	8	69	1010	0.15	84.72	154.33	0.02	1360	0.59	1203	0.52	11.57	65.77%
9	8	85	1180	0.17	84.37	184.43	0.03	1360	0.59	1203	0.52	11.57	66.79%
10	8	86	1110	0.23	82.26	196.91	0.04	1360	0.59	1203	0.52	11.57	52.24%
11	8	99	910	0.14	82.54	158.89	0.02	1360	0.59	1203	0.52	11.57	64.54%
12	8	105	950	0.10	86.30	130.15	0.01	1360	0.59	1203	0.52	11.57	75.74%
Averages			**1108**	**0.16**	**83.54**	**182.61**	**0.03**	**1360**	**0.59**	**1203**	**0.52**	**11.57**	**66.88%**
Standard Deviations			**129**	**0.04**	**1.23**	**27.21**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**7.22%**
CVs			**11.65%**	**26.25%**	**1.47%**	**14.90%**	**28.93%**	**NA**	**NA**	**NA**	**NA**	**NA**	**10.79%**

Table 19. Day 42 % Phosphorus Digestibility
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Adjusted for Dry Matter: Titanium in Ileal Content Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Adjusted for Dry Matter: Titanium in Feed Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	7	4	1320	0.24	83.95	211.86	0.04	1490	0.49	1320	0.43	11.40	44.71%
1	4	5	900	0.16	85.80	127.80	0.02	1490	0.49	1320	0.43	11.40	45.94%
1	1	6	1040	0.17	83.40	172.64	0.03	1490	0.49	1320	0.43	11.40	50.29%
1	5	7	1400	0.20	83.38	232.68	0.03	1490	0.49	1320	0.43	11.40	56.56%
1	8	8	1440	0.21	81.77	262.51	0.04	1490	0.49	1320	0.43	11.40	55.65%
1	3	9	1170	0.17	83.95	187.79	0.03	1490	0.49	1320	0.43	11.40	55.82%
1	2	10	1270	0.20	83.10	214.63	0.03	1400	0.64	1242	0.57	11.29	65.55%
1	6	11	1180	0.20	84.42	183.84	0.03	1490	0.49	1320	0.43	11.40	48.46%
2	7	12	1150	0.19	81.81	209.19	0.03	1490	0.49	1320	0.43	11.40	49.76%
2	6	13	1350	0.25	81.86	244.89	0.05	1490	0.49	1320	0.43	11.40	43.69%
2	2	14	1160	0.23	82.67	201.03	0.04	1400	0.64	1242	0.57	11.29	56.63%
2	3	15	1350	0.29	81.91	244.22	0.05	1490	0.49	1320	0.43	11.40	34.68%
2	1	16	1450	0.16	80.54	282.17	0.03	1490	0.49	1320	0.43	11.40	66.45%
2	5	17	1500	0.24	80.94	285.90	0.05	1490	0.49	1320	0.43	11.40	51.35%
2	4	18	1180	0.19	81.95	212.99	0.03	1490	0.49	1320	0.43	11.40	51.04%
2	8	19	1360	0.31	83.92	218.69	0.05	1490	0.49	1320	0.43	11.40	30.69%
3	7	22	1300	0.15	83.37	216.19	0.02	1490	0.49	1320	0.43	11.40	64.91%
3	5	23	1340	0.18	83.29	223.91	0.03	1490	0.49	1320	0.43	11.40	59.15%
3	3	24	1100	0.21	83.90	177.10	0.03	1490	0.49	1320	0.43	11.40	41.95%
3	1	25	1420	0.30	83.61	232.74	0.05	1490	0.49	1320	0.43	11.40	35.76%
3	4	26	1300	0.19	83.57	213.59	0.03	1490	0.49	1320	0.43	11.40	55.56%
3	2	27	1130	0.32	82.30	200.01	0.06	1400	0.64	1242	0.57	11.29	38.05%
3	6	28	1110	0.14	83.56	182.48	0.02	1490	0.49	1320	0.43	11.40	61.65%
3	8	29	1400	0.29	82.15	249.90	0.05	1490	0.49	1320	0.43	11.40	37.01%
4	7	30	1260	0.22	82.99	214.33	0.04	1490	0.49	1320	0.43	11.40	46.91%
4	8	31	1860	0.23	74.51	474.11	0.06	1490	0.49	1320	0.43	11.40	62.40%
4	4	32	1060	0.15	83.41	175.85	0.02	1490	0.49	1320	0.43	11.40	56.97%
4	6	33	1110	0.20	84.39	173.27	0.03	1490	0.49	1320	0.43	11.40	45.21%
4	5	34	1230	0.17	83.60	201.72	0.03	1490	0.49	1320	0.43	11.40	57.97%
4	3	35	1030	0.31	83.86	166.24	0.05	1490	0.49	1320	0.43	11.40	8.48%
4	2	36	1030	0.18	83.83	166.55	0.03	1400	0.64	1242	0.57	11.29	61.77%
4	1	37	1390	0.27	84.47	215.87	0.04	1490	0.49	1320	0.43	11.40	40.93%
5	8	41	950	0.09	83.72	154.66	0.01	1490	0.49	1320	0.43	11.40	71.19%
5	6	42	1110	0.19	82.65	192.59	0.03	1490	0.49	1320	0.43	11.40	47.95%
5	7	43	1160	0.16	83.66	189.54	0.03	1490	0.49	1320	0.43	11.40	58.06%
5	3	44	1140	0.23	84.29	179.09	0.04	1490	0.49	1320	0.43	11.40	38.65%
5	4	45	1190	0.24	82.80	204.68	0.04	1490	0.49	1320	0.43	11.40	38.67%
5	1	46	1130	0.27	82.56	197.07	0.05	1490	0.49	1320	0.43	11.40	27.34%
5	5	47	1170	0.16	82.99	199.02	0.03	1490	0.49	1320	0.43	11.40	58.42%
5	2	48	1090	0.25	82.76	187.92	0.04	1400	0.64	1242	0.57	11.29	49.83%
6	4	49	1310	0.26	83.15	220.74	0.04	1490	0.49	1320	0.43	11.40	39.65%
6	6	50	1340	0.23	84.05	213.73	0.04	1490	0.49	1320	0.43	11.40	47.81%
6	7	51	960	0.16	83.62	157.25	0.03	1490	0.49	1320	0.43	11.40	49.32%
6	3	52	1040	0.24	83.61	170.46	0.04	1490	0.49	1320	0.43	11.40	29.83%
6	1	53	950	0.18	83.33	158.37	0.03	1490	0.49	1320	0.43	11.40	42.38%
6	2	54	1060	0.29	78.12	231.93	0.06	1400	0.64	1242	0.57	11.29	40.15%
6	5	55	1210	0.22	83.13	204.13	0.04	1490	0.49	1320	0.43	11.40	44.71%
6	8	56	1320	0.26	83.98	211.46	0.04	1490	0.49	1320	0.43	11.40	40.11%
7	4	59	1230	0.24	83.08	208.12	0.04	1490	0.49	1320	0.43	11.40	40.67%
7	1	60	960	0.32	84.31	150.62	0.05	1490	0.49	1320	0.43	11.40	-1.36%

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
7	6	61	1110	0.19	84.68	170.05	0.03	1490	0.49	1320	0.43	11.40	47.95%
7	3	62	1060	0.24	84.37	165.68	0.04	1490	0.49	1320	0.43	11.40	31.15%
7	5	63	980	0.20	83.09	165.72	0.03	1490	0.49	1320	0.43	11.40	37.94%
7	8	64	1250	0.23	81.62	229.75	0.04	1490	0.49	1320	0.43	11.40	44.05%
7	2	65	1260	0.30	80.61	244.31	0.06	1400	0.64	1242	0.57	11.29	47.92%
7	7	66	1160	0.12	82.91	198.24	0.02	1490	0.49	1320	0.43	11.40	68.54%
8	7	67	1300	0.26	83.10	219.70	0.04	1490	0.49	1320	0.43	11.40	39.18%
8	3	68	1230	0.12	85.25	181.43	0.02	1490	0.49	1320	0.43	11.40	70.33%
8	8	69	1280	0.21	83.69	208.77	0.03	1490	0.49	1320	0.43	11.40	50.11%
8	2	70	1090	0.14	84.41	169.93	0.02	1400	0.64	1242	0.57	11.29	71.90%
8	1	71	990	0.14	85.32	145.33	0.02	1490	0.49	1320	0.43	11.40	57.00%
8	6	72	1060	0.16	84.81	161.01	0.02	1490	0.49	1320	0.43	11.40	54.10%
8	4	73	1320	0.23	82.68	228.62	0.04	1490	0.49	1320	0.43	11.40	47.02%
8	5	74	1520	0.37	82.63	264.02	0.06	1490	0.49	1320	0.43	11.40	25.98%
9	2	78	1390	0.30	82.42	244.36	0.05	1400	0.64	1242	0.57	11.29	52.79%
9	1	79	1310	0.15	83.27	219.16	0.03	1490	0.49	1320	0.43	11.40	65.18%
9	5	80	1410	0.23	82.31	249.43	0.04	1490	0.49	1320	0.43	11.40	50.40%
9	4	81	1200	0.13	83.63	196.44	0.02	1490	0.49	1320	0.43	11.40	67.06%
9	6	82	1250	0.24	81.14	235.75	0.05	1490	0.49	1320	0.43	11.40	41.62%
9	7	83	1370	0.19	82.98	233.17	0.03	1490	0.49	1320	0.43	11.40	57.83%
9	3	84	1280	0.18	81.76	233.47	0.03	1490	0.49	1320	0.43	11.40	57.24%
9	8	85	1270	0.15	83.23	212.98	0.03	1490	0.49	1320	0.43	11.40	64.08%
10	8	86	1340	0.13	81.61	246.43	0.02	1490	0.49	1320	0.43	11.40	70.50%
10	6	87	1060	0.14	82.57	184.76	0.02	1490	0.49	1320	0.43	11.40	59.84%
10	4	88	1370	0.20	81.35	255.51	0.04	1490	0.49	1320	0.43	11.40	55.61%
10	3	89	1320	0.17	83.24	221.23	0.03	1490	0.49	1320	0.43	11.40	60.84%
10	1	90	1290	0.23	82.98	219.56	0.04	1490	0.49	1320	0.43	11.40	45.78%
10	2	91	1130	0.23	83.56	185.77	0.04	1400	0.64	1242	0.57	11.29	55.48%
10	7	92	1300	0.25	84.05	207.35	0.04	1490	0.49	1320	0.43	11.40	41.52%
10	5	93	1140	0.24	83.25	190.95	0.04	1490	0.49	1320	0.43	11.40	35.98%
11	3	96	1130	0.18	84.03	180.46	0.03	1490	0.49	1320	0.43	11.40	51.56%
11	6	97	1240	0.17	83.05	210.18	0.03	1490	0.49	1320	0.43	11.40	58.31%
11	4	98	1230	0.14	84.02	196.55	0.02	1490	0.49	1320	0.43	11.40	65.39%
11	8	99	1140	0.20	83.11	192.55	0.03	1490	0.49	1320	0.43	11.40	46.65%
11	1	100	1270	0.16	82.79	218.57	0.03	1490	0.49	1320	0.43	11.40	61.69%
11	5	101	1230	0.14	83.67	200.86	0.02	1490	0.49	1320	0.43	11.40	65.39%
11	2	102	1030	0.19	84.36	161.09	0.03	1400	0.64	1242	0.57	11.29	59.65%
11	7	103	1410	0.22	83.07	238.71	0.04	1490	0.49	1320	0.43	11.40	52.55%
12	4	104	1210	0.10	84.02	193.36	0.02	1490	0.49	1320	0.43	11.40	74.87%
12	8	105	1100	0.19	84.10	174.90	0.03	1490	0.49	1320	0.43	11.40	47.48%
12	6	106	1250	0.13	83.46	206.75	0.02	1490	0.49	1320	0.43	11.40	68.38%
12	5	107	1250	0.20	84.80	190.00	0.03	1490	0.49	1320	0.43	11.40	51.35%
12	3	108	1330	0.11	82.69	230.22	0.02	1490	0.49	1320	0.43	11.40	74.85%
12	1	109	1150	0.24	84.97	172.85	0.04	1490	0.49	1320	0.43	11.40	36.54%
12	7	110	1180	0.25	84.27	185.61	0.04	1490	0.49	1320	0.43	11.40	35.58%
12	2	111	1370	0.23	82.31	242.35	0.04	1400	0.64	1242	0.57	11.29	63.28%

Table 20. Day 42 % Phosphorus Digestibility Summarized by Treatment Group
CQR Study Number AGV-15-3
Facility Number 8W

Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Adjusted for Dry Matter: Titanium in Ileal Content Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Adjusted for Dry Matter: Titanium in Feed Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	1	6	1040	0.17	83.40	172.64	0.03	1490	0.49	1320	0.43	11.40	50.29%
2	1	16	1450	0.16	80.54	282.17	0.03	1490	0.49	1320	0.43	11.40	66.45%
3	1	25	1420	0.30	83.61	232.74	0.05	1490	0.49	1320	0.43	11.40	35.76%
4	1	37	1390	0.27	84.47	215.87	0.04	1490	0.49	1320	0.43	11.40	40.93%
5	1	46	1130	0.27	82.56	197.07	0.05	1490	0.49	1320	0.43	11.40	27.34%
6	1	53	950	0.18	83.33	158.37	0.03	1490	0.49	1320	0.43	11.40	42.38%
7	1	60	960	0.32	84.31	150.62	0.05	1490	0.49	1320	0.43	11.40	-1.36%
8	1	71	990	0.14	85.32	145.33	0.02	1490	0.49	1320	0.43	11.40	57.00%
9	1	79	1310	0.15	83.27	219.16	0.03	1490	0.49	1320	0.43	11.40	65.18%
10	1	90	1290	0.23	82.98	219.56	0.04	1490	0.49	1320	0.43	11.40	45.78%
11	1	100	1270	0.16	82.79	218.57	0.03	1490	0.49	1320	0.43	11.40	61.69%
12	1	109	1150	0.24	84.97	172.85	0.04	1490	0.49	1320	0.43	11.40	36.54%
Averages			**1196**	**0.22**	**83.46**	**198.75**	**0.04**	**1490**	**0.49**	**1320**	**0.43**	**11.4**	**44.00%**
Standard Deviations			**183**	**0.06**	**1.26**	**40.23**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**18.94%**
CVs			**15.32%**	**29.40%**	**1.51%**	**20.24%**	**28.03%**	**NA**	**NA**	**NA**	**NA**	**NA**	**43.06%**
1	2	10	1270	0.20	83.10	214.63	0.03	1400	0.64	1242	0.57	11.29	65.55%
2	2	14	1160	0.23	82.67	201.03	0.04	1400	0.64	1242	0.57	11.29	56.63%
3	2	27	1130	0.32	82.30	200.01	0.06	1400	0.64	1242	0.57	11.29	38.05%
4	2	36	1030	0.18	83.83	166.55	0.03	1400	0.64	1242	0.57	11.29	61.77%
5	2	48	1090	0.25	82.76	187.92	0.04	1400	0.64	1242	0.57	11.29	49.83%
6	2	54	1060	0.29	78.12	231.93	0.06	1400	0.64	1242	0.57	11.29	40.15%
7	2	65	1260	0.30	80.61	244.31	0.06	1400	0.64	1242	0.57	11.29	47.92%
8	2	70	1090	0.14	84.41	169.93	0.02	1400	0.64	1242	0.57	11.29	71.90%
9	2	78	1390	0.30	82.42	244.36	0.05	1400	0.64	1242	0.57	11.29	52.79%
10	2	91	1130	0.23	83.56	185.77	0.04	1400	0.64	1242	0.57	11.29	55.48%
11	2	102	1030	0.19	84.36	161.09	0.03	1400	0.64	1242	0.57	11.29	59.65%
12	2	111	1370	0.23	82.31	242.35	0.04	1400	0.64	1242	0.57	11.29	63.28%
Averages			**1168**	**0.24**	**82.54**	**204.16**	**0.04**	**1400**	**0.64**	**1242**	**0.57**	**11.29**	**55.25%**
Standard Deviations			**126**	**0.06**	**1.74**	**31.10**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**10.11%**
CVs			**10.77%**	**23.38%**	**2.11%**	**15.23%**	**30.84%**	**NA**	**NA**	**NA**	**NA**	**NA**	**18.30%**

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	3	9	1170	0.17	83.95	187.79	0.03	1490	0.49	1320	0.43	11.40	55.82%
2	3	15	1350	0.29	81.91	244.22	0.05	1490	0.49	1320	0.43	11.40	34.68%
3	3	24	1100	0.21	83.90	177.10	0.03	1490	0.49	1320	0.43	11.40	41.95%
4	3	35	1030	0.31	83.86	166.24	0.05	1490	0.49	1320	0.43	11.40	8.48%
5	3	44	1140	0.23	84.29	179.09	0.04	1490	0.49	1320	0.43	11.40	38.65%
6	3	52	1040	0.24	83.61	170.46	0.04	1490	0.49	1320	0.43	11.40	29.83%
7	3	62	1060	0.24	84.37	165.68	0.04	1490	0.49	1320	0.43	11.40	31.15%
8	3	68	1230	0.12	85.25	181.43	0.02	1490	0.49	1320	0.43	11.40	70.33%
9	3	84	1280	0.18	81.76	233.47	0.03	1490	0.49	1320	0.43	11.40	57.24%
10	3	89	1320	0.17	83.24	221.23	0.03	1490	0.49	1320	0.43	11.40	60.84%
11	3	96	1130	0.18	84.03	180.46	0.03	1490	0.49	1320	0.43	11.40	51.56%
12	3	108	1330	0.11	82.69	230.22	0.02	1490	0.49	1320	0.43	11.40	74.85%
Averages			**1182**	**0.20**	**83.57**	**194.78**	**0.03**	**1490**	**0.49**	**1320**	**0.43**	**11.4**	**46.28%**
Standard Deviations			**117**	**0.06**	**1.02**	**28.83**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**19.04%**
CVs			**9.90%**	**30.01%**	**1.22%**	**14.80%**	**31.53%**	**NA**	**NA**	**NA**	**NA**	**NA**	**41.13%**
1	4	5	900	0.16	85.80	127.80	0.02	1490	0.49	1320	0.43	11.40	45.94%
2	4	18	1180	0.19	81.95	212.99	0.03	1490	0.49	1320	0.43	11.40	51.04%
3	4	26	1300	0.19	83.57	213.59	0.03	1490	0.49	1320	0.43	11.40	55.56%
4	4	32	1060	0.15	83.41	175.85	0.02	1490	0.49	1320	0.43	11.40	56.97%
5	4	45	1190	0.24	82.80	204.68	0.04	1490	0.49	1320	0.43	11.40	38.67%
6	4	49	1310	0.26	83.15	220.74	0.04	1490	0.49	1320	0.43	11.40	39.65%
7	4	59	1230	0.24	83.08	208.12	0.04	1490	0.49	1320	0.43	11.40	40.67%
8	4	73	1320	0.23	82.68	228.62	0.04	1490	0.49	1320	0.43	11.40	47.02%
9	4	81	1200	0.13	83.63	196.44	0.02	1490	0.49	1320	0.43	11.40	67.06%
10	4	88	1370	0.20	81.35	255.51	0.04	1490	0.49	1320	0.43	11.40	55.61%
11	4	98	1230	0.14	84.02	196.55	0.02	1490	0.49	1320	0.43	11.40	65.39%
12	4	104	1210	0.10	84.02	193.36	0.02	1490	0.49	1320	0.43	11.40	74.87%
Averages			**1208**	**0.19**	**83.29**	**202.85**	**0.03**	**1490**	**0.49**	**1320**	**0.43**	**11.4**	**53.20%**
Standard Deviations			**127**	**0.05**	**1.12**	**30.95**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**11.61%**
CVs			**10.49%**	**27.19%**	**1.35%**	**15.26%**	**30.31%**	**NA**	**NA**	**NA**	**NA**	**NA**	**21.83%**

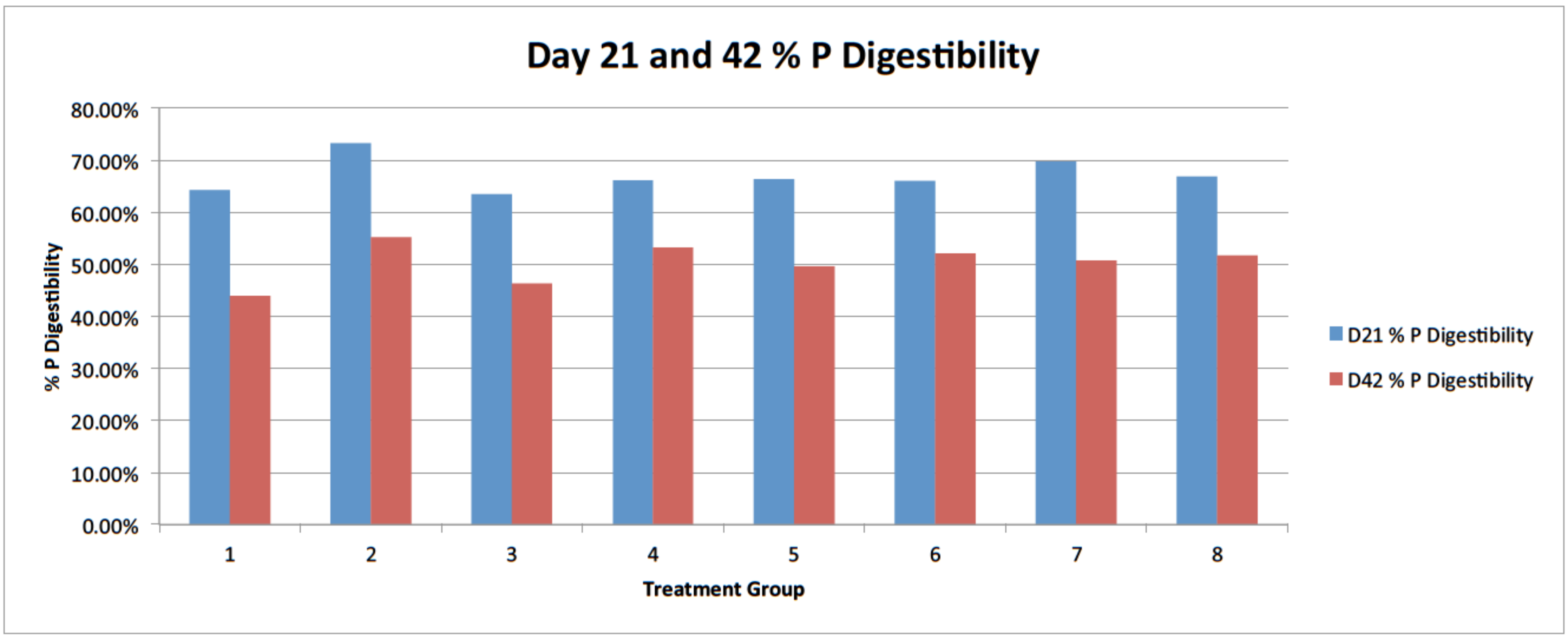
Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Adjusted for Dry Matter: Titanium in Ileal Content Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Adjusted for Dry Matter: Titanium in Feed Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	5	7	1400	0.20	83.38	232.68	0.03	1490	0.49	1320	0.43	11.40	56.56%
2	5	17	1500	0.24	80.94	285.90	0.05	1490	0.49	1320	0.43	11.40	51.35%
3	5	23	1340	0.18	83.29	223.91	0.03	1490	0.49	1320	0.43	11.40	59.15%
4	5	34	1230	0.17	83.60	201.72	0.03	1490	0.49	1320	0.43	11.40	57.97%
5	5	47	1170	0.16	82.99	199.02	0.03	1490	0.49	1320	0.43	11.40	58.42%
6	5	55	1210	0.22	83.13	204.13	0.04	1490	0.49	1320	0.43	11.40	44.71%
7	5	63	980	0.20	83.09	165.72	0.03	1490	0.49	1320	0.43	11.40	37.94%
8	5	74	1520	0.37	82.63	264.02	0.06	1490	0.49	1320	0.43	11.40	25.98%
9	5	80	1410	0.23	82.31	249.43	0.04	1490	0.49	1320	0.43	11.40	50.40%
10	5	93	1140	0.24	83.25	190.95	0.04	1490	0.49	1320	0.43	11.40	35.98%
11	5	101	1230	0.14	83.67	200.86	0.02	1490	0.49	1320	0.43	11.40	65.39%
12	5	107	1250	0.20	84.80	190.00	0.03	1490	0.49	1320	0.43	11.40	51.35%
Averages			**1282**	**0.21**	**83.09**	**217.36**	**0.04**	**1490**	**0.49**	**1320**	**0.43**	**11.4**	**49.60%**
Standard Deviations			**158**	**0.06**	**0.91**	**34.80**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**11.47%**
CVs			**12.30%**	**27.67%**	**1.10%**	**16.01%**	**30.43%**	**NA**	**NA**	**NA**	**NA**	**NA**	**23.12%**

1	6	11	1180	0.20	84.42	183.84	0.03	1490	0.49	1320	0.43	11.40	48.46%
2	6	13	1350	0.25	81.86	244.89	0.05	1490	0.49	1320	0.43	11.40	43.69%
3	6	28	1110	0.14	83.56	182.48	0.02	1490	0.49	1320	0.43	11.40	61.65%
4	6	33	1110	0.20	84.39	173.27	0.03	1490	0.49	1320	0.43	11.40	45.21%
5	6	42	1110	0.19	82.65	192.59	0.03	1490	0.49	1320	0.43	11.40	47.95%
6	6	50	1340	0.23	84.05	213.73	0.04	1490	0.49	1320	0.43	11.40	47.81%
7	6	61	1110	0.19	84.68	170.05	0.03	1490	0.49	1320	0.43	11.40	47.95%
8	6	72	1060	0.16	84.81	161.01	0.02	1490	0.49	1320	0.43	11.40	54.10%
9	6	82	1250	0.24	81.14	235.75	0.05	1490	0.49	1320	0.43	11.40	41.62%
10	6	87	1060	0.14	82.57	184.76	0.02	1490	0.49	1320	0.43	11.40	59.84%
11	6	97	1240	0.17	83.05	210.18	0.03	1490	0.49	1320	0.43	11.40	58.31%
12	6	106	1250	0.13	83.46	206.75	0.02	1490	0.49	1320	0.43	11.40	68.38%
Averages			**1181**	**0.19**	**83.39**	**196.61**	**0.03**	**1490**	**0.49**	**1320**	**0.43**	**11.4**	**52.08%**
Standard Deviations			**103**	**0.04**	**1.17**	**26.08**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**8.27%**
CVs			**8.71%**	**21.47%**	**1.40%**	**13.26%**	**25.54%**	**NA**	**NA**	**NA**	**NA**	**NA**	**15.88%**

Block	Trt Group	Pen	Titanium in Ileal Content (ppm)	Phosphorus (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Adjusted for Dry Matter: Titanium in Ileal Content Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Adjusted for Dry Matter: Titanium in Feed Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Feed Adjusted for Dry Matter	% Moisture in Feed	% Phosphorus Digestibility
1	7	4	1320	0.24	83.95	211.86	0.04	1490	0.49	1320	0.43	11.40	44.71%
2	7	12	1150	0.19	81.81	209.19	0.03	1490	0.49	1320	0.43	11.40	49.76%
3	7	22	1300	0.15	83.37	216.19	0.02	1490	0.49	1320	0.43	11.40	64.91%
4	7	30	1260	0.22	82.99	214.33	0.04	1490	0.49	1320	0.43	11.40	46.91%
5	7	43	1160	0.16	83.66	189.54	0.03	1490	0.49	1320	0.43	11.40	58.06%
6	7	51	960	0.16	83.62	157.25	0.03	1490	0.49	1320	0.43	11.40	49.32%
7	7	66	1160	0.12	82.91	198.24	0.02	1490	0.49	1320	0.43	11.40	68.54%
8	7	67	1300	0.26	83.10	219.70	0.04	1490	0.49	1320	0.43	11.40	39.18%
9	7	83	1370	0.19	82.98	233.17	0.03	1490	0.49	1320	0.43	11.40	57.83%
10	7	92	1300	0.25	84.05	207.35	0.04	1490	0.49	1320	0.43	11.40	41.52%
11	7	103	1410	0.22	83.07	238.71	0.04	1490	0.49	1320	0.43	11.40	52.55%
12	7	110	1180	0.25	84.27	185.61	0.04	1490	0.49	1320	0.43	11.40	35.58%
Averages			**1239**	**0.20**	**83.32**	**206.76**	**0.03**	**1490**	**0.49**	**1320**	**0.43**	**11.4**	**50.74%**
Standard Deviations			**123**	**0.05**	**0.66**	**22.02**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**10.12%**
CVs			**9.92%**	**22.91%**	**0.79%**	**10.65%**	**21.91%**	**NA**	**NA**	**NA**	**NA**	**NA**	**19.95%**
1	8	8	1440	0.21	81.77	262.51	0.04	1490	0.49	1320	0.43	11.40	55.65%
2	8	19	1360	0.31	83.92	218.69	0.05	1490	0.49	1320	0.43	11.40	30.69%
3	8	29	1400	0.29	82.15	249.90	0.05	1490	0.49	1320	0.43	11.40	37.01%
4	8	31	1860	0.23	74.51	474.11	0.06	1490	0.49	1320	0.43	11.40	62.40%
5	8	41	950	0.09	83.72	154.66	0.01	1490	0.49	1320	0.43	11.40	71.19%
6	8	56	1320	0.26	83.98	211.46	0.04	1490	0.49	1320	0.43	11.40	40.11%
7	8	64	1250	0.23	81.62	229.75	0.04	1490	0.49	1320	0.43	11.40	44.05%
8	8	69	1280	0.21	83.69	208.77	0.03	1490	0.49	1320	0.43	11.40	50.11%
9	8	85	1270	0.15	83.23	212.98	0.03	1490	0.49	1320	0.43	11.40	64.08%
10	8	86	1340	0.13	81.61	246.43	0.02	1490	0.49	1320	0.43	11.40	70.50%
11	8	99	1140	0.20	83.11	192.55	0.03	1490	0.49	1320	0.43	11.40	46.65%
12	8	105	1100	0.19	84.10	174.90	0.03	1490	0.49	1320	0.43	11.40	47.48%
Averages			**1309**	**0.21**	**82.28**	**236.39**	**0.04**	**1490**	**0.49**	**1320**	**0.43**	**11.4**	**51.66%**
Standard Deviations			**222**	**0.06**	**2.63**	**80.99**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**13.19%**
CVs			**16.92%**	**30.55%**	**3.20%**	**34.26%**	**34.32%**	**NA**	**NA**	**NA**	**NA**	**NA**	**25.53%**

Graph 7. % Phosphorus Digestibility on Day 21 and Day 42
CQR Study Number AGV-15-3
Facility Number 8W

Trt Group	D21 % P Digestibility	D42 % P Digestibility	Treatment Description
1	64.26%	44.00%	Low Phosphate (LP)
2	73.29%	55.25%	High Phosphate (HP)
3	63.47%	46.28%	250 Units Phytase (LP)
4	66.20%	53.20%	500 Units Phytase (LP)
5	66.36%	49.60%	750 Units Phytase (LP)
6	66.01%	52.08%	1000 Units Phytase (LP)
7	69.80%	50.74%	3000 Units Phytase (LP)
8	66.88%	51.66%	Phytase 2500 TPT Premix at 0.02% of Finished Feed (LP)



Appendix 10

GraINzyme Phytase Phy02 Dose Response in Poultry

Project No. AGV-15-4

Conducted by Colorado Quality Research, Ft. Collins, CO

Final Study Report Pages 1 - 143

COLORADO QUALITY RESEARCH FINAL REPORT

GraINzyme Phytase Phy02 Dose Response with Tolerance in Poultry

Project No. AGV-15-4

SPONSOR

Agrivida, Inc.
200 Boston Ave, Suite 2975
Medford, MA 02155

TEST FACILITY

COLORADO QUALITY RESEARCH, INC.
400 East County Road 72
Wellington, CO 80549

May 2016

GOOD LABORATORY PRACTICE COMPLIANCE STATEMENT

This study was conducted in accordance with this protocol, CQR and Agrivida Standard Operating Procedures, and the principles and guidelines for the care and use of agricultural animals in research (FASS, 2010). The portion of this study conducted by Colorado Quality Research was conducted in compliance with the Food and Drug Administration's Good Laboratory Practice for Nonclinical Laboratory Studies regulation (21 CFR Part 58). Specific items that were not conducted under GLP per protocol were:

- Tibia ashing
- Ileal Phosphorus Digestibility Testing
- Total coliform analysis of test facility water by Stewart Environmental Consultants, Inc.
- Northern Colorado Water Association water testing
- Diet Formulations
- Proximate Analysis
- Yearly scale licensing by the State of Colorado
- Enzyme analyses of the feed samples by Agrivida
- Statistical analyses performed by Agrivida
- Hematological Assays
- Test diet analysis

Study Director:

06MAY16

Dan Moore, Ph.D. Date
Colorado Quality Research, Inc.
400 E. County Road 72, Wellington, CO 80549

QUALITY ASSURANCE STATEMENT

Study Title: GraINzyme Phytase Phy02 Dose Response with Tolerance in Poultry

Study Number: AGV-15-4

Reviews conducted by the Quality Assurance Unit confirm that the final report accurately describes the methods followed and accurately reflect the raw data for the portion of the study conducted by Colorado Quality Research, Inc. (CQR).

Following is a list of reviews conducted by Integrated Quality Management on the study reported herein. The original Quality Assurance Reports will be retained at Colorado Quality Research.

Dates of Inspection/Audit	Phase	Date Reported To: Study Director	Date Reported To: Management
1 May 2015	Protocol Review	1 May 2015	1 May 2015
23-14 May 2015	Treatment Diets – Preparation and Sampling	30 July 2015	30 July 2015
29 July 2015	Day 0 – Bird Receipt and Placement	30 July 2015	30 July 2015
9 September 2015	Day 42 – Necropsy and Sample Collection	10 September 2015	10 September 2015
8, 30, 31 March 2016	Raw Data/Study Record Review	1April 2016	1April 2016
8,30,31 March and 1 April 2016	Final Report Review	1 April 2016	1 April 2016

Catherine Bens
Contract Quality Assurance
Integrated Quality Management

6 May 2016
Date

STUDY DIRECTOR'S COMMENTS/CERTIFICATIONS STATEMENT

No adverse effects were observed. There were 5 protocol deviations during the course of the study; however, none had an impact on the quality of the data obtained in the study.

I, Dan Moore, Study Director, attest that Study No.AGV-15-4 was conducted according to the Protocol, amendments and deviations and that the data were collected and recorded in accordance with the applicable Food and Drug Administration, Center for Veterinary Medicine (CVM) Guidelines.

Study Director

06MAY16
Date

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I. STUDY TITLE

GraINzyme Phytase Phy02 Dose Response with Tolerance in Poultry

II. PROTOCOL NUMBER

CQR Protocol Number AGV-15-4

III. STUDY SPONSOR

Agrivida, Inc.
200 Boston Ave, Suite 2975
Medford, MA 02155
919-675-6666

IV. STUDY OBJECTIVE(S)

The objective of this study was to demonstrate the effectiveness over a range of doses of Phy02, a phytase enzyme product that is being developed by Agrivida, Inc. as a feed additive for poultry diets. In addition, this study included a tolerance dose to demonstrate tolerance of broilers to high doses of the Phy02 phytase.

V. STUDY SCHEDULE

A. Experimental Start Date (Day 0)

July 29th, 2015

B. Schedule of Events

Event	Study Day	Calendar Date
Received, weighed birds by pen, vaccinated for NCB, and placed 17 chicks/pen; Administered Starter 1 diets.	0	29JUL15
Weighed birds by pen; Weighed back Starter 1 diets; Administered Starter 2 diets.	14	12AUG15
Weighed birds by pen; Weighed back Starter 2 diets and changed to Grower/Finisher diets; Removed 3 birds/pen; collected ileal and tibia samples	21	19AUG15

Weighed birds by pen; Weighed back Grower/Finisher diets; Collected tibia and ileal content samples from 3 birds/pen; Collected hematological samples from 3 birds/pen in Trt Groups 2 and 8; Necropsied same 3 birds/pen in Trt Groups 2 and 8 for pathological or toxicological symptoms (collected tissues per Protocol Amendment 3); Ended live phase	42	09SEP15

C. Experimental End Date (Day 42)

September 9th, 2015

VI. STUDY DESIGN

A. Treatment Groups

Treatment groups were defined as follows:

Table 1. Summary of Study Design

Trt Group	Description	No. Pens	No. Birds/Pen	No. Birds/Trt
1	Low Phosphate (LP)	12	17	204
2	High Phosphate (HP)	12	17	204
3	250 Units Phytase (LP)	12	17	204
4	500 Units Phytase (LP)	12	17	204
5	750 Units Phytase (LP)	12	17	204
6	1000 Units Phytase (LP)	12	17	204
7	3000 Units Phytase (LP)	12	17	204
8	30,000 Units Phytase (LP)	12	17	204
Totals		**96**	**NA**	**1632**

B. Experimental Design

The test facility (Building #7) was divided into 12 blocks of 8 pens per block (See **APPENDIX 2**). Treatments were assigned to the pens using a complete randomized block design (see section VI.D.2). Birds were assigned to pens randomly according to CQR SOP B-10. Specific treatment groups are detailed in section VI.A.

C. Blocking Factor(s)

Pen location.

D. Randomization Procedures

1. Allocation of Animals to Treatment Groups

Birds were assigned to pens randomly according to CQR SOP B-10.

2. Allocation of Treatment Groups to Pens

The assignment of treatment codes to pens was conducted using Microsoft Excel 2007. The computer-generated assignment of treatment codes to pens was as follows:

Table 2. Assignment of Treatment Codes to Pens

	Treatment Codes							
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Block 1	135	134	98	97	136	99	133	100
Block 2	107	101	102	105	106	108	103	104
Block 3	110	112	113	114	115	111	116	109
Block 4	120	121	117	124	122	118	119	123
Block 5	130	125	129	132	127	131	128	126
Block 6	140	178	177	139	137	138	180	179
Block 7	145	142	144	143	141	148	146	147
Block 8	153	151	152	149	154	155	156	150
Block 9	164	166	165	163	162	160	161	159
Block 10	168	174	173	171	169	167	172	170
Block 11	186	187	182	185	181	184	188	183
Block 12	194	189	196	190	192	193	191	195

3. Allocation of Treatment Codes to Treatment Groups

The assignment of treatment codes (A – H) to treatment groups was conducted using Microsoft Excel 2007 and documented in a Note to File. See Section VII.D.

The following table illustrates the treatment code assignment:

Table 3. Assignment of Treatment Codes to Treatment Groups

Treatment Group	Treatment Code
1	E
2	D
3	F
4	G
5	H
6	A
7	B
8	C

VII. STUDY PROCEDURES

A. Test Animals

1. Description

Commercial Broiler Chickens

a) Age:

~1 Day-of-age upon receipt (Day 0)

b) Sex:

Male

c) Breed/Class:

Cobb 500

d) Average Initial Body Weight:

44 grams (Range of 41 to 46 grams)

e) Physiological State:

Growing broiler chicks

2. Number of Animals

Number of Birds/Pen: 17
Number of Birds/Treatment: 204
Total Number of Birds: 1632

Pen 119 inadvertently had 18 birds per pen from Day 0-14, at which time the extra bird was removed (per deviation 3).

3. Source of Animals

Birds were obtained from the Cobb-Vantress hatchery in Siloam Springs, Arkansas. The Study Director was responsible for identifying the source of the animals for use in the study. This information was documented and maintained in the study record.

4. Identification Method

There was one card attached to each pen identifying the pen number. A second card attached to each pen identified the treatment code (See Section VII.D).

Prior to Study Day 21, all birds were identified with a uniquely numbered identification tag attached at the back of the neck.

B. Inclusion Criteria

Chicks were visually observed by a veterinarian and only healthy chicks (alert and mobile) were placed on the study.

C. Exclusion Criteria

Upon visual evaluation at placement, birds that appeared unthrifty, ill, or injured were not eligible for inclusion on the study.

D. Blinding of Study

1. Extent of Blinding

Individuals responsible for the collection of data (e.g. pen weights, feed weights, daily observations, biological samples, etc) were blinded to treatment identity.

2. Blinding Methods and Procedures

Letter codes (A, B, C, D, E, F, G, and H) were randomly assigned to treatment groups using Microsoft Excel 2007's random numbers generator. Treatment feeds and pens were labeled with the assigned letter codes instead of treatment group identities. See Section VI.D.3.

3. Personnel with Access to Treatment Codes and Rationale

Personnel with access to the treatment codes included feed mill staff and those individuals not responsible for the collection of data.

E. Study Methods

1. Measurements Made

a) Body Weight

Birds by pen on Study Days 0, 14, 21, and 42. The weights of all mortalities and culls over the course of the study were recorded on the Mortality & Necropsy Records for the appropriate pens. Average bird weight on a pen basis, on each weigh day, was summarized.

b) Pen Feed Intake

The feed remaining in each pen's feeder was weighed and the amount of feed consumed per pen was calculated by subtracting the feed weighed out of the pen from the total amount of feed weighed into the pen. Feeders were weighed on or before Study Day 0 and on Study Days 14, 21, and 42.

c) Performance Data

Average feed conversion was calculated for Days 0 – 14, 14 – 21, 0 – 21, 21 – 42, and 0 – 42 by dividing the total feed intake for that pen by the weight of the surviving birds in that pen.

Adjusted feed conversion was calculated for Days 0 – 14, 14 – 21, 0 – 21, 21 – 42, and 0 – 42 by dividing the total feed intake for that pen by the weight of the surviving birds in that pen and the weight of the birds that died or were removed from that pen.

d) Bone Parameters and Ileal Phosphorus Digestibility

TiO2 was placed in all feeds beginning at Study Day 14.

At Days 21 and 42, three birds were randomly collected from each pen, sacrificed and ileal and left tibia samples were collected. The tibia samples were pooled in one bag per pen (3 tibias per pen in a bag). Adhering muscle was carefully removed from each tibia to get them mostly clean and then they were frozen and prepared to be shipped to the lab (University of Arkansas). The left tibias were ashed to determine % ash (AOAC 923.03).

The ileal samples were also be pooled in one plastic vial per pen (3 ileal samples per pen in a vial) and were frozen and shipped to the lab (University of Missouri) for determination of ileal phosphorus digestibility. From each bird, starting at the Meckel's Diverticulum, the contents of the ileum were squeezed into the plastic bags.

e) Hematological Endpoints

For only treatment groups 2 (High Phosphate control) and 8 (30,000 Units Phytase). At Day 42, prior to euthanasia for tibia and ileal content collection, blood was collected from the same three birds indicated in the above section for hematological analyses.

From each bird a minimum of 1.0 mL of whole blood was collected into a lavender top EDTA containing tube via the brachial vein. Tubes were labeled with study number, animal number, pen number, and date of collection. It was mixed by gently inverting the tube 5 to 6 times. Two peripheral blood smears were prepared from each lavender top tube. The animal identification number was written on the frosted edge of the slides with a lead pencil. The lavender top tubes were shipped on ice packs to the performing laboratory.

From each bird a mimimum of 2.0 mL of whole blood was collected into a gold SST tube via the brachial vein. Tubes were labeled with study number, animal number, pen number, and date of collection. Blood was allowed to clot for ~30 minutes. The tubes were centrifuged for 10 – 15 minutes. For each sample, the serum was transferred from the SST tube into the tall plastic tube labeled "Serum Tube." (A minimum of 0.56 mL of serum was required. The preferred volume was 1.0 mL). The SST tubes were discarded after removing the serum.

Samples were shipped on ice packs to Marshfield Labs.

The following hematological endpoints were assayed:

Red Blood Cells (RBC)	Glucose (GLU)	Basophil (BASO)
Haematocrit (HCT)	Phosphorus (PHOS)	Lymphocytes (LYMPH)
Mean Corpuscular Volume (MCV)	Alanine aminotransaminase (ALT)	Monocytes (MONO)

Blood Platelet (PLT)	Creatine Phosphphokinase (CPK)	Mean Corpuscular Hemoglobin (MCH)
White Blood Cells (WBC)	Haemoglobin (HGB)	Mean Corpuscular Hemoglobin Concentration (MCHC)
Albumin (ALB)	Eosinophil (EOS)	Red Cell Distribution Width (RDW)
Heterophils (HET)	Absolute Band Heterophils (ABBHET)	Absolute Heterophils (ABHET)
Absolute Lymphocytes (ABLYMP)	Absolute Activated Lymphocytes (ABACTL)	Absolute Monocytes (ABMONO)
Absolute Eosinophils (ABEOS)	Absolute Basophils (ABBASO)	Total Protein (TP)
Globulin (GLOBU)	Albumin/Globulin (A/G)	Creatine Kinase (CK)

f) Histological Sampling

There were no abnormal findings in any birds belonging to group 8 and thus no histological samples were collected.

F. Study Facilities

1. Containment Equipment

Birds were housed in concrete floor pens (~3' x 5') within an environmentally controlled facility (Building #7). All birds were placed in clean pens with clean pine shavings as bedding. Additional shavings were added to pens if they became too damp for comfortable conditions for the test birds during the study. Floor space, temperature, lighting, bird density, and feeder and waterer space were similar for all treatment groups. In order to prevent bird migration, each pen was checked to ensure that no openings greater than 1 inch existed for approximately 14 inches in height between pens. To achieve this, a solid partition was in place for approximately the first 12 inches from the floor between each pen.

2. **Lighting Equipment**

Lighting was via incandescent lights and a commercial lighting program was used. Hours of light for every 24-hour period were as follows:

Approximate Bird Age (Days)	Approximate Hours of Continuous Light per 24 Hour Period	Approximate Light Intensity (foot candles)
0 – 4	24	1.0 – 1.3
5 – 10	10	1.0 – 1.3
11 – 18	12	0.2 – 0.3
19 – Study End	16	0.2 – 0.3

3. **Heating Equipment**

Building #7 was heated with 2 forced air propane heaters & 1 supplemental heater when needed.

4. **Cooling Equipment**

Evaporative cooling cells and negative pressure ventilation.

5. **Feeding Equipment**

Feed was provided *ad libitum* throughout the study via one hanging, ~17 inch diameter tube feeder per pen. One chick feeder tray was placed in each pen for approximately the first four days. Birds were placed on their respective treatment diets on Day 0 and as per the experimental design.

6. **Watering Equipment**

Water was provided *ad libitum* throughout the study via one automatic nipple drinker (4 nipples per drinker) per pen. Drinkers were checked twice daily and cleaned as needed to ensure a clean and constant water supply to the birds.

7. **Ventilation Equipment**

Ventilation was provided by negative pressure with a Plenum (air mixing chamber). There were two air circulating tubes each with a tube fan and two exhaust fans.

8. Space Allocation per Animal

Stocking density was representative of industry standards and was the same across pens on Day 0 (~ 0.88 ft^2/bird), with the exception of pen 119 into which an extra bird was inadvertently placed on Day 0. The bird was removed following Day 14 pen weights and the occurrence documented in a Note to File and Deviation 3 in the study records.

9. Facility Diagram

See **APPENDIX 2**.

G. Experimental Diets

1. Diet Formulation

Diets were formulated by CQR. Diets met and conformed with the commercial standards for feed used based on breed and age range of broilers. Copies of the diet formulations were included in the study records and Final Report (**APPENDIX 1**).

There were two different basal diet formulations. Low Phosphate (LP) diets were formulated to contain 0.3% available phosphate (AvP) in the Starter 1 and Starter 2 diets and 0.25% AvP in the Grower/Finisher diets. The LP diets were used for Treatment Groups 1 and 3 – 8. The High Phosphate (HP) diets were formulated to contain 0.45% AvPin the Starter 1 and Starter 2 diets and 0.4% AvP in the Grower/Finisher diets. The HP diet was used as a basal for Treatment Group 2 (Positive Control) only.

a) Feed Additives

Salinomycin was added to the Starter 1 and Starter 2 diets at a level of 50 g/ton in the complete feed. (Bio-Cox 60; Salinomycin sodium; 60 g/lb; Lot Number HSK20483; Expiration OCT 2015; Alpharma).

Titanium dioxide was added to the Starter 2 and Grower/Finisher diets at a level of 0.30% in the basal feed.

b) Vitamin and Mineral Premixes

Table 4. Colorado Quality Research Trace Mineral Premix Formulation

Calcium (Ca) Min	5.35%
Calcium (Ca) Max	6.45%
Manganese (Mn) Min	12.01%
Zinc (Zn) Min	9.90%
Iron (Fe) Min	3.95%
Magnesium (Mg) Min	2.48%
Copper (Cu) Min	1.022%
Iodine (I) Min	1400 ppm
Selenium (Se) Min	300 ppm
Ingredients: Calcium carbonate, basic copper chloride, ferrous sulfate, magnesium oxide, manganese sulfate, zinc sulfate, calcium iodate, sodium selenite, mineral oil	

Table 5. Guaranteed Analysis of Vitamin Premix (Minimum per Pound)

Vitamin A, IU	4,250,000
Vitamin D3, IU	1,375,000
Vitamin E, IU	12,500
Vitamin B12, mg	6
Biotin, mg	40
Menadione, mg	875
Thiamine, mg	875
Riboflavin, mg	3,500
d-Pantothenic Acid, mg	5,500
Vitamin B6, mg	1,400
Niacin, mg	22,500
Folic Acid, mg	450
Ingredients: Rice hulls, calcium carbonate, ehoxyquin, vitamin E supplement, niacin supplement, mineral oil, calcium pantothenate, riboflavin supplement, vitamin A supplement, vitamin D3 supplement, menadione sodium bisulfate complex, pyridoxine hydrochloride, thiamine mononitrate, vitamin B12 supplement, folic acid, and biotin.	

2. Sampling and Assays

Prior to the pelleting process, a ~500g sample was taken of all treatment diets.

Following pelleting, treatment feeds were sampled (~500 g sample size) in duplicate according to CQR standard operating procedures (SOP FM-4 rev04). Five to ten samples of approximately equal size were collected from evenly distributed points as the feed was exiting the mixer/pelleter. These samples were combined into a representative composite sample which was then split into two duplicate samples in a manner appropriate to ensure minimal risk of cross-contamination. One sample was submitted to Agrivida for enzyme (phytase) analysis. The second sample of the treatment feeds was retained by CQR until notification from the Sponsor was received that the back-up samples were no longer needed. All samples were labeled with the CQR project number, sample description, and date of collection.

Basal feeds were sampled (~500 g sample size) in triplicate according to CQR standard operating procedures. One sample was submitted to MVTL for proximate analysis(with the addition of lysine, Methionine, calcium, and phosphorus analysis) [See the following: AOAC 942.05; AOAC 930.15; AOAC (18) 2005 985.01; AOAC 968.08 (D.(a)); AOAC 990.03; AOAC 2003.06; AOAC 2003.05; ISO 11085-2008; AN 3414 (2005-03-02) Revision 4.1; AOAC (18) 2005 Method 994.12; and AOCS B1 6a-05], one sample was submitted to Agrivida for enzyme (phytase) analysis, and the third sample was retained by CQR until the Sponsor requested that it be shipped to the University of Missouri for additional analyses. All samples were labeled with the CQR project number, sample description, and date of collection.

3. Feed Form

Starter 1 was fed as crumbles. Starter 2 and Grower/Finisher were pelleted.

4. Manufacture of the Experimental Diets

Basal diets were manufactured at CQR and stored in bulk mash form. The treatment diets were mixed at the CQR feed mill. A 500 pound capacity vertical mixer, a 4000 pound capacity vertical mixer, or a 14,000 lb horizontal mixer and a California Pellet Mill system were used to prepare the starter and grower/finisher diets. Feed was pelleted using a ~5-mm die and the starter 1 diet was further processed into crumbles. The pelleting temperature was ~65 ºC. Mixed feed was stored in bulk storage bins labeled with study number, treatment letter code, and diet type. Complete records of diet mixing were included in the study records.

5. Feeding Program

Feed was provided *ad libitum* throughout the study. Feed added and removed from pens was weighed and recorded from Day 0 to end of study (Day 42). Diet changes were conducted at the same time for all pens. The following feeding program was followed:

Diet	Form	Period	~Lbs of Mixed per Trt
Starter 1	Crumbled	0 – 14 Days	300
Starter 2	Pelleted	14 – 21 Days	390
Grower/Finisher	Pelleted	21 – 42 Days	1680

6. Watering Program

Water was provided *ad libitum* throughout the study.

H. Drug Administration

The only drug administered in this study (with the exception of Salinomycin in the Starter 1 and Starter 2 diets) was the test article as is detailed in section VI.A.

I. Removal of Test Subjects

1. Criteria for Removal

Birds that developed clinically significant concurrent disease unrelated to the test procedures may, at the discretion of the Study Director or a designee, have been removed from the study. Moribund and/or injured birds may also have been euthanized upon the authority of the facility veterinarian or a qualified technician. Sex-slips, when noted, were euthanized by a qualified technician.

2. Removal Procedure

If an animal died, or was removed and euthanized for humane reasons, it was weighed and recorded on the mortality sheet for the pen and a necropsy performed. The reason for removal was documented. All removed birds were euthanized by cervical dislocation.

3. Fate of Removed Test Subjects

Birds were euthanized and disposed of by landfill via commercial dumpster. No birds entered the human food chain.

J. Vaccinations

Birds were vaccinated for Mareks at the hatchery. Upon the receipt, the chicks were vaccinated for Newcastle Disease (Poulvac Aero® ND; B1 Type, B1 Strain, Live Virus; Zoetis Inc, Kalamazoo, MI; Serial No. 1407910; Expiration 24MAR17) and Newcastle Infectious Bronchitis (Bronchitis Vaccine; Mass. Type, Live Virus; Pfizer Animal Health, Exton, PA; Serial No. 1308001; Expiration 14SEP15) using a spray cabinet. No other vaccinations or treatments were administered during the course of the study unless approved by the Sponsor.

K. Concurrent/Concomitant Medications/Therapies

No concomitant therapy was allowed during this study. Individual animals requiring therapy were removed, euthanized, and disposed of.

L. General Management Practices

The test facility, pens and birds were observed at least twice daily for general flock condition, lighting, water, feed, ventilation, and unanticipated events. If abnormal conditions or abnormal behavior was noted at any of the twice-daily observations they were documented and documentation was included with the study records. The minimum-maximum temperature and humidity of the test facility was recorded once daily.

M. Disposal of Test Subjects

An accounting was maintained of all birds received for the study. Refer to Section VII.I for the management of test subjects removed during the course of the study. At study completion, birds were sacrificed by cervical dislocation. The meat from the birds did not enter the human food chain. Removed birds, mortalities, carcasses, and meat were placed in a dumpster and transported to a commercial landfill for burial. Documentation of test animal disposition was included in the study records and described in the Final Report.

VIII. Specification of Variables

A. Variables Measured for Evaluating Labeled Claim

1. Pen weights at Study Days 0, 14, 21, and 42.
2. Pen feed intake for Days 0 – 14, 14 – 21, 21 – 42, 0 – 21, and 0 – 42.
3. Performance data (feed conversion and adjusted feed conversion) for Days 0 – 14, 14 – 21, 0 – 21, 21 – 42, and 0 – 42.
4. Tibia Ash Parameters of 3 birds per pen at Study Days 21 and 42.
5. Ileal Phosphorus Digestibility of 3 birds per pen at days 21 and 42.
6. Hematological Endpoints at Day 42 for 3 birds per pen belonging to treatment groups 2 and 8
7. Necropsy Data at Day 42 for 3 birds per pen belonging to treatment groups 2 and 8

B. Other Variables Recorded During the Study

Feed analysis for test article and proximate analysis.

IX. Data Analysis

A. Experimental Unit

The experimental unit was the pen.

B. Number of Replicates per Treatment

There were twelve replicates per treatment.

C. Statistical Methodology

The experimental design was a randomized complete block design. Pen location within the barn was used as the blocking criteria. Each of the 12 blocks had 8 pens to which the treatments were randomly distributed. Pen was used as experimental unit for each analyzed variable. Data was analyzed using fit least squares of the JMP software (version 12, SAS Institute Inc., Cary, NC). The ANOVA model included treatment and block. Mean values were separated using Tukey's honesty significant difference procedure. P-values < 0.05 was considered significant in all comparisons.

D. Basis for Study Conclusion

The basis for study conclusion included dose response to the phytase in terms of survivability, body weights, bone ash and ileal Phosphate digestibility, and feed conversion ratios between control and treated birds.

X. Study Locations and Personnel

Study Director	
Dan Moore, PhD (CV: on file, available upon request)	Colorado Quality Research, Inc. 400 E. County Road 72 Wellington, CO 80549 W: 970-568-7738 F: 970-568-7719 dan@coloradoqualityresearch.com
Test Facility Management	
Stephen Davis, DVM, Dip. ACPV (CV: on file, available upon request)	Colorado Quality Research, Inc. 400 E. County Road 72 Wellington, CO 80549 W: 970-568-7738 F: 970-568-7719 steve@coloradoqualityresearch.com
Testing Facility Quality Assurance (QA) Officer	
Catherine Bens, MA (CV: on file, available upon request)	Integrated Quality Management 389 Big Sky Place Wellington, CO 80549-2131 W: 970-214-8035 catbens@cowisp.net
Sponsor Representative	
Jim Ligon, PhD (CV: on file, available upon request)	Agrivida, Inc. VP Business Development 200 Boston Ave, Suite 2975 Medford, MA 02155 M: [redacted] (b) (6) [redacted] (b) (6)@gmail.com
Enzyme Analysis	
Phillip A. Lessard, Ph.D. (CV: on file, available upon request)	Agrivida, Inc. 200 Boston Ave., Suite 2975 Medford, MA 02155 Philip.lessard@agrivida.com
Statistician	
Jonathan Broomhead, Ph.D. (CV: on file, available upon request)	Agrivida, Inc. 200 Boston Ave., Suite 2975 Medford, MA 02155 jon.broomhead@agrivida.com
Contributing Scientist – Tibia Ash Parameters	
Linda Kirby (CV: on file, available upon request)	University of Arkansas Central Analytical Lab 1260 W. Maple Street Fayetteville, AR 72701 lkirby@uark.edu

Contributing Scientist – Ileal Phosphorus Digestibility, Feed Analysis	
Thomas P. Mawhinney (CV: on file, available upon request)	Experimental Station Chemical Laboratories Room 4, Agricultural Building University of Missouri Columbia, MO 65211-7170 mawhinneyt@missouri.edu
Contributing Scientist – Proximate Analysis of Basal Feeds	
Bryan Brock (CV: on file, available upon request)	MVTL Laboratories 2 N. German Street New Ulm, MN 56072 W: (800) 782-3557 bbrock@mvtl.com
Contributing Scientist – Hematological Endpoints	
Shelley A VanProosdy (CV: on file, available upon request)	Marshfield Laboratories 1000 North Oak Avenue Marshfield, WI 54449-5795 W: (715) 221-6284 F: (715) 221-6279 Vanproosdy.shelley@marshfieldclinic.org

XI. Collection and Retention of Source Data

Contributing scientist reports were provided to the Study Director for the preparation of the Final Report by participating outside laboratories. Raw data from contributing scientists was sent to CQR. Original documents were forwarded to the Study Sponsor and exact copies of the raw data were archived at CQR.

The Study Director's Final Report, electronic Microsoft Excel files of the data, and original study records were provided to the Study Sponsor. An exact copy of the final report and all study records was kept for five years in the CQR archive. The CQR archive is located at 400 East County Road 72, Wellington, Colorado.

XII. Addendums/Deviations to the Protocol

Any planned change in the final approved protocol was documented as an amendment. Any unplanned change from the approved protocol was documented as a deviation. The amendments/deviations contained, but were not limited to: the study number, amendment/deviation number, name of the Study Director, identification of the protocol section and page number affected, reason(s) for the protocol amendment/deviation, how the change will affect the study, and effective date.

Protocol changes were discussed and agreed upon by the Study Sponsor. Deviations were reported to the Study Sponsor immediately after they were detected. Protocol amendments were signed and dated by the Study Director and Sponsor Representative. Copies of amendments/deviations were provided to the QA Consultant and the Study Sponsor. Amendments/deviations were appended to the protocol and addressed in the Final Study Report.

There were five protocol deviations over the course of the study. They are summarized below:

Table 6. Protocol Deviations

Deviation No.	Reason for Deviation	Expected Impact on Study
1	Titanium dioxide was added to the basal feed at a level of 0.30%. The levels in the completed feed were calculated and included in the text of the deviation.	None.
2	Birds were not tagged upon placement.	None.
3	There was an extra bird inadvertently placed into Pen Number 119 on Day 0.	None.
4	Hematological data that was not originally indicated in Amendments 3 and 4 was provided by the performing laboratory.	Positive. Additional data obtained.
5	Hematological assays were not conducted under GLP. No written reports of inspections/audits were performed by Agrivida's Quality Assurance Unit. A ~500g sample of the test article was not shipped to Phil Lessard prior to study start.	None.

There were four protocol amendments over the course of the study. They are summarized below:

Table 7. Protocol Amendments

Amendment No.	Protocol Section(s) Affected	Reason for Amendment	Expected Impact on Study
1	VI.B. Schedule of Events; VIII.A.d Initial Body Weight; VIII. E. Study Methods; VIII.G.2. Sampling and Assays; IX. Specification of Variables; XI. Study Locations and Personnel	Birds were to be weighed by pen on Day 0 instead of individually. Birds were to be weighed on Day 14 at the time of feed change. It was decided to collect ileal content into plastic vials. The sponsor requested additional analyses from MVTL.	No impact is expected as a result of Day 0 pen weights or ileal sample containers. Day 14 weights and additional basal feed analysis provided additional data to the study.
2	VIII.A.4 Identification Method; VIII.H. Drug Administration;	Birds were to be tagged prior to Day 21. Salinomycin was indicated as a drug administered to the birds.	None.
3	VI.B. Schedule of Events; VIII. E. Study Methods; IX. Specification of Variables; XI. Study Locations and Personnel	Hematological and histological analyses were added to the protocol.	Positive. Additional data was obtained.
4	Amendment 3 VI.B. Schedule of Events; Amendment 3 VIII.E.1.e Hematalogical Endpoints; X.C. Statistical Methodology; X.D. Basis for Study Conclusion; XI. Study Locations and Personnel	A typographical error was corrected in the Schedule of Events. It was clarified that barcoded labels would be affixed to hematological samples at the lab. Statistical Methodology information and the basis for study conclusion was amended to the protocol.	None.

XIII. Investigational Test Substance

A. Test Article

1. Chemical Name

Phytase

2. Trade Name

GraINzyme Phytase Phy02

3. Active/Inactive Ingredients

Phytase ((b) (4) FTU/g)

4. Dosage Form

Via complete feed.

5. Dose(s) Tested

250 Units Phytase/kg of complete feed
500 Units Phytase/kg of complete feed
750 Units Phytase/kg of complete feed
1000 Units Phytase/kg of complete feed
3000 Units Phytase/kg of complete feed
30000 Units Phytase/kg of complete feed

Test article was added to the basal feed in the following approximate quantities in order to achieve the targeted levels of phytase in the treatment feeds:

Table 8. Pounds of Test Article Added to Feed to Deliver Desired Dose

Trt Group	Product	Target Dose (FTU/kg)	Starter 1	Starter 2	Grower/Finisher
1	NA	0	NA	NA	NA
2	NA	0	NA	NA	NA
3	GraINzyme Phytase Phy02[1]	250			(b) (4)
4	GraINzyme Phytase Phy02[1]	500			
5	GraINzyme Phytase Phy02[1]	750			
6	GraINzyme Phytase Phy02[1]	1000			
7	GraINzyme Phytase Phy02[1]	3000			
8	GraINzyme Phytase Phy02[1]	30000			

[1] Concentration of GraINzyme Phytase Phy02 as determined analytically by Agrivida was (b) (4) FTU/g.

6. **Lot Number**

TAVPHY02_0018

7. **Expiration Date**

17OCT15

8. **Packaging**

Double-bagged within three solid plastic pails

9. **Test Substance Storage During Study**

Locked, temperature controlled, dry area.

10. **Material Safety Data Sheet (MSDS)**

An MSDS was provided by the Study Sponsor and maintained in the study records.

XIV. Test Article Disposition, Animal Accountability, Feed Disposition, and Feed Accountability

A. Excess Test and Control Articles

An accounting of test article received and used was documented. Any test article not used to mix the complete feed was disposed of by burial at a local commercial landfill, or will be used or discarded as directed by the Sponsor. Documentation of unused test article and sample disposal is included in the study records.

B. Feed

An accounting was maintained of all treatment diets. The amount mixed, used, and discarded was documented. Unused feed and retained feed samples were disposed of by placing into a dumpster for commercial transport to a local landfill for burial.

C. Test Animals

An accounting was maintained of all birds received for the study. Birds were sacrificed at study end for tissue collection. Meat from these birds was not used for human consumption. Removed birds, mortalities, carcasses, and meat were transported to a commercial landfill for burial.

XV. Adverse Events

A. Definition

Adverse Events were defined as in CQR SOP B-63. An adverse event was classified as any observation in animals that is unfavorable and unintended and occurs after the use of a veterinary product or investigational veterinary product, whether or not considered to be product-related. Adverse events included, but were not limited to, the following conditions:

High mortality
Toxicity
Improper feathering
Paleness or lack of pigmentation
Diarrhea or other signs of abnormal droppings
Sleepiness or docile conditions
Unstable gate
Hyperactivity
Excessive thirst
Anorexia

A serious adverse event was classified as any adverse event which results in death, is life threatening, results in persistent or significant disability or incapacity, or a congenital anomaly or birth defect. For animals managed as a group, only an increased incidence of serious adverse events that exceed the rates normally expected in that particular group was considered a serious adverse event.

B. Reporting Adverse Events to the Sponsor

All adverse events were reported to the Study Director and Sponsor Monitor. If necessary, the appropriate personnel were contacted by telephone.

XVI. Results

A. Proximate Analysis of Basal Diets

Table 9. Proximate Analysis of Low Phosphate Basal Feed

Analyte	Low Phosphate Starter 1	Low Phosphate Starter 2	Low Phosphate Grower/Finisher
Moisture	12.56%	12.17%	11.25%
Methionine	0.5660%	0.5530%	0.4620%
Lysine	1.226%	1.215%	0.9600%
Ash	7.12%	7.20%	NA
Calcium	1.06%	1.10%	0.82%
Fat, Ethyl Ether	3.75%	3.69%	4.54%
Fiber, Crude	2.18%	2.12%	2.32%
Phosphorus	0.5962%	0.6118%	0.4925%
Protein N x 6.25	19.50%	19.60%	20.00%

Table 10. Proximate Analysis of High Phosphate Basal Feed

Analyte	High Phosphate Starter 1	High Phosphate Starter 2	High Phosphate Grower/Finisher
Moisture	12.35%	12.31%	11.42%
Methionine	0.5820%	0.5660%	0.4920%
Lysine	1.236%	1.223%	1.092%
Ash	6.84%	7.69%	NA
Calcium	1.10%	1.08%	0.86%
Fat, Ethyl Ether	3.63%	3.73%	4.04%
Fiber, Crude	2.08%	1.97%	2.08%
Phosphorus	0.8172%	0.8811%	0.6363%
Protein N x 6.25	21.50%	20.20%	20.00%

Table 11. Additional Analyses of Basal Feeds

Analyte	Low Phosphate Starter 2	Low Phosphate Grower/Finisher	High Phosphate Starter 2	High Phosphate Grower/Finisher
Titanium (ppm)	1360	1450	1030	1390
Moisture (W/W%)	11.79	11.01	11.65	11.27
Phosphorus (W/W%)	0.62	0.55	0.88	0.74

W/W% = grams per 100 grams of sample

Table 12. Analysis of Test Article Levels (FTU/kg)

Trt Group	Targeted Level	Starter 1		Starter 2		Grower/Finisher	
		Mash	Crumble	Mash	Pellet	Mash	Pellet
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	250	166	150	164	182	276	306
4	500	288	421	263	299	407	389
5	750	552	306	561	361	575	691
6	1000	869	625	766	394	837	696
7	3000	2378	2178	2393	2432	2326	2183
8	30000	27376	22706	26252	23480	24407	23983

B. Performance and Mortality Data

Days 0-14

All performance and mortality data for 0-14 days are listed in Table 13. There were no differences ($P>0.05$) in mortality during this time period. There were significant differences for feed intake, body weight gain and adjusted feed conversion ($P<0.0001$, $P<0.0001$ and $P<0.0001$, respectively).

The following differences were observed between treatments for feed intake ($P<0.05$):

T1 decreased vs. all treatments
T4 decreased vs. T2, T6, T7 and T8
T3 decreased vs. T2, T7 and T8
T5 decreased vs. T8
T6 decreased vs. T8

The following differences were observed between treatments for body weight gain ($P<0.05$):

T1 decreased vs. all treatments
T3 decreased vs. T5, T6, T7 and T8
T4 decreased vs. T6, T7 and T8
T2 decreased vs. T7 and T8
T5 decreased vs. T8
T6 decreased vs. T8
T7 decreased vs. T8

The following differences were observed between treatments for adjusted feed conversion ($P<0.05$):

T8 decreased vs. T1, T2, T3 and T4
T7 decreased vs. T1, T2 and T3
T6 decreased vs. T1, T2 and T3
T5 decreased vs. T1, T2 and T3
T4 decreased vs. T1, T2 and T3

Days 0-21

All performance and mortality data for 0-21 days are listed in Table 14. There were no differences (P>0.05) in mortality during this time period. There were significant differences for feed intake, body weight gain and adjusted feed conversion (P<0.0001, P<0.0001 and P<0.0001, respectively).

The following differences were observed between treatments for feed intake (P<0.05):

T1 decreased vs. all treatments
T3 decreased vs. T2, T7 and T8
T4 decreased vs. T2, T7 and T8
T2 decreased vs. T8
T5 decreased vs. T8
T6 decreased vs. T8

The following differences were observed between treatments for body weight gain (P<0.05):

T1 decreased vs. all treatments
T3 decreased vs. T2, T5, T6, T7 and T8
T4 decreased vs. T6, T7 and T8
T2 decreased vs. T7 and T8
T5 decreased vs. T7 and T8
T6 decreased vs. T8
T7 decreased vs. T8

The following differences were observed between treatments for adjusted feed conversion (P<0.05):

T8 decreased vs. T1, T2, T3 and T4
T7 decreased vs. T1, T2 and T3
T6 decreased vs. T1, T2 and T3
T5 decreased vs. T1 and T2
T4 decreased vs. T1

Days 0-42

All performance and mortality data for 0-42 days are listed in Table 15. There were no differences (P>0.05) in mortality during this time period. There were significant differences for feed intake, body weight gain and adjusted feed conversion (P<0.0001, P<0.0001 and P<0.0001, respectively).

The following differences were observed between treatments for feed intake (P<0.05):

T1 decreased vs. all treatments
T3 decreased vs. T2, T5, T7 and T8
T4 decreased vs. T2, T7 and T8

The following differences were observed between treatments for body weight gain (P<0.05):

T1 decreased vs. all treatments
T3 decreased vs. T2, T5, T6, T7 and T8
T4 decreased vs. T7 and T8

The following differences were observed between treatments for adjusted feed conversion (P<0.05):

T7 decreased vs. T1, T2 and T3
T6 decreased vs. T1, T2 and T3
T4 decreased vs. T1, T2 and T3
T5 decreased vs. T1 and T2
T8 decreased vs. T1 and T2

Days 14-21

All performance data for 14-21 days are listed in Table 16. There were significant differences for feed intake, body weight gain and adjusted feed conversion (P<0.0001, P<0.0001 and P<0.0001, respectively).

The following differences were observed between treatments for feed intake (P<0.05):

T1 decreased vs. all treatments
T3 decreased vs. T7 and T8
T4 decreased vs. T7 and T8
T2 decreased vs. T8
T5 decreased vs. T8
T6 decreased vs. T8

The following differences were observed between treatments for body weight gain (P<0.05):

T1 decreased vs. all treatments
T3 decreased vs. T5, T6, T7 and T8
T4 decreased vs. T7 and T8
T2 decreased vs. T7 and T8
T5 decreased vs. T7 and T8
T6 decreased vs. T8

The following differences were observed between treatments for adjusted feed conversion (P<0.05):

T8 decreased vs. T1
T6 decreased vs. T1
T7 decreased vs. T1

Days 21-42

All performance data for 21-42 days are listed in Table 17. There were significant differences for feed intake, body weight gain and adjusted feed conversion (P<0.0001, P<0.0001 and P=0.025, respectively).

The following differences were observed between treatments for feed intake (P<0.05):

T1 decreased vs. all treatments
T3 decreased vs. T2, T5, T7 and T8
T4 decreased vs. T8

The following differences were observed between treatments for body weight gain (P<0.05):

T1 decreased vs. all treatments
T3 decreased vs. T5, T7 and T8

The following differences were observed between treatments for adjusted feed conversion (P<0.05):

T4 decreased vs. T1, T2, T3 and T8
T7 decreased vs. T8

Table 13. Days 0 - 14 Bird Performance and Mortality Data

Trt Group	Treatment Description	Feed Intake (kg)	Body Wt Gain (kg)	Adj. Feed Conversion	Mortality (%)
1	Negative Control	0.330^{e}	0.250^{f}	1.319^{a}	0.49
2	Positive Control	0.372^{ab}	0.289^{cde}	1.287^{a}	1.96
3	250 U + NC	0.357^{cd}	0.277^{e}	1.289^{a}	0.98
4	500 U + NC	0.354^{d}	0.285^{de}	1.244^{b}	0.98
5	750 U + NC	0.364^{bcd}	0.293^{bcd}	1.242^{bc}	0
6	1000 U + NC	0.370^{bc}	0.299^{bc}	1.238^{bc}	1.96
7	3000 U + NC	0.374^{ab}	0.304^{b}	1.229^{bc}	1.96
8	30,000 U + NC	0.384^{a}	0.319^{a}	1.204^{c}	3.43
SEM		0.0029	0.0028	0.0091	0.84
TRT P Value		<0.0001	<0.0001	<0.0001	0.115*

$^{a-f}$ Values within columns with no common superscript are statistically different (P < 0.05).
* Statistical analysis was done on Square Root, ArcSin transformed values

Table 14. Days 0 - 21 Bird Performance and Mortality Data

Trt Group	Treatment Description	Feed Intake (kg)	Body Wt Gain (kg)	Adj. Feed Conversion	Mortality (%)
1	Negative Control	0.777[d]	0.572[f]	1.357[a]	1.47
2	Positive Control	0.910[b]	0.682[cd]	1.334[ab]	2.94
3	250 U + NC	0.872[c]	0.654[e]	1.332[abc]	2.45
4	500 U + NC	0.875[c]	0.669[de]	1.308[bcd]	1.93
5	750 U + NC	0.899[bc]	0.690[cd]	1.303[cde]	0.98
6	1000 U + NC	0.903[bc]	0.700[bc]	1.290[de]	2.94
7	3000 U + NC	0.928[ab]	0.721[b]	1.288[de]	2.45
8	30,000 U + NC	0.958[a]	0.752[a]	1.275[e]	4.41
	SEM	0.0073	0.0061	0.0067	1.04
	TRT P Value	<0.0001	<0.0001	<0.0001	0.41*

[a-f] Values within columns with no common superscript are statistically different ($P < 0.05$).
* Statistical analysis was done on Square Root, ArcSin transformed values

Table 15. Days 0 - 42 Bird Performance and Mortality Data

Trt Group	Treatment Description	Feed Intake (kg)	Body Wt Gain (kg)	Adj. Feed Conversion	Mortality (%)
1	Negative Control	3.668[d]	2.381[d]	1.540[a]	2.94
2	Positive Control	4.387[a]	2.851[ab]	1.539[a]	4.90
3	250 U + NC	4.192[c]	2.733[c]	1.534[ab]	5.39
4	500 U + NC	4.250[bc]	2.822[bc]	1.506[c]	3.84
5	750 U + NC	4.356[ab]	2.880[ab]	1.512[bc]	4.41
6	1000 U + NC	4.319[abc]	2.863[ab]	1.509[c]	5.88
7	3000 U + NC	4.402[a]	2.927[a]	1.504[c]	4.90
8	30,000 U + NC	4.448[a]	2.944[a]	1.512[bc]	7.84
	SEM	0.031	0.022	0.006	1.53
	TRT P Value	<0.0001	<0.0001	<0.0001	0.64*

[a-d] Values within columns with no common superscript are statistically different ($P < 0.05$).
* Statistical analysis was done on Square Root, ArcSin transformed values

Table 16. Days 14 - 21 Bird Performance and Mortality Data

Trt Group	Treatment	Feed Intake (kg)	Body Wt Gain (kg)	Adj. Feed Conversion
1	Negative Control	0.447^{d}	0.322^{e}	1.388^{a}
2	Positive Control	0.538^{bc}	0.393^{cd}	1.369^{ab}
3	250 U + NC	0.514^{c}	0.377^{d}	1.365^{ab}
4	500 U + NC	0.521^{c}	0.384^{cd}	1.357^{ab}
5	750 U + NC	0.535^{bc}	0.397^{c}	1.348^{ab}
6	1000 U + NC	0.534^{bc}	0.402^{bc}	1.329^{b}
7	3000 U + NC	0.555^{ab}	0.416^{ab}	1.332^{b}
8	30,000 U + NC	0.575^{a}	0.433^{a}	1.329^{b}
	SEM	0.0055	0.0043	0.0093
	TRT P Value	<0.0001	<0.0001	<0.0001

$^{a\text{-}e}$ Values within columns with no common superscript are statistically different ($P < 0.05$).

Table 17. Days 21 - 42 Bird Performance and Mortality Data

Trt Group	Treatment Description	Feed Intake (kg)	Body Wt Gain (kg)	Adj. Feed Conversion
1	Negative Control	2.917^{d}	1.809^{c}	1.612^{AB}
2	Positive Control	3.512^{ab}	2.169^{ab}	1.619^{A}
3	250 U + NC	3.355^{c}	2.079^{b}	1.615^{AB}
4	500 U + NC	3.409^{bc}	2.153^{ab}	1.583^{C}
5	750 U + NC	3.497^{ab}	2.190^{a}	1.597^{ABC}
6	1000 U + NC	3.456^{abc}	2.163^{ab}	1.599^{ABC}
7	3000 U + NC	3.512^{ab}	2.206^{a}	1.593^{BC}
8	30,000 U + NC	3.541^{a}	2.192^{a}	1.617^{A}
	SEM	0.029	0.021	0.0085
	TRT P Value	<0.0001	<0.0001	0.025

^{abcd} Values within columns with no common superscript are statistically different ($P < 0.05$).
^{ABC} Values within columns with no common superscript are statistically different ($P < 0.05$; Student's T test was used because Tukey's test was not assigning superscripts).

C. Hematological Endpoints

All hematology data are presented in Table 18. All of the hematology comparisons are between the positive control (T2) and treatment 8 (the highest inclusion level of phytase, 30,000 FTU/kg). No differences (P>0.05) in hematological parameters were observed with the exception of phosphorus with positive control (T2) having a higher level (P=0.028) than treatment 8.

Table 18. Hematology Results for Treatment Groups 2 and 8

	Positive Control (Trt 2)	30,000 FTU (Trt 8)	SEM	Treatment P Value
Haemoglobin, g/dL	12.45	12.67	0.15	0.33
Hematocrit, %	34.70	35.19	0.41	0.42
Red Blood Cell $x10^6$ uL	2.86	2.91	0.03	0.23
Mean Corpuscular volume, fL	121.5	121.0	0.5	0.46
Mean Corpuscular Hemoglobin, pg	43.59	43.55	0.25	0.92
MCH concentration, g/dL	35.88	35.99	0.12	0.52
Red Cell Distribution Width, %	9.40	9.14	0.15	0.24
White Blood Cell $x10^3$ ul	13.95	13.73	1.35	0.91
Heterophils, %	33.69	31.64	1.89	0.46
Lymphocytes, %	53.17	58.69	2.03	0.08
Monocytes, %	4.29	4.65	0.51	0.63
Eosinophil, %	5.00	5.03	0.90	0.98
Basophil, %	2.88	3.38	0.29	0.25
Absolute Heterophils, $x10^3$ ul	4.40	4.38	0.39	0.97
Absolute Lymphocytes, $x10^3$ ul	7.74	8.00	0.91	0.85
Absolute Monocytes, $x10^3$ ul	0.564	0.667	0.103	0.49
Absolute Eosinophil, $x10^3$ ul	0.698	0.703	0.143	0.98
Absolute Basophil, $x10^3$ ul	0.410	0.502	0.082	0.44
Total Protein, g/dL	2.81	2.85	0.04	0.48
Albumin, g/dL	1.03	1.07	0.02	0.28
Globulin, g/dL	1.82	1.86	0.03	0.45
Albumin/Globulin	0.556	0.542	0.009	0.32
Creatine Kinase, U/L	Non-Est[1]	Non-Est[1]	-	-
Alanine Aminotransferase, U/L	<5[2]	<5	-	-
Phosphorus, mg/dL	6.79[a]	6.38[b]	0.12	0.028
Glucose, mg/dL	255.6	255.9	2.6	0.94

[1] Non-Estimable, many samples (54 of 72) above the maximum analyzable limit >22500 U/L
[2] Below analyzable limits
[ab] Values within row with no common superscript are statistically different (P < 0.05).

D. Tibia Ash

All tibia ash data are presented in Table 19. There were significant differences for tibia ash on Day 21 and Day 42 (P<0.0001 and P<0.0001, respectively).

The following differences were observed between treatments on Day 21 (P<0.05):

T1 decreased vs. all treatments

The following differences were observed between treatments on Day 42 (P<0.05):

T1 decreased vs. T2, T3, T4, T6, T7 and T8

Table 19. Tibia Ash Results on Days 21 and 42

Trt Group	Treatment Description	Day 21 Tibia Ash (%)	Day 42 Tibia Ash (%)
1	Negative Control	21.30^{b}	34.99^{b}
2	Positive Control	24.87^{a}	37.59^{a}
3	250 U + NC	23.90^{a}	38.29^{a}
4	500 U + NC	24.76^{a}	38.98^{a}
5	750 U + NC	24.54^{a}	37.15^{ab}
6	1000 U + NC	24.86^{a}	39.23^{a}
7	3000 U + NC	25.41^{a}	39.12^{a}
8	30,000 U + NC	25.58^{a}	39.00^{a}
	SEM	0.40	0.53
	TRT P Value	<0.0001	<0.0001

^{ab} Values within columns with no common superscript are statistically different (P < 0.05).

E. Percent Phosphorus Digestibility

All all ileal phosphorus digestibility data are presented in Table 20. There were significant differences for digestibility and concentration on Day 21 and Day 42 (P<0.0001, P=0.032, P=0.0006 and P=0.0002, respectively).

The following differences were observed between treatments on Day 21 (P<0.05):

Digestibility:

T1 decreased vs. T2, T7 and T8
T3 decreased vs. T2
T4 decreased vs. T2
T5 decreased vs. T2
T6 decreased vs. T2
T7 decreased vs. T2

Concentration:

T1 increased vs. T5, T7 and T8

The following differences were observed between treatments on Day 42 (P<0.05):

Digestibility:

T3 decreased vs. T7 and T8
T1 decreased vs. T8

Concentration:

T2 increased vs. T4, T7 and T8
T3 vs. T8

Table 20. Ileal Phosphorus Digestibility on Days 21 and 42 (Dry Matter Basis)

Trt Group	Treatment	21d Ileal P digestibility (%)	21d Ileal P (mg/100g)	42d Ileal P digestibility (%)	42d Ileal P (mg/100g)
1	Negative Control	61.83^{c}	30.1^{a}	56.18^{bc}	30.0^{abc}
2	Positive Control	82.73^{a}	24.9^{ab}	63.98^{abc}	37.0^{a}
3	250 U + NC	68.50^{bc}	24.0^{ab}	51.04^{c}	30.9^{ab}
4	500 U + NC	67.71^{bc}	23.0^{ab}	63.39^{abc}	23.8^{bc}
5	750 U + NC	68.32^{bc}	21.3^{b}	60.86^{abc}	26.5^{abc}
6	1000 U + NC	68.92^{bc}	22.4^{ab}	60.33^{abc}	27.2^{abc}
7	3000 U + NC	69.98^{b}	20.8^{b}	66.18^{ab}	23.0^{bc}
8	30,000 U + NC	75.80^{ab}	21.3^{b}	71.28^{a}	19.5^{c}
	SEM	1.84	2.0	3.02	2.5
	TRT P Value	<0.0001	0.032	0.0006	0.0002

[abc] Values within columns with no common superscript are statistically different ($P < 0.05$).

XVII. Conclusions

This study was conducted to evaluate the effectiveness over a range of doses of Phy02, a new phytase enzyme product being developed as a feed additive for poultry diets, and to demonstrate tolerance of broilers to high doses of the Phy02 phytase.

The negative control performed as expected with decreased feed intake and body weight gain for all time points tested compared to the positive control. There was a dose dependent response of the inclusion of phytase for an improvement in performance for a majority of time points and parameters tested. Notable exceptions were time periods days 21-42 and days 0-42 for adjusted feed conversion. From days 0-42, there were not many differences in adjusted feed conversion between the phytase treatments with the exception of treatment 3 (250 FTU/kg) which had significantly higher feed conversion than treatments 4, 6 and 7; however, all phytase treatments had significantly improved adjusted feed conversion compared to the negative control with the exception of treatment 3. Treatment 8 (30,000 FTU/kg) had a significantly higher feed conversion than treatments 4 (500 FTU/kg) and 7 (3,000 FTU/kg), but had similar feed conversion to all other treatments from days 21-42.

Hematological parameters were compared between treatment 2 (positive control) and treatment 8 (30,000 FTU/kg) to determine if any differences existed. No differences were observed in 25 out of 26 parameters tested with phosphorus being the only parameter different between the two treatments. Treatment 2 had higher phosphorus levels than treatment 8. However, the difference in phosphorus levels between the treatments is not biologically significant and within expected ranges for broilers.

Tibia ash was decreased in the negative control broilers compared to all other treatments on days 21 and 42 with the exception of treatment 5 (750 FTU/kg) on day 42 indicating the efficacy of the phytase. There was a dose dependent response with increased phytase levels resulting in increased phosphorus digestibility on days 21 and 42. Phosphorus concentration of ileal digesta was reduced with increased levels of phytase on days 21 and 42 with the exception of treatment 6 (1,000 FTU/kg) on day 21 and treatments 5 (750 FTU/kg) and 6 (1,000 FTU/kg) on day 42. However, the trend in decreasing phosphorus concentration was not always significant ($P<0.05$).

The results of this study indicate the new phytase, Phy02, is efficacious when fed at different levels to broilers and does exhibit a dose dependent response on performance, and is safe and well tolerated when fed to broilers at all levels up to 30,000 FTU/kg.

XVIII. List of Protocol Appendices

A. Appendix 1 – Diet Formulations

B. Appendix 2 – Building Diagram

C. Appendix 3 – Proximate Analysis Results

D. Appendix 4 – Tibia Ash Results

E. Appendix 5 – Ileal Content Analysis Results

F. Appendix 6 – Titanium, Phosphorus, and Moisture Analysis of Feed Results

G. Appendis 7 – Statistical Analysis

APPENDIX 1 – DIET FORMULATIONS

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151SP AGV-15-1 BS PC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Unrounded Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Restriction Rcost
1913	Corn, CQR	1135.89	56.795	164.64	113.20	295.20			
1914	SBM , CQR	716.19	35.810	508.00	261.40	843.60			
1542	Soy Oil	38.93	1.947	600.00	224.40	2008.40			
1554	DICALCIUM PHOS	36.42	1.821	255.24		25253.0			
1553	Sand	28.02	1.401	15.00		29.40		1.6000	
1552	Limestone, CQR	19.87	0.994	30.00	15.00	29505.6			
1544	SALT, PLAIN (N	8.81	0.440	29.34	15.00	145444.			
1549	DL-METHIONINE,	5.98	0.299	2637.89	15.00	23294.8			
1548	CQR Choline	3.92	0.196	2534.00	15.00	48090.4			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1545	Salinomycin (6	0.820	0.041	0.00			0.0410	0.0410	
1551	Threonine, CQR	0.169	0.008	1849.00	15.00	15136.0			
1550	L-LYSINE, CQR	0.166	0.008	1725.00	15.00	8300.60			

Total Batch: 2000.00 Lbs at 309.15 $/Ton 15.458 $/100Lb 0.1546 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.5661	0.10 PCT
5	FAT, CRUDE	PCT	0.4283	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4130	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
35	THREONINE	PCT	0.1853	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.74	
3	MOISTURE		10.26	
4	PROTEIN, CRUDE	22.00	22.00	
5	FAT, CRUDE	4.50	4.50	
6	FIBER, CRUDE		2.23	
7	CALCIUM	0.93	0.9300	
8	PHOS. TOTAL	0.71	0.7205	
9	ASH		5.50	
10	PHOS., AVAILAB	0.45	0.4500	0.45
18	ADF		0.0000	
19	M.E. POULTRY	1378.00	1378.00	
21	M.E. SWINE		1485.49	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.55	0.6413	
32	CYSTINE		0.3487	
33	LYSINE	1.31	1.31	
34	TRYPTOPHAN		0.2980	
35	THREONINE	0.92	0.9200	
36	ISOLEUCINE		1.13	
37	HISTIDINE		0.6218	
38	VALINE		1.24	
39	LEUCINE		1.98	
40	ARGININE		1.52	
41	PHENYLALANINE		1.24	
42	TSAA	0.99	0.9900	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5274	
47	VITAMIN A		1265.17	
48	VITAMIN E		12.30	
49	THIAMIN		1.95	
50	RIBOFLAVIN		2.68	
51	PANTOTHENIC AC		8.67	
52	BIOTIN		156.14	
53	FOLIC ACID		446.81	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.21	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.9437	
63	MAGNESIUM		0.1613	
64	SULPHUR		0.2044	
65	MANGANESE		107.18	
66	IRON		371.60	
67	COPPER		19.98	
68	ZINC		89.49	
69	SELENIUM		0.3028	
70	COBALT		0.0000	
71	FLOURINE		0.0033	
72	CHLORIDE	0.28	0.2979	
73	SALT		0.4405	
74	IODINE		0.5957	
76	Dig Methionine		0.6129	
77	Dig Cystine		0.2885	
78	Dig Lysine		1.18	
79	Dig Tryptophan		0.2168	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Formulated By: Single Product Formulation
Trial Version: 17
Product: AGV151SP AGV-15-1 BS PC
Using Costs: Plant 1 Owning Costs
Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.8039	
81	Dig Isoleucine		1.04	
82	Dig Histidine		0.5584	
83	Dig Valine		1.12	
84	Dig Leucine		1.83	
85	Dig Arginine		1.39	
86	Dig Phenylalan		1.43	
87	Dig TSAA		0.9018	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		0.8943	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 16
Product: AGV151SN AGV-15-1 BS NC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1135.89	56.795	164.64		295.20			
1914	SBM , CQR	716.19	35.810	508.00	261.40	*******			
1542	Soy Oil	38.93	1.947	600.00	224.40				
1553	Sand	33.48	1.674	15.00		29.40		1.6800	-0.14
1552	Limestone, CQR	30.68	1.534	30.00	15.00	29505.6			
1554	DICALCIUM PHOS	20.11	1.006	255.24		29394.8			
1544	SALT, PLAIN (N	8.84	0.442	29.34	15.00	404093.			
1549	DL-METHIONINE,	5.98	0.299	2637.89	15.00	23294.8			
1548	CQR Choline	3.92	0.196	2534.00	15.00	74427.2			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1545	Salinomycin (6	0.820	0.041	0.00			0.0410	0.0410	
1551	Threonine, CQR	0.169	0.008	1849.00	15.00	15136.0			
1550	L-LYSINE, CQR	0.166	0.008	1725.00	15.00	8300.60			

Total Batch: 2000.00 Lbs at 307.27 $/Ton 15.364 $/100Lb 0.1536 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.5661	0.10 PCT
5	FAT, CRUDE	PCT	0.4283	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4130	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
35	THREONINE	PCT	0.1853	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.74	
3	MOISTURE		10.26	
4	PROTEIN, CRUDE	22.00	22.00	
5	FAT, CRUDE	4.50	4.50	
6	FIBER, CRUDE		2.23	
7	CALCIUM	0.93	0.9290	0.93
8	PHOS. TOTAL	0.56	0.5705	
9	ASH		5.32	
10	PHOS., AVAILAB	0.30	0.3000	0.30
18	ADF		0.0000	
19	M.E. POULTRY	1378.00	1378.00	1378.00
21	M.E. SWINE		1485.49	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.55	0.6413	
32	CYSTINE		0.3487	
33	LYSINE	1.31	1.31	
34	TRYPTOPHAN		0.2980	
35	THREONINE	0.92	0.9200	
36	ISOLEUCINE		1.13	
37	HISTIDINE		0.6218	
38	VALINE		1.24	
39	LEUCINE		1.98	
40	ARGININE		1.52	
41	PHENYLALANINE		1.24	
42	TSAA	0.99	0.9900	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5274	
47	VITAMIN A		1265.17	
48	VITAMIN E		12.30	
49	THIAMIN		1.95	
50	RIBOFLAVIN		2.68	
51	PANTOTHENIC AC		8.67	
52	BIOTIN		156.14	
53	FOLIC ACID		446.81	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.21	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	0.20
62	POTASSIUM		0.9431	
63	MAGNESIUM		0.1564	
64	SULPHUR		0.2044	
65	MANGANESE		104.73	
66	IRON		290.08	
67	COPPER		19.33	
68	ZINC		87.70	
69	SELENIUM		0.2979	
70	COBALT		0.0000	
71	FLOURINE		0.0018	
72	CHLORIDE	0.28	0.2990	
73	SALT		0.4421	
74	IODINE		0.5957	
76	Dig Methionine		0.6129	
77	Dig Cystine		0.2885	
78	Dig Lysine		1.18	
79	Dig Tryptophan		0.2168	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PROSUSER
Plant: 1 Silver Springs | Formulated By: Single Product Formulation | Trial Version: 16
Product: AGV151SN AGV-15-1 BS NC | Using Costs: Plant 1 Owning Costs | Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.8039	
81	Dig Isoleucine		1.04	
82	Dig Histidine		0.5584	
83	Dig Valine		1.12	
84	Dig Leucine		1.83	
85	Dig Arginine		1.39	
86	Dig Phenylalan		1.43	
87	Dig TSAA		0.9018	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		1.38	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER

Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 16
Product: AGV151GP AGV-15-1 BG PC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1252.29	62.615	164.64	113.60	295.60			
1914	SBM , CQR	629.58	31.479	508.00	227.40	841.60			
1542	Soy Oil	41.69	2.084	600.00	223.40	1999.80			
1554	DICALCIUM PHOS	31.53	1.576	255.24		25099.8			
1552	Limestone, CQR	18.88	0.944	30.00	15.00	33574.0			
1544	SALT, PLAIN (N	8.85	0.442	29.34	15.00	144552.			
1549	DL-METHIONINE,	4.23	0.212	2637.89	15.00	26146.0			
1548	CQR Choline	4.13	0.206	2534.00	15.00	47811.2			
1553	Sand	3.58	0.179	15.00		29.40		1.5000	
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1550	L-LYSINE, CQR	0.441	0.022	1725.00	15.00	9208.20			

Total Batch: 2000.00 Lbs at 294.77 $/Ton 14.738 $/100Lb 0.1474 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.6442	0.10 PCT
5	FAT, CRUDE	PCT	0.4294	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4106	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Unused Ingredients

Ingr Code	Ingredient Name	Current $/Ton	At $/Ton	Would Use	Minimum Pct	Maximum Pct	Rcost
1551	Threonine, CQR	1849.00	15.00				18.34

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.47	
3	MOISTURE		10.53	
4	PROTEIN, CRUDE	20.30	20.30	
5	FAT, CRUDE	4.80	4.80	
6	FIBER, CRUDE		2.20	
7	CALCIUM	0.84	0.8400	
8	PHOS. TOTAL	0.66	0.6607	
9	ASH		5.03	
10	PHOS., AVAILAB	0.40	0.4000	0.40
18	ADF		0.0000	
19	M.E. POULTRY	1425.00	1425.00	
21	M.E. SWINE		1518.02	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.51	0.5332	
32	CYSTINE		0.3268	
33	LYSINE	1.20	1.20	
34	TRYPTOPHAN		0.2709	
35	THREONINE	0.83	0.8395	
36	ISOLEUCINE		1.03	
37	HISTIDINE		0.5784	
38	VALINE		1.14	
39	LEUCINE		1.87	
40	ARGININE		1.39	
41	PHENYLALANINE		1.14	
42	TSAA	0.86	0.8600	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5815	
47	VITAMIN A		1311.15	
48	VITAMIN E		12.86	
49	THIAMIN		1.99	
50	RIBOFLAVIN		2.66	
51	PANTOTHENIC AC		8.50	
52	BIOTIN		151.84	
53	FOLIC ACID		435.80	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.37	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.8718	
63	MAGNESIUM		0.1519	
64	SULPHUR		0.1900	
65	MANGANESE		104.89	
66	IRON		341.03	
67	COPPER		19.27	
68	ZINC		87.99	
69	SELENIUM		0.3017	
70	COBALT		0.0000	
71	FLOURINE		0.0028	
72	CHLORIDE	0.26	0.3006	
73	SALT		0.4424	
74	IODINE		0.5944	
76	Dig Methionine		0.5065	
77	Dig Cystine		0.2709	
78	Dig Lysine		1.08	
79	Dig Tryptophan		0.1987	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Formulated By: Single Product Formulation
Trial Version: 16
Product: AGV151GP AGV-15-1 BG PC
Using Costs: Plant 1 Owning Costs
Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.7313	
81	Dig Isoleucine		0.9463	
82	Dig Histidine		0.5214	
83	Dig Valine		1.03	
84	Dig Leucine		1.73	
85	Dig Arginine		1.27	
86	Dig Phenylalan		1.37	
87	Dig TSAA		0.7777	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		0.8494	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151GN AGV-15-1 BG NC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1252.29	62.615	164.64	113.60	295.60			
1914	SBM , CQR	629.58	31.479	508.00	227.40	841.60			
1542	Soy Oil	41.69	2.084	600.00	223.40	1999.80			
1552	Limestone, CQR	29.75	1.487	30.00	15.00	33574.0			
1554	DICALCIUM PHOS	15.22	0.761	255.24		25099.8			
1553	Sand	8.98	0.449	15.00		29.40		1.5000	
1544	SALT, PLAIN (N	8.88	0.444	29.34	15.00	144552.			
1549	DL-METHIONINE,	4.23	0.212	2637.89	15.00	26146.0			
1548	CQR Choline	4.13	0.206	2534.00	15.00	47811.2			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1550	L-LYSINE, CQR	0.441	0.022	1725.00	15.00	9208.20			

Total Batch: 2000.00 Lbs at 292.89 $/Ton 14.645 $/100Lb 0.1464 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.6442	0.10 PCT
5	FAT, CRUDE	PCT	0.4294	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4106	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Unused Ingredients

Ingr Code	Ingredient Name	Current $/Ton	At $/Ton	Would Use	Minimum Pct	Maximum Pct	Rcost
1551	Threonine, CQR	1849.00	15.00				18.34

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.47	
3	MOISTURE		10.53	
4	PROTEIN, CRUDE	20.30	20.30	
5	FAT, CRUDE	4.80	4.80	
6	FIBER, CRUDE		2.20	
7	CALCIUM	0.84	0.8400	
8	PHOS. TOTAL	0.51	0.5107	
9	ASH		4.85	
10	PHOS., AVAILAB	0.25	0.2500	0.25
18	ADF		0.0000	
19	M.E. POULTRY	1425.00	1425.00	
21	M.E. SWINE		1518.02	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.51	0.5332	
32	CYSTINE		0.3268	
33	LYSINE	1.20	1.20	
34	TRYPTOPHAN		0.2709	
35	THREONINE	0.83	0.8395	
36	ISOLEUCINE		1.03	
37	HISTIDINE		0.5784	
38	VALINE		1.14	
39	LEUCINE		1.87	
40	ARGININE		1.39	
41	PHENYLALANINE		1.14	
42	TSAA	0.86	0.8600	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5815	
47	VITAMIN A		1311.15	
48	VITAMIN E		12.86	
49	THIAMIN		1.99	
50	RIBOFLAVIN		2.66	
51	PANTOTHENIC AC		8.50	
52	BIOTIN		151.84	
53	FOLIC ACID		435.80	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.37	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.8713	
63	MAGNESIUM		0.1470	
64	SULPHUR		0.1900	
65	MANGANESE		102.44	
66	IRON		259.51	
67	COPPER		18.62	
68	ZINC		86.19	
69	SELENIUM		0.2968	
70	COBALT		0.0000	
71	FLOURINE		0.0014	
72	CHLORIDE	0.26	0.3016	
73	SALT		0.4441	
74	IODINE		0.5944	
76	Dig Methionine		0.5065	
77	Dig Cystine		0.2709	
78	Dig Lysine		1.08	
79	Dig Tryptophan		0.1987	

Continued... See Page 2

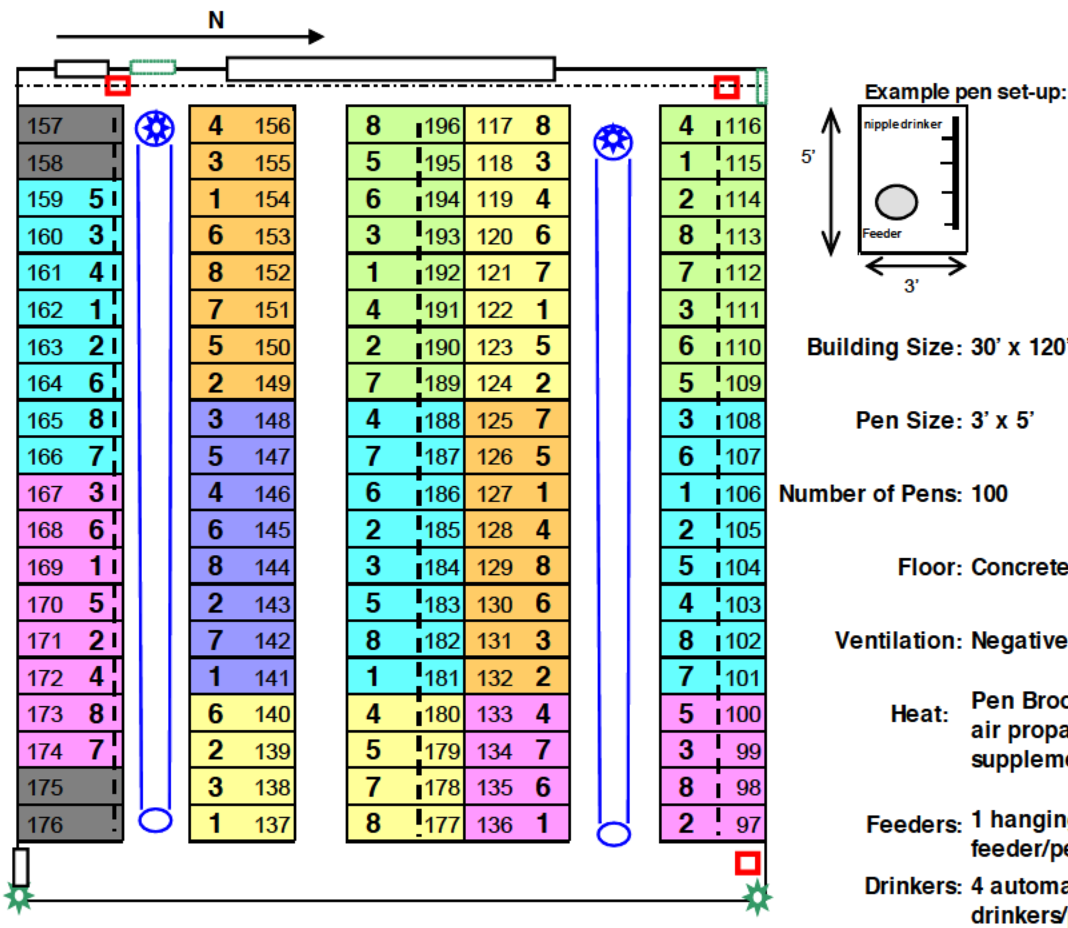
Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Formulated By: Single Product Formulation
Trial Version: 17
Product: AGV151GN AGV-15-1 BG NC
Using Costs: Plant 1 Owning Costs
Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.7313	
81	Dig Isoleucine		0.9463	
82	Dig Histidine		0.5214	
83	Dig Valine		1.03	
84	Dig Leucine		1.73	
85	Dig Arginine		1.27	
86	Dig Phenylalan		1.37	
87	Dig TSAA		0.7777	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		1.34	

APPENDIX 2 – BUILDING DIAGRAM

COLORADO QUALITY RESEARCH, INC.
RESEARCH FACILITY NO. 7
PROJECT NO. AGV-15-4



Building Size: 30' x 120'

Pen Size: 3' x 5'

Number of Pens: 100

Floor: Concrete

Ventilation: Negative pressure

Heat: Pen Brooders, 2 forced air propane heaters & 1 supplemental heater

Feeders: 1 hanging tube feeder/pen

Drinkers: 4 automatic nipple drinkers/pen

Exhaust Fans 24"
Intake 24" X 24"
Heater
Tube Fan
Air circulating Tube
Door
Lights
Plenom (air mixing chamber)

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1201 Lincoln Highway ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com
MEMBER ACIL

APPENDIX 3 - PROXIMATE ANALYSIS RESULTS

Report Date: 10 Aug 2015

Lab Number: 15-F22434
Work Order #: 17-7870
Account #: 7903

SHOSHANA GRAY
COLORADO QUALITY RESEARCH, INC
400 EAST COUNTY ROAD 72
WELLINGTON CO 80549

Date Submitted: 27 Jul 2015
Date Received: 29 Jul 2015

Sample Description: D 0-14
Product Name: LP STARTER BASAL MASH
Project Name: AGV-15-4

ANALYTE	AS RECEIVED		METHOD REF	DATE ANALYZED
Moisture	12.56	%	AOAC 930.15	31 Jul 2015
Methionine	0.5660	%	AOAC 994.12	9 Aug 2015
Lysine	1.226	%	AOAC 994.12	9 Aug 2015
Ash	7.12	%	AOAC 942.05	31 Jul 2015
Calcium	1.06	%	AOAC 985.01	31 Jul 2015
Fat, Ethyl Ether	3.75	%	AOAC 2003.05	4 Aug 2015
Fiber, Crude	2.18	%	AOCS BA6A-05	30 Jul 2015
Phosphorus	0.5962	%	AOAC 985.01	31 Jul 2015
Protein N x 6.25	19.50	%	AOAC 990.03	31 Jul 2015

Approved by: J. Joel Sieh
J. Joel Sieh
Feed Laboratory Manager

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Report Date: 10 Aug 2015

Lab Number: 15-F22435
Work Order #: 17-7870
Account #: 7903

SHOSHANA GRAY
COLORADO QUALITY RESEARCH, INC
400 EAST COUNTY ROAD 72
WELLINGTON CO 80549

Date Submitted: 27 Jul 2015
Date Received: 29 Jul 2015

Sample Description: D 14-21
Product Name: LP STARTER BASAL MASH
Project Name: AGV-15-4

ANALYTE	AS RECEIVED		METHOD REF	DATE ANALYZED
Moisture	12.17	%	AOAC 930.15	31 Jul 2015
Methionine	0.5530	%	AOAC 994.12	9 Aug 2015
Lysine	1.215	%	AOAC 994.12	9 Aug 2015
Ash	7.20	%	AOAC 942.05	31 Jul 2015
Calcium	1.10	%	AOAC 985.01	3 Aug 2015
Fat, Ethyl Ether	3.69	%	AOAC 2003.05	4 Aug 2015
Fiber, Crude	2.12	%	AOCS BA6A-05	30 Jul 2015
Phosphorus	0.6118	%	AOAC 985.01	3 Aug 2015
Protein N x 6.25	19.60	%	AOAC 990.03	31 Jul 2015

Approved by: J. Joel Sieh

J. Joel Sieh
Feed Laboratory Manager

MINNESOTA VALLEY TESTING LABORATORIES, INC.

MVTL

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Report Date: 10 Aug 2015

Lab Number: 15-F22436
Work Order #: 17-7870
Account #: 7903

SHOSHANA GRAY
COLORADO QUALITY RESEARCH, INC
400 EAST COUNTY ROAD 72
WELLINGTON CO 80549

Date Submitted: 27 Jul 2015
Date Received: 29 Jul 2015

Sample Description: D 0-14
Product Name: TRT 2 HP STARTER BASAL MASH
Project Name: AGV-15-4

ANALYTE	AS RECEIVED		METHOD REF	DATE ANALYZED
Moisture	12.35	%	AOAC 930.15	31 Jul 2015
Methionine	0.5820	%	AOAC 994.12	9 Aug 2015
Lysine	1.236	%	AOAC 994.12	9 Aug 2015
Ash	6.84	%	AOAC 942.05	31 Jul 2015
Calcium	1.10	%	AOAC 985.01	3 Aug 2015
Fat, Ethyl Ether	3.63	%	AOAC 2003.05	4 Aug 2015
Fiber, Crude	2.08	%	AOCS BA6A-05	30 Jul 2015
Phosphorus	0.8172	%	AOAC 985.01	3 Aug 2015
Protein N x 6.25	21.50	%	AOAC 990.03	31 Jul 2015

Approved by: J. Joel Sieh

J. Joel Sieh
Feed Laboratory Manager

MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 10 Aug 2015

Lab Number: 15-F22437
Work Order #: 17-7870
Account #: 7903

SHOSHANA GRAY
COLORADO QUALITY RESEARCH, INC
400 EAST COUNTY ROAD 72
WELLINGTON CO 80549

Date Submitted: 27 Jul 2015
Date Received: 29 Jul 2015

Sample Description: D 14-21
Product Name: TRT 2 HP STARTER BASAL MASH
Project Name: AGV-15-4

ANALYTE	AS RECEIVED		METHOD REF	DATE ANALYZED
Moisture	12.31	%	AOAC 930.15	31 Jul 2015
Methionine	0.5660	%	AOAC 994.12	9 Aug 2015
Lysine	1.223	%	AOAC 994.12	9 Aug 2015
Ash	7.69	%	AOAC 942.05	31 Jul 2015
Calcium	1.08	%	AOAC 985.01	3 Aug 2015
Fat, Ethyl Ether	3.73	%	AOAC 2003.05	4 Aug 2015
Fiber, Crude	1.97	%	AOCS BA6A-05	30 Jul 2015
Phosphorus	0.8811	%	AOAC 985.01	3 Aug 2015
Protein N x 6.25	20.20	%	AOAC 990.03	31 Jul 2015

Approved by: J. Joel Sieh

J. Joel Sieh
Feed Laboratory Manager

MINNESOTA VALLEY TESTING LABORATORIES, INC.

MVTL

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MEMBER
ACIL

Report Date: 28 Sep 2015

Lab Number: 15-F24679
Work Order #: 17-8323
Account #: 7903

SHOSHANA GRAY
COLORADO QUALITY RESEARCH INC
400 EAST COUNTY ROAD 72
WELLINGTON CO 80549

Date Submitted: 13 Aug 2015
Date Received: 17 Aug 2015

Sample Description: GROWER/FINISHER BASAL MASH
Product Name: TRT 2 HIGH PHOSHPATE
Project Name: AGV 15-4

ANALYTE	AS RECEIVED		METHOD REF	DATE ANALYZED
Moisture	11.42	%	AOAC 930.15	19 Aug 2015
Methionine	0.4920	%	AOAC 994.12	28 Sep 2015
Lysine	1.092	%	AOAC 994.12	28 Sep 2015
Calcium	0.86	%	AOAC 985.01	20 Aug 2015
Fat, Ethyl Ether	4.04	%	AOAC 2003.05	18 Aug 2015
Fiber, Crude Ankom	2.08	%	AOCS BA6A-05	20 Aug 2015
Phosphorus	0.6363	%	AOAC 985.01	20 Aug 2015
Protein N x 6.25	20.00	%	AOAC 990.03	18 Aug 2015

Approved by: J. Joel Sieh

J. Joel Sieh
Feed Laboratory Manager

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www.mvtl.com
MEMBER ACIL

Report Date: 28 Sep 2015

Lab Number: 15-F24680
Work Order #: 17-8323
Account #: 7903

SHOSHANA GRAY
COLORADO QUALITY RESEARCH INC
400 EAST COUNTY ROAD 72
WELLINGTON CO 80549

Date Submitted: 13 Aug 2015
Date Received: 17 Aug 2015

Sample Description: GROWER/FINISHER BASAL MASH
Product Name: TRT LOW PHOSHPATE
Project Name: AGV 15-4

ANALYTE	AS RECEIVED		METHOD REF	DATE ANALYZED
Moisture	11.25	%	AOAC 930.15	19 Aug 2015
Methionine	0.4620	%	AOAC 994.12	28 Sep 2015
Lysine	0.9600	%	AOAC 994.12	28 Sep 2015
Calcium	0.82	%	AOAC 985.01	20 Aug 2015
Fat, Ethyl Ether	4.54	%	AOAC 2003.05	19 Aug 2015
Fiber, Crude Ankom	2.32	%	AOCS BA6A-05	20 Aug 2015
Phosphorus	0.4925	%	AOAC 985.01	20 Aug 2015
Protein N x 6.25	20.00	%	AOAC 990.03	18 Aug 2015

Approved by: J. Joel Sieh

J. Joel Sieh
Feed Laboratory Manager

APPENDIX 4 - TIBIA ASH RESULTS

CEPS Central Analytical Laboratory Report

poultryscience.uark.edu
University of Arkansas
Poultry Science Center L-209
Fayetteville, AR 72701
479-575-6532

Report Date: 11/6/2015
Report No: 163081

Investigator	Shoshana Gray
Institution	Colorado Quality Research, Inc.
Department	
Address	400 East County Road 72; Wellington, CO 80549
Customer#	121708
Phone#	970-568-7738 email: shoshana@coloradoqualityresearch.com
Report Description	Analysis of **Tibia Bones--AGV-15-4**

CAL Sample ID: 163081-163272

Sample ID	Ash %	Sample ID	Ash %
Day 21			
97	25.7	**125**	26.3
98	22.3	**126**	26.5
99	22.7	**127**	21.4
100	24.4	**128**	24.3
101	25.3	**129**	26.7
102	27.6	**130**	24.2
103	25.9	**131**	23.7
104	25.5	**132**	26.9
105	27.2	**133**	24.4
106	23.1	**134**	24.1
107	27.8	**135**	23.6
108	28.4	**136**	20.2
109	23.5	**137**	20.2
110	23.3	**138**	22.6
111	23.3	**139**	24.7
112	24.7	**140**	24.4
113	25.5	**141**	21.5
114	25.3	**142**	26.2
115	24.2	**143**	23.5
116	27.6	**144**	25.5
117	25.6	**145**	24.2
118	23.9	**146**	26.0
119	24.7	**147**	24.4
120	25.0	**148**	24.7
121	25.2	**149**	24.1
122	22.4	**150**	24.3
123	23.9	**151**	24.3
124	24.8	**152**	30.6

Bones were dried, then ashed.

Sample ID	Ash %
Day 21	
153	22.9
154	21.4
155	23.2
156	24.2
159	26.6
160	24.3
161	24.4
162	20.6
163	23.0
164	25.9
165	24.9
166	24.9
167	23.1
168	25.8
169	18.4
170	21.6
171	24.5
172	23.7
173	23.5
174	28.7
177	25.5
178	24.2
179	24.6
180	24.2
181	21.4
182	25.6
183	26.5
184	24.5
185	23.9
186	25.9
187	24.5
188	24.6
189	26.6
190	24.7
191	23.3
192	20.7
193	22.2
194	25.3
195	22.7
196	23.6

AGV-15-3

Sample ID	Ash %
Day 21	
4	22.9
5	23.1
6	19.7
7	23.1
8	25.6
9	23.3
10	25.1
11	23.0
12	24.3
13	24.9
14	26.8
15	24.2
16	24.4
17	27.6
18	27.4
19	27.3
22	26.7
23	25.3
24	26.3
25	23.1
26	26.6
27	26.1
28	27.3
29	27.0
30	25.6
31	25.2
32	25.5
33	24.7
34	27.1
35	22.8
36	26.3
37	23.5
41	27.1
42	26.2
43	27.5
44	25.4
45	27.0
46	24.1
47	26.3
48	24.7
49	24.7
50	26.9

Bones were dried, then ashed.

AGV-15-3

Sample ID	Ash %	Sample ID	Ash %
Day 21		83	27.1
51	26.7	84	25.6
52	25.3	85	26.4
53	21.9	86	26.4
54	23.2	87	25.6
55	26.6	88	24.7
56	25.4	89	24.6
59	28.4	90	21.2
60	23.0	91	23.7
61	26.0	92	26.2
62	25.3	93	25.0
63	25.2	96	24.6
64	27.2	97	26.2
65	27.3	98	24.6
66	26.8	99	26.8
67	27.4	100	22.5
68	25.0	101	25.8
69	27.3	102	28.1
70	25.0	103	27.2
71	23.0	104	26.8
72	26.6	105	28.7
73	26.3	106	28.1
74	25.0	107	29.1
78	26.0	108	26.6
79	24.1	109	24.3
80	27.7	110	27.7
81	27.9	111	27.8
82	27.0		

Bones were dried, then ashed.

Report Approved: Linda K. Kirby — Linda K. Kirby

11-6-15 — Date

poultryscience.uark.edu
University of Arkansas
Poultry Science Center L-209
Fayetteville, AR 72701
479-575-6532

CEPS Central Analytical Laboratory Report

Report Date: 11/24/2015

Report No: 163273

Investigator	Shoshana Gray	CAL Sample ID:	163273-163320
Institution	Colorado Quality Research, Inc.		163356-163403
Department			
Address	400 East County Road 72; Wellington, CO 80549		
Customer#	121708		
Phone#	970-568-7738	email:	shoshana@coloradoqualityresearch.com
Report Description	Analysis of **Tibia Bones--AGV-15-4**		

Sample ID	Ash %	Sample ID	Ash %
Day 42			
97	36.8	**125**	38.3
98	38.5	**126**	35.5
99	37.2	**127**	35.0
100	35.3	**128**	37.5
101	37.6	**129**	37.4
102	38.1	**130**	37.6
103	39.4	**131**	36.8
104	36.9	**132**	40.4
105	35.7	**133**	37.4
106	34.3	**134**	38.5
107	36.3	**135**	38.0
108	37.6	**136**	33.9
109	36.8	**137**	29.9
110	37.6	**138**	36.7
111	38.2	**139**	39.3
112	36.9	**140**	35.3
113	37.3	**141**	35.6
114	36.2	**142**	40.3
115	34.2	**143**	38.5
116	39.1	**144**	40.9
117	43.3	**145**	40.6
118	45.1	**146**	42.6
119	41.2	**147**	36.1
120	44.9	**148**	36.1
121	43.1	**149**	37.6
122	33.6	**150**	38.7
123	37.9	**151**	41.4
124	37.1	**152**	36.2

Bones were dried, then ashed.

Sample ID	Ash %
Day 42	
153	40.0
154	35.4
155	38.7
156	39.7
159	37.6
160	37.6
161	36.4
162	34.9
163	36.3
164	39.7
165	38.9
166	38.7
167	38.1
168	38.3
169	39.4
170	36.9
171	37.2
172	37.6
173	40.8
174	38.4
177	38.4
178	38.7
179	38.6
180	41.8
181	35.7
182	40.3
183	38.3
184	37.1
185	39.2
186	42.3
187	36.9
188	37.5
189	40.6
190	36.7
191	37.7
192	38.1
193	40.3
194	40.1
195	37.2
196	37.9

Bones were dried, then ashed.

Report Approved: Linda K. Kirby 11-24-15

Linda K. Kirby Date

UNIVERSITY of MISSOURI

EXPERIMENT STATION CHEMICAL LABORATORIES

COLLEGE OF AGRICULTURE, FOOD AND NATURAL RESOURCES

APPENDIX 5 - ILEAL CONTENT ANALYSIS RESULTS

December 8, 2015

Shoshana Gray
Colorado Quality Research, Inc.
400 East County Rd. 72
Wellington, CO 80549

Dear Ms. Gray:

Please find enclosed a completed reports of analyses for the samples we received September 16, 2015.

We have assigned lab number 14634-14635 to your samples. Reference standards were performed.

A University of Missouri invoice will be sent to you by the Accounting Department for payment of these services.

The original results will be on file in our office and available to you upon request. We are glad that we have been able to work with you on this project and look forward to being of service to you again.

Please let us know if you have further questions.

ESCL

Agriculture Experiment Station
Experiment Station Chemical Laboratories
University of Missouri-Columbia

Sincerely,

Dr. James K. Waters
Research Chemist

Dr. Thomas P. Mawhinney
Director

Enclosure

Experiment Station Chemical Laboratories

University of Missouri Room 4 Agricultural Building Columbia, Missouri 65211

Sender: Shoshana Grey **Date Received:** September 16, 2015
Address: Colorado Quality Research, Inc.
400 East County Road 72, Wellington, Colorado 80549
Phone: 970-568-7738 970=568=7719
Purchase Order #: Invoice **Date of Report:** December 8, 2015

Description:14634= AGV-15-4DAY 21; 14635=AGV-15-4 DAY42 **Page 1 of 7**

ESCL #	Dept. Number	Titanium ppm	Moisture W/W%	Phosphorus W/W%
14634- 1	97	1190	84.00	0.10
14634- 2	98	1530	78.98	0.17
14634- 3	99	1080	82.64	0.17
14634- 4	100	1110	83.46	0.13
14634- 5	101	960	84.00	0.16
14634- 6	102	1100	82.96	0.12
14634- 7	103	840	84.39	0.15
14634- 8	104	820	86.39	0.11
14634- 9	105	1240	80.52	0.16
14634- 10	106	1030	81.24	0.16
14634- 11	107	980	83.36	0.14
14634- 12	108	1080	83.01	0.17
14634- 13	109	1010	83.39	0.11
14634- 14	110	970	85.52	0.11
14634- 15	111	940	83.38	0.12
14634- 16	112	1060	83.42	0.10
14634- 17	113	1420	81.46	0.26
14634- 18	114	1070	82.13	0.19
14634- 19	115	1140	82.61	0.15
14634- 20	116	1070	81.97	0.12
14634- 21	117	970	84.37	0.07
14634- 22	118	1280	83.27	0.17
14634- 23	119	1010	83.38	0.18
14634- 24	120	1020	84.11	0.15
14634- 25	121	970	84.58	0.14
14634- 26	122	820	84.83	0.14
14634- 27	123	830	84.23	0.16
14634- 28	124	780	85.75	0.15
14634- 29	125	840	85.18	0.13
14634- 30	126	1050	82.70	0.16
14634- 31	127	1150	83.03	0.15

W/W%= grams per 100 grams of sample. *ppm= parts per million.*
Results are expressed on an "as is" basis unless otherwise indicated.
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Experiment Station Chemical Laboratories

University of Missouri Room 4 Agricultural Building Columbia, Missouri 65211

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Purchase Order #: Invoice **Date of Report:** December 8, 2015

Description:14634= AGV-15-4DAY 21; 14635=AGV-15-4 DAY42

ESCL #	Dept. Number	Titanium ppm	Moisture W/W%	Phosphorus W/W%
14634- 32	128	1010	83.05	0.15
14634- 33	129	1000	83.51	0.12
14634- 34	130	910	82.98	0.12
14634- 35	131	820	84.66	0.04
14634- 36	132	1170	83.03	0.18
14634- 37	133	990	83.50	0.14
14634- 38	134	1030	83.03	0.16
14634- 39	135	890	83.87	0.13
14634- 40	136	1230	81.29	0.25
14634- 41	137	970	82.34	0.19
14634- 42	138	640	82.56	0.13
14634- 43	139	1060	81.87	0.15
14634- 44	140	850	84.24	0.14
14634- 45	141	890	83.82	0.23
14634- 46	142	860	84.90	0.12
14634- 47	143	850	86.94	0.12
14634- 48	144	1060	83.62	0.10
14634- 49	145	1000	84.19	0.15
14634- 50	146	1070	84.07	0.18
14634- 51	147	950	85.57	0.12
14634- 52	148	1040	84.55	0.17
14634- 53	149	1100	83.84	0.15
14634- 54	150	1000	85.12	0.13
14634- 55	151	1040	84.30	0.16
14634- 56	152	910	85.56	0.10
14634- 57	153	770	86.49	0.10
14634- 58	154	1080	83.61	0.19
14634- 59	155	1060	83.10	0.18
14634- 60	156	840	85.90	0.11
14634- 61	159	960	83.72	0.16
14634- 62	160	1080	85.57	0.20

W/W%= grams per 100 grams of sample. *ppm= parts per million.*
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Description:14634= AGV-15-4DAY 21; 14635=AGV-15-4 DAY42 **Page 3 of 7**

ESCL #	Dept. Number	Titanium ppm	Moisture W/W%	Phosphorus W/W%
14634- 63	161	1110	84.23	0.14
14634- 64	162	1210	83.76	0.20
14634- 65	163	1120	84.92	0.15
14634- 66	164	1070	83.79	0.20
14634- 67	165	1170	84.82	0.09
14634- 68	166	1040	84.08	0.14
14634- 69	167	1040	83.91	0.09
14634- 70	168	1160	82.50	0.18
14634- 71	169	1120	83.27	0.15
14634- 72	170	1080	84.07	0.17
14634- 73	171	1160	84.78	0.17
14634- 74	172	1100	84.90	0.15
14634- 75	173	1120	83.86	0.13
14634- 76	174	1280	84.02	0.16
14634- 77	177	1160	86.55	0.16
14634- 78	178	1030	86.86	0.10
14634- 79	179	1140	86.04	0.16
14634- 80	180	1170	86.60	0.17
14634- 81	181	930	85.00	0.21
14634- 82	182	1270	84.98	0.14
14634- 83	183	750	88.90	0.12
14634- 84	184	1220	85.64	0.16
14634- 85	185	1050	85.92	0.20
14634- 86	186	1250	84.15	0.17
14634- 87	187	910	87.47	0.11
14634- 88	188	790	89.31	0.13
14634- 89	189	1090	87.31	0.17
14634- 90	190	1110	86.45	0.16
14634- 91	191	1250	84.51	0.17
14634- 92	192	1060	86.20	0.15
14634- 93	193	1190	84.56	0.19

W/W%= grams per 100 grams of sample. *ppm= parts per million.*
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Address: Colorado Quality Research, Inc.
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Phone: 970-568-7738 970=568=7719
Purchase Order #: Invoice **Date of Report:** December 8, 2015

Description:14634= AGV-15-4DAY 21; 14635=AGV-15-4 DAY42 **Page 4 of 7**

ESCL #	Dept. Number	Titanium ppm	Moisture W/W%	Phosphorus W/W%
14634- 94	194	1140	86.82	0.11
14634- 95	195	1090	85.76	0.16
14634- 96	196	1080	85.65	0.09
14635- 97	97	1420	83.23	0.24
14635- 98	98	1060	84.43	0.12
14635- 99	99	1160	84.09	0.19
14635- 100	100	990	84.99	0.16
14635- 101	101	1040	83.65	0.17
14635- 102	102	1090	85.74	0.10
14635- 103	103	1060	84.47	0.15
14635- 104	104	1380	82.48	0.15
14635- 105	105	1150	84.62	0.20
14635- 106	106	1130	83.99	0.20
14635- 107	107	1100	83.93	0.17
14635- 108	108	1310	82.40	0.22
14635- 109	109	1330	83.56	0.24
14635- 110	110	1150	82.43	0.23
14635- 111	111	940	85.00	0.15
14635- 112	112	1270	83.74	0.23
14635- 113	113	940	83.63	0.15
14635- 114	114	1050	83.80	0.23
14635- 115	115	1070	84.18	0.15
14635- 116	116	1220	83.81	0.21
14635- 117	117	1360	84.10	0.14
14635- 118	118	1010	86.46	0.18
14635- 119	119	1230	84.72	0.18
14635- 120	120	1280	83.81	0.25
14635- 121	121	1290	83.61	0.17
14635- 122	122	1040	84.00	0.21
14635- 123	123	1240	83.40	0.16
14635- 124	124	1150	84.24	0.27

W/W%= grams per 100 grams of sample. *ppm= parts per million.*
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Phone: 970-568-7738 970=568=7719
Purchase Order #: Invoice **Date of Report:** December 8, 2015

Description:14634= AGV-15-4DAY 21; 14635=AGV-15-4 DAY42

ESCL #	Dept. Number	Titanium ppm	Moisture W/W%	Phosphorus W/W%
14635- 125	125	1090	84.70	0.11
14635- 126	126	1050	85.26	0.16
14635- 127	127	1100	85.18	0.13
14635- 128	128	1190	83.90	0.15
14635- 129	129	1120	83.99	0.11
14635- 130	130	900	85.53	0.12
14635- 131	131	780	88.27	0.17
14635- 132	132	1100	84.60	0.24
14635- 133	133	1030	85.58	0.12
14635- 134	134	1060	85.76	0.13
14635- 135	135	1170	82.67	0.14
14635- 136	136	1300	83.89	0.14
14635- 137	137	1320	83.35	0.27
14635- 138	138	1210	84.63	0.27
14635- 139	139	1330	84.31	0.17
14635- 140	140	1210	83.84	0.17
14635- 141	141	1240	84.42	0.16
14635- 142	142	1120	84.98	0.11
14635- 143	143	1450	83.69	0.26
14635- 144	144	1090	85.17	0.10
14635- 145	145	1200	84.61	0.20
14635- 146	146	1090	84.94	0.23
14635- 147	147	1030	84.75	0.14
14635- 148	148	1030	85.13	0.27
14635- 149	149	1170	84.42	0.19
14635- 150	150	1400	83.54	0.26
14635- 151	151	1020	85.16	0.09
14635- 152	152	1230	83.82	0.12
14635- 153	153	1250	84.17	0.22
14635- 154	154	1010	84.30	0.15
14635- 155	155	1100	83.08	0.23

W/W%= grams per 100 grams of sample. *ppm= parts per million.*
Results are expressed on an "as is" basis unless otherwise indicated.
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Experiment Station Chemical Laboratories

University of Missouri Room 4 Agricultural Building Columbia, Missouri 65211

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Phone: 970-568-7738 970=568=7719
Purchase Order #: Invoice **Date of Report:** December 8, 2015

Description:14634= AGV-15-4DAY 21; 14635=AGV-15-4 DAY42 **Page 6 of 7**

ESCL #	Dept. Number	Titanium ppm	Moisture W/W%	Phosphorus W/W%
14635- 156	156	1190	83.48	0.22
14635- 157	159	870	85.40	0.15
14635- 158	160	1060	85.05	0.20
14635- 159	161	1120	84.08	0.09
14635- 160	162	1080	84.45	0.15
14635- 161	163	1590	83.77	0.30
14635- 162	164	980	85.64	0.11
14635- 163	165	1100	84.42	0.15
14635- 164	166	1090	84.95	0.22
14635- 165	167	950	86.23	0.14
14635- 166	168	1080	85.80	0.18
14635- 167	169	880	82.28	0.14
14635- 168	170	1030	87.15	0.20
14635- 169	171	1040	85.43	0.21
14635- 170	172	1140	86.61	0.13
14635- 171	173	1280	85.48	0.14
14635- 172	174	750	88.18	0.05*
14635- 173	177	1190	84.91	0.10
14635- 174	178	1210	85.03	0.12
14635- 175	179	1100	83.25	0.14
14635- 176	180	960	87.76	0.13
14635- 177	181	1160	85.13	0.14
14635- 178	182	1170	81.96	0.14
14635- 179	183	1370	84.38	0.17
14635- 180	184	1390	84.33	0.25
14635- 181	185	1090	84.24	0.25
14635- 182	186	860	87.14	0.11
14635- 183	187	1230	84.12	0.24
14635- 184	188	1230	84.76	0.18
14635- 185	189	1550	83.93	0.14
14635- 186	190	1170	83.42	0.23

W/W%= grams per 100 grams of sample. **sample repeated, value correct.*
Results are expressed on an "as is" basis unless otherwise indicated. ppm= parts per million.
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Description:14634= AGV-15-4DAY 21; 14635=AGV-15-4 DAY42 **Page 7 of 7**

ESCL #	Dept. Number	Titanium ppm	Moisture W/W%	Phosphorus W/W%
14636- 187	191	980	85.76	0.09
14636- 188	192	1090	82.69	0.38
14636- 189	193	1300	84.59	0.17
14636- 190	194	1420	82.95	0.16
14636- 191	195	1000	84.90	0.11
14636- 192	196	1070	83.99	0.11

W/W%= grams per 100 grams of sample. *ppm= parts per million.*
Results are expressed on an "as is" basis unless otherwise indicated.

UNIVERSITY *of* MISSOURI

EXPERIMENT STATION CHEMICAL LABORATORIES

COLLEGE OF AGRICULTURE, FOOD AND NATURAL RESOURCES

APPENDIX 6 - TITANIUM, PHOSPHORUS, AND MOISTURE ANALYSIS OF FEED RESULTS

November 18, 2015

Shoshana Gray
Colorado Quality Research, Inc.
400 East County Rd. 72
Wellington, CO 80549

Dear Ms. Gray:

Please find enclosed a completed reports of analyses for the samples we received October 21, 2015.

We have assigned lab number 17372-17379 to your samples. Reference standards were performed.

A University of Missouri invoice will be sent to you by the Accounting Department for payment of these services.

The original results will be on file in our office and available to you upon request. We are glad that we have been able to work with you on this project and look forward to being of service to you again.

Please let us know if you have further questions.

ESCL
Agriculture Experiment Station
Experiment Station Chemical Laboratories
University of Missouri-Columbia

Sincerely,

Dr. James K. Waters KA

Dr. James K. Waters
Research Chemist

Dr. Thomas P. Mawhinney
Director

Enclosure

Experiment Station Chemical Laboratories

University of Missouri Room 4 Agricultural Building Columbia, Missouri 65211

Sender: Shoshana Gray **Date Received:** October 21, 2015
Address: Colorado Quality Research, Inc.
400 East County Rod 72, Wellington, Colorado 80549
Phone/Fax: 970-568-7738 / 970=568=7719
Purchase Order #: Invoice **Date of Report:** November 18, 2015

Description: AGV-15-3 & AGV-15-4 **Page 1 of 1**

ESCL #	CQR ID	Titanium ppm	Moisture W/W%	Phosphorus W/W%
17372	AGV 15-3 LP Starter	1360	11.57	0.59
17373	AGV 15-3 LP Grow. /Fin.	1490	11.40	0.49
17374	AGV 15-3 HP Starter	1240	11.57	0.82
17375	AGV 15-3 HP Grow. /Fin.	1400	11.29	0.64
17376	AGV 15-4 LP Starter	1360	11.79	0.62
17377	AGV 15-4 LP Grow. / Fin.	1450	11.01	0.55
17378	AGV 15-4 HP Starter	1030	11.65	0.88
17379	AGV 15-4 HP Grow. / Fin.	1390	11.27	0.74

W/W%= grams per 100 grams of sample, ppm= parts per million.
Results are expressed on an "as is" basis unless otherwise indicated.

Shoshana Gray

From:	Jon Broomhead [jon.broomhead@agrivida.com]
Sent:	Tuesday, March 01, 2016 1:57 PM
To:	Shoshana Gray; Jim Ligon
Subject:	AGV-15-4 report
Attachments:	AGV-15-4 All stats.docx
Categories:	PRINTED FOR STUDY NOTEBOOK, AGV-15-4

Hi Shoshana,

When do you think you will have the final report from AGV-15-4? In case I hadn't send you it yet, attached is the final statistical report for AGV-15-4.

You are still waiting for the AGV-15-5 ileal P digestibility, so hopefully that report can be not too far away after getting those results. Jim is needing the reports for submitting for the FDA/GRAS notification.

Thanks,

Jon

AGV-15-4 Statistical Report

Pen was used as experimental unit for each analyzed variable. Data was analyzed using fit least squares of the JMP software (version 12, SAS Institute Inc., Cary, NC). The ANOVA model included treatment and block. Mean values were separated using Tukey's honesty significant difference procedure, unless otherwise stated. P-values < 0.05 are considered significant in all comparisons.

0-14 d performance

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion	Mortality, %
Positive Control	0.372^{ab}	0.289^{cde}	1.287^{a}	1.96
Negative Control	0.330^{e}	0.250^{f}	1.319^{a}	0.49
250 U + NC	0.357^{cd}	0.277^{e}	1.289^{a}	0.98
500 U + NC	0.354^{d}	0.285^{de}	1.244^{b}	0.98
750 U + NC	0.364^{bcd}	0.293^{bcd}	1.242^{bc}	0
1000 U + NC	0.370^{bc}	0.299^{bc}	1.238^{bc}	1.96
3000 U + NC	0.374^{ab}	0.304^{b}	1.229^{bc}	1.96
30,000 U + NC	0.384^{a}	0.319^{a}	1.204^{c}	3.43
SEM	0.0029	0.0028	0.0091	0.84
TRT P Value	<0.0001	<0.0001	<0.0001	0.115*
Block P Value	0.0002	0.043	0.18	0.54*

$^{a-f}$ Values within columns with no common superscript are statistically different (P < 0.05).
*Statistical analysis was done on Square Root, ArcSin transformed values

0-21 d performance

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion	Mortality, %
Positive Control	0.910^{b}	0.682^{cd}	1.334^{ab}	2.94
Negative Control	0.777^{d}	0.572^{f}	1.357^{a}	1.47
250 U + NC	0.872^{c}	0.654^{e}	1.332^{abc}	2.45
500 U + NC	0.875^{c}	0.669^{de}	1.308^{bcd}	1.93
750 U + NC	0.899^{bc}	0.690^{cd}	1.303^{cde}	0.98
1000 U + NC	0.903^{bc}	0.700^{bc}	1.290^{de}	2.94
3000 U + NC	0.928^{ab}	0.721^{b}	1.288^{de}	2.45
30,000 U + NC	0.958^{a}	0.752^{a}	1.275^{e}	4.41
SEM	0.0073	0.0061	0.0067	1.04
TRT P Value	<0.0001	<0.0001	<0.0001	0.41*
Block P Value	<0.0001	0.012	0.101	0.30*

$^{a-f}$ Values within columns with no common superscript are statistically different (P < 0.05).
*Statistical analysis was done on Square Root, ArcSin transformed values

0-42 d performance

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion	Mortality, %
Positive Control	4.387[a]	2.851[ab]	1.539[a]	4.90
Negative Control	3.668[d]	2.381[d]	1.540[a]	2.94
250 U + NC	4.192[c]	2.733[c]	1.534[ab]	5.39
500 U + NC	4.250[bc]	2.822[bc]	1.506[c]	3.84
750 U + NC	4.356[ab]	2.880[ab]	1.512[bc]	4.41
1000 U + NC	4.319[abc]	2.863[ab]	1.509[c]	5.88
3000 U + NC	4.402[a]	2.927[a]	1.504[c]	4.90
30,000 U + NC	4.448[a]	2.944[a]	1.512[bc]	7.84
SEM	0.031	0.022	0.006	1.53
TRT P Value	<0.0001	<0.0001	<0.0001	0.64*
Block P Value	<0.0001	<0.0001	0.52	0.20*

[a-d] Values within columns with no common superscript are statistically different ($P < 0.05$).

*Statistical analysis was done on Square Root, ArcSin transformed values

14-21 d performance

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	0.538^{bc}	0.393^{cd}	1.369^{ab}
Negative Control	0.447^{d}	0.322^{e}	1.388^{a}
250 U + NC	0.514^{c}	0.377^{d}	1.365^{ab}
500 U + NC	0.521^{c}	0.384^{cd}	1.357^{ab}
750 U + NC	0.535^{bc}	0.397^{c}	1.348^{ab}
1000 U + NC	0.534^{bc}	0.402^{bc}	1.329^{b}
3000 U + NC	0.555^{ab}	0.416^{ab}	1.332^{b}
30,000 U + NC	0.575^{a}	0.433^{a}	1.329^{b}
SEM	0.0055	0.0043	0.0093
TRT P Value	<0.0001	<0.0001	<0.0001
Block P Value	0.0003	0.0103	0.033

$^{a-e}$ Values within columns with no common superscript are statistically different (P < 0.05).

21-42 d performance

Treatment	Feed Intake, kg	Body Wt Gain, kg	Adj. Feed Conversion
Positive Control	3.512^{ab}	2.169^{ab}	1.619^{A}
Negative Control	2.917^{d}	1.809^{c}	1.612^{AB}
250 U + NC	3.355^{c}	2.079^{b}	1.615^{AB}
500 U + NC	3.409^{bc}	2.153^{ab}	1.583^{C}
750 U + NC	3.497^{ab}	2.190^{a}	1.597^{ABC}
1000 U + NC	3.456^{abc}	2.163^{ab}	1.599^{ABC}
3000 U + NC	3.512^{ab}	2.206^{a}	1.593^{BC}
30,000 U + NC	3.541^{a}	2.192^{a}	1.617^{A}
SEM	0.029	0.021	0.0085
TRT P Value	<0.0001	<0.0001	0.025
Block P Value	<0.0001	<0.0001	0.52

^{abcd} Values within columns with no common superscript are statistically different (P < 0.05).
^{ABC} Values within columns with no common superscript are statistically different (P < 0.05; Student's T test was used because Tukey's test was not assigning superscripts)

Tibia Ash

Treatment	21d Tibia Ash		42d Tibia Ash	
	Grams[1]	%	Grams[1]	%
Positive Control	2.56^{b}	24.87^{a}	10.91^{ab}	37.59^{a}
Negative Control	1.91^{c}	21.30^{b}	8.18^{c}	34.99^{b}
250 U + NC	2.59^{b}	23.90^{a}	10.05^{b}	38.29^{a}
500 U + NC	2.59^{b}	24.76^{a}	10.62^{ab}	38.98^{a}
750 U + NC	2.65^{b}	24.54^{a}	10.66^{ab}	37.15^{ab}
1000 U + NC	2.73^{b}	24.86^{a}	10.48^{ab}	39.23^{a}
3000 U + NC	2.73^{b}	25.41^{a}	10.93^{ab}	39.12^{a}
30,000 U + NC	3.02^{a}	25.58^{a}	11.09^{a}	39.00^{a}
SEM	0.06	0.40	0.23	0.53
TRT P Value	<0.0001	<0.0001	<0.0001	<0.0001
Block P Value	0.39	0.008	0.13	0.0029

^{ab} Values within columns with no common superscript are statistically different ($P < 0.05$).
[1]Tibia ash weight; n = 3 tibia per pen

Ileal P digestibility (Dry Matter basis)

Treatment	21d Ileal P digestibility (%)	21d Ileal P (mg/100g)	42d Ileal P digestibility (%)	42d Ileal P (mg/100g)
Positive Control	82.73^{a}*	24.9^{ab}	63.98^{abc}	37.0^{a}
Negative Control	61.83^{c}	30.1^{a}	56.18^{bc}	30.0^{abc}
250 U + NC	68.50^{bc}	24.0^{ab}	51.04^{c}	30.9^{ab}
500 U + NC	67.71^{bc}	23.0^{ab}	63.39^{abc}	23.8^{bc}
750 U + NC	68.32^{bc}	21.3^{b}	60.86^{abc}	26.5^{abc}
1000 U + NC	68.92^{bc}	22.4^{ab}	60.33^{abc}	27.2^{abc}
3000 U + NC	69.98^{b}	20.8^{b}	66.18^{ab}	23.0^{bc}
30,000 U + NC	75.80^{ab}	21.3^{b}	71.28^{a}	19.5^{c}
SEM	1.84	2.0	3.02	2.5
TRT P Value	<0.0001	0.032	0.0006	0.0002
Block P Value	0.54	0.80	0.84	0.29

^{abc} Values within columns with no common superscript are statistically different ($P < 0.05$).
* 21d Positive control appears to be artificially high (vs. NC treatments) due to higher P and lower Ti in analyzed feed sample.

Hematology

	Positive Control	30,000 FTU	SEM	Treatment P Value	Block P Value
Haemoglobin, g/dL	12.45	12.67	0.15	0.33	0.96
Hematocrit, %	34.70	35.19	0.41	0.42	0.99
Red Blood Cell x10^6 uL	2.86	2.91	0.03	0.23	0.95
Mean Corpuscular volume, fL	121.5	121.0	0.5	0.46	0.92
Mean Corpuscular Hemoglobin, pg	43.59	43.55	0.25	0.92	0.91
MCH concentration, g/dL	35.88	35.99	0.12	0.52	0.63
Red Cell Distribution Width, %	9.40	9.14	0.15	0.24	0.59
White Blood Cell x10^3 ul	13.95	13.73	1.35	0.91	0.87
Heterophils, %	33.69	31.64	1.89	0.46	0.60
Lymphocytes, %	53.17	58.69	2.03	0.08	0.36
Monocytes, %	4.29	4.65	0.51	0.63	0.19
Eosinophil, %	5.00	5.03	0.90	0.98	0.93
Basophil, %	2.88	3.38	0.29	0.25	0.40
Absolute Heterophils, x10^3 ul	4.40	4.38	0.39	0.97	0.88
Absolute Lymphocytes, x10^3 ul	7.74	8.00	0.91	0.85	0.72
Absolute Monocytes, x10^3 ul	0.564	0.667	0.103	0.49	0.42
Absolute Eosinophil, x10^3 ul	0.698	0.703	0.143	0.98	0.83
Absolute Basophil, x10^3 ul	0.410	0.502	0.082	0.44	0.58
Total Protein, g/dL	2.81	2.85	0.04	0.48	0.20
Albumin, g/dL	1.03	1.07	0.02	0.28	0.89
Globulin, g/dL	1.82	1.86	0.03	0.45	0.26
Albumin/Globulin	0.556	0.542	0.009	0.32	0.50
Creatine Kinase, U/L	Non-Est[1]	Non-Est[1]	-	-	-
Alanine Aminotransferase, U/L	<5[2]	<5	-	-	-
Phosphorus, mg/dL	6.79[a]	6.38[b]	0.12	0.028	0.56
Glucose, mg/dL	255.6	255.9	2.6	0.94	0.053

[1] Non-Estimable, many samples (54 of 72) above the the maximum analyzable limit >22500 U/L

[2] Below analyzable limits

[ab] Values within row with no common superscript are statistically different ($P < 0.05$).

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Table 2. Day 0 Pen Weights (30JUL15) Summarized by Treatment Group
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Block	Treatment	Pen	No. of Birds	Day 0 Pen Wt (kg)	Avg. Day 0 Bird Wt (kg)
2	1	106	17	0.751	0.044
3	1	115	17	0.752	0.044
4	1	122	17	0.755	0.044
5	1	127	17	0.755	0.044
1	1	136	17	0.734	0.043
6	1	137	17	0.737	0.043
7	1	141	17	0.746	0.044
8	1	154	17	0.757	0.045
9	1	162	17	0.774	0.046
10	1	169	17	0.751	0.044
11	1	181	17	0.718	0.042
12	1	192	17	0.761	0.045
Total & Averages			**204**	**0.749**	**0.044**
Standard Deviations				**0.014**	**0.001**
CVs				**1.913%**	**1.913%**

1	2	97	17	0.777	0.046
2	2	105	17	0.749	0.044
3	2	114	17	0.739	0.043
4	2	124	17	0.743	0.044
5	2	132	17	0.738	0.043
6	2	139	17	0.725	0.043
7	2	143	17	0.755	0.044
8	2	149	17	0.743	0.044
9	2	163	17	0.759	0.045
10	2	171	17	0.749	0.044
11	2	185	17	0.776	0.046
12	2	190	17	0.748	0.044
Total & Averages			**204**	**0.750**	**0.044**
Standard Deviations				**0.015**	**0.001**
CVs				**2.012%**	**2.012%**

1	3	99	17	0.747	0.044
2	3	108	17	0.744	0.044
3	3	111	17	0.761	0.045
4	3	118	17	0.749	0.044
5	3	131	17	0.746	0.044
6	3	138	17	0.764	0.045
7	3	148	17	0.733	0.043
8	3	155	17	0.747	0.044
9	3	160	17	0.770	0.045
10	3	167	17	0.715	0.042
11	3	184	17	0.767	0.045
12	3	193	17	0.752	0.044
Total & Averages			**204**	**0.750**	**0.044**
Standard Deviations				**0.015**	**0.001**
CVs				**2.048%**	**2.048%**

Table 2. Day 0 Pen Weights (30JUL15) Summarized by Treatment Group
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Building 7

Block	Treatment	Pen	No. of Birds	Day 0 Pen Wt (kg)	Avg. Day 0 Bird Wt (kg)
2	4	103	17	0.760	0.045
3	4	116	17	0.746	0.044
4	4	119	18	0.781	0.043
5	4	128	17	0.723	0.043
1	4	133	17	0.741	0.044
7	4	146	17	0.755	0.044
8	4	156	17	0.736	0.043
9	4	161	17	0.747	0.044
10	4	172	17	0.758	0.045
6	4	180	17	0.738	0.043
11	4	188	17	0.737	0.043
12	4	191	17	0.754	0.044
Total & Averages			**204**	**0.748**	**0.044**
Standard Deviations				**0.015**	**0.001**
CVs				**2.000%**	**1.474%**
1	5	100	17	0.764	0.045
2	5	104	17	0.735	0.043
3	5	109	17	0.753	0.044
4	5	123	17	0.721	0.042
5	5	126	17	0.736	0.043
7	5	147	17	0.725	0.043
8	5	150	17	0.719	0.042
9	5	159	17	0.735	0.043
10	5	170	17	0.732	0.043
6	5	179	17	0.759	0.045
11	5	183	17	0.746	0.044
12	5	195	17	0.734	0.043
Total & Averages			**204**	**0.738**	**0.043**
Standard Deviations				**0.014**	**0.001**
CVs				**1.958%**	**1.958%**
2	6	107	17	0.778	0.046
3	6	110	17	0.762	0.045
4	6	120	17	0.757	0.045
5	6	130	17	0.741	0.044
1	6	135	17	0.741	0.044
6	6	140	17	0.733	0.043
7	6	145	17	0.754	0.044
8	6	153	17	0.749	0.044
9	6	164	17	0.782	0.046
10	6	168	17	0.777	0.046
11	6	186	17	0.724	0.043
12	6	194	17	0.756	0.044
Total & Averages			**204**	**0.755**	**0.044**
Standard Deviations				**0.018**	**0.001**
CVs				**2.420%**	**2.420%**

Table 2. Day 0 Pen Weights (30JUL15) Summarized by Treatment Group
AGV-15-4
Building 7

Block	Treatment	Pen	No. of Birds	Day 0 Pen Wt (kg)	Avg. Day 0 Bird Wt (kg)
2	7	101	17	0.766	0.045
3	7	112	17	0.723	0.043
4	7	121	17	0.732	0.043
5	7	125	17	0.742	0.044
1	7	134	17	0.728	0.043
7	7	142	17	0.747	0.044
8	7	151	17	0.758	0.045
9	7	166	17	0.756	0.044
10	7	174	17	0.753	0.044
6	7	178	17	0.750	0.044
11	7	187	17	0.745	0.044
12	7	189	17	0.718	0.042
Total & Averages			**204**	**0.743**	**0.044**
Standard Deviations				**0.015**	**0.001**
CVs				**2.014%**	**2.014%**
1	8	98	17	0.750	0.044
2	8	102	17	0.765	0.045
3	8	113	17	0.751	0.044
4	8	117	17	0.780	0.046
5	8	129	17	0.705	0.041
7	8	144	17	0.762	0.045
8	8	152	17	0.749	0.044
9	8	165	17	0.763	0.045
10	8	173	17	0.749	0.044
6	8	177	17	0.771	0.045
11	8	182	17	0.756	0.044
12	8	196	17	0.757	0.045
Total & Averages			**204**	**0.755**	**0.044**
Standard Deviations				**0.018**	**0.001**
CVs				**2.434%**	**2.434%**

Table 4. Bird Weights and Feed Conversion Days 0 - 14 (12AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D14	D14 Pen Wt (kg)	D14 Avg Bird Wt (kg)	D0-14 Avg Bird Gain (kg)	Feed Conversion D0-14	Adj. Feed Conversion D0-14
1	1	136	17	0	0	0	17	4 960	0.292	0.249	1.320	1 320
2	1	106	17	0	0	0	17	5.160	0.304	0.259	1.293	1 293
3	1	115	17	0	0	0	17	5.160	0.304	0.259	1.338	1 338
4	1	122	17	0	0	0	17	4 980	0.293	0.249	1.292	1 292
5	1	127	17	0	0	0	17	5 220	0.307	0.263	1.299	1 299
6	1	137	17	0	0	0	17	4 800	0.282	0.239	1.354	1 354
7	1	141	17	0	0	0	17	4 920	0.289	0.246	1.332	1 332
8	1	154	17	0	0	0	17	5 240	0.308	0.264	1.276	1 276
9	1	162	17	1	0	0	16	4.680	0.293	0.247	1.362	1 317
10	1	169	17	0	0	0	17	4 900	0.288	0.244	1.345	1 345
11	1	181	17	0	0	0	17	4 840	0.285	0.242	1.368	1 368
12	1	192	17	0	0	0	17	4 900	0.288	0.243	1.290	1 290
Total & Averages			**204**	**1**	**0**	**0**	**203**	**4.980**	**0.294**	**0.250**	**1.322**	**1.319**
Standard Deviations								**0.178**	**0.009**	**0.009**	**0.032**	**0.029**
CVs								**3.576%**	**3.023%**	**3.427%**	**2.396%**	**2.210%**
1	2	97	17	0	0	0	17	5 920	0.348	0.303	1.279	1 279
2	2	105	17	0	0	0	17	5.640	0.332	0.288	1.317	1 317
3	2	114	17	0	0	0	17	5 880	0.346	0.302	1.245	1 245
4	2	124	17	0	0	0	17	5.680	0.334	0.290	1.268	1 268
5	2	132	17	0	0	0	17	5.680	0.334	0.291	1.271	1 271
6	2	139	17	1	0	0	16	4 880	0.305	0.262	1.381	1 364
7	2	143	17	0	0	0	17	5 500	0.324	0.279	1.298	1 298
8	2	149	17	0	0	0	17	5.620	0.331	0.287	1.300	1 300
9	2	163	17	0	0	0	17	5.740	0.338	0.293	1.269	1 269
10	2	171	17	1	0	0	16	5.480	0.343	0.298	1.319	1 292
11	2	185	17	0	0	0	17	5.660	0.333	0.287	1.282	1 282
12	2	190	17	1	1	0	15	4 980	0.332	0.288	1.300	1 262
Total & Averages			**204**	**3**	**1**	**0**	**200**	**5.555**	**0.333**	**0.289**	**1.294**	**1.287**
Standard Deviations								**0.319**	**0.011**	**0.011**	**0.035**	**0.031**
CVs								**5.749%**	**3.379%**	**3.747%**	**2.707%**	**2.413%**
1	3	99	17	0	0	0	17	5.140	0.302	0.258	1.379	1 379
2	3	108	17	0	0	0	17	5 560	0.327	0.283	1.254	1 254
3	3	111	17	0	0	0	17	5 340	0.314	0.269	1.337	1 337
4	3	118	17	0	0	0	17	5.420	0.319	0.275	1.267	1 267
5	3	131	17	0	0	0	17	5.640	0.332	0.288	1.328	1 328
6	3	138	17	1	0	0	16	5 080	0.318	0.273	1.297	1 277
7	3	148	17	0	0	0	17	5.600	0.329	0.286	1.294	1 294
8	3	155	17	0	0	0	17	5 380	0.316	0.273	1.256	1 256
9	3	160	17	0	0	0	17	5.720	0.336	0.291	1.333	1 333
10	3	167	17	0	0	0	17	5 360	0.315	0.273	1.283	1 283
11	3	184	17	1	0	0	16	5 040	0.315	0.270	1.259	1 235
12	3	193	17	0	0	0	17	5.660	0.333	0.289	1.222	1 222
Total & Averages			**204**	**2**	**0**	**0**	**202**	**5.412**	**0.321**	**0.277**	**1.293**	**1.289**
Standard Deviations								**0.233**	**0.010**	**0.010**	**0.045**	**0.047**
CVs								**4.305%**	**3.117%**	**3.597%**	**3.459%**	**3.645%**

Table 4. Bird Weights and Feed Conversion Days 0 - 14 (12AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D14	D14 Pen Wt (kg)	D14 Avg Bird Wt (kg)	D0-14 Avg Bird Gain (kg)	Feed Conversion D0-14	Adj. Feed Conversion D0-14
1	4	133	17	0	0	0	17	5.640	0.332	0.288	1.261	1 261
2	4	103	17	0	0	0	17	5.720	0.336	0.292	1.278	1 278
3	4	116	17	0	0	0	17	5.480	0.322	0.278	1.246	1 246
4	4	119	18	0	0	0	18	5 860	0.326	0.280	1.217	1 217
5	4	128	17	1	0	0	16	5 040	0.315	0.272	1.320	1 289
6	4	180	17	0	0	0	17	5 320	0.313	0.270	1.261	1 261
7	4	146	17	0	0	0	17	5.780	0.340	0.296	1.222	1 222
8	4	156	17	0	0	0	17	5 580	0.328	0.285	1.201	1 201
9	4	161	17	0	0	0	17	5.740	0.338	0.294	1.266	1 266
10	4	172	17	0	0	0	17	5.680	0.334	0.290	1.223	1 223
11	4	188	17	0	0	0	17	5.620	0.331	0.287	1.229	1 229
12	4	191	17	0	1	0	16	5 260	0.329	0.284	1.256	1 235
Total & Averages			**205**	**1**	**1**	**0**	**203**	**5.560**	**0.329**	**0.285**	**1.248**	**1.244**
Standard Deviations								**0.242**	**0.009**	**0.008**	**0.033**	**0.027**
CVs								**4.357%**	**2.590%**	**2.874%**	**2.613%**	**2.174%**
1	5	100	17	0	0	0	17	5.740	0.338	0.293	1.282	1 282
2	5	104	17	0	0	0	17	5.760	0.339	0.296	1.238	1 238
3	5	109	17	0	0	0	17	5.760	0.339	0.295	1.246	1 246
4	5	123	17	0	0	0	17	5.760	0.339	0.296	1.242	1 242
5	5	126	17	0	0	0	17	5 880	0.346	0.303	1.209	1 209
6	5	179	17	0	0	0	17	5.700	0.335	0.291	1.222	1 222
7	5	147	17	0	0	0	17	5 580	0.328	0.286	1.273	1 273
8	5	150	17	0	0	0	17	5 540	0.326	0.284	1.282	1 282
9	5	159	17	0	0	0	17	5.720	0.336	0.293	1.212	1 212
10	5	170	17	0	0	0	17	5 820	0.342	0.299	1.234	1 234
11	5	183	17	0	0	0	17	5 940	0.349	0.306	1.198	1.198
12	5	195	17	0	0	0	17	5 380	0.316	0.273	1.270	1 270
Total & Averages			**204**	**0**	**0**	**0**	**204**	**5.715**	**0.336**	**0.293**	**1.242**	**1.242**
Standard Deviations								**0.153**	**0.009**	**0.009**	**0.029**	**0.029**
CVs								**2.674%**	**2.674%**	**2.996%**	**2.352%**	**2.352%**
1	6	135	17	0	0	0	17	6.100	0.359	0.315	1.205	1 205
2	6	107	17	0	0	0	17	5 820	0.342	0.297	1.238	1 238
3	6	110	17	1	0	0	16	5 520	0.345	0.300	1.307	1 276
4	6	120	17	0	0	0	17	6 020	0.354	0.310	1.212	1 212
5	6	130	17	1	0	0	16	5 560	0.348	0.304	1.270	1 255
6	6	140	17	0	0	0	17	5.400	0.318	0.275	1.273	1 273
7	6	145	17	0	0	0	17	5.740	0.338	0.293	1.256	1 256
8	6	153	17	1	0	0	16	5 360	0.335	0.291	1.258	1 229
9	6	164	17	0	0	0	17	5 800	0.341	0.295	1.267	1 267
10	6	168	17	1	0	0	16	5.680	0.355	0.309	1.256	1 234
11	6	186	17	0	0	0	17	5 800	0.341	0.299	1.194	1.194
12	6	194	17	0	0	0	17	5 800	0.341	0.297	1.217	1 217
Total & Averages			**204**	**4**	**0**	**0**	**200**	**5.717**	**0.343**	**0.299**	**1.246**	**1.238**
Standard Deviations								**0.226**	**0.011**	**0.011**	**0.033**	**0.027**
CVs								**3.958%**	**3.154%**	**3.538%**	**2.677%**	**2.220%**

Table 4. Bird Weights and Feed Conversion Days 0 - 14 (12AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D14	D14 Pen Wt (kg)	D14 Avg Bird Wt (kg)	D0-14 Avg Bird Gain (kg)	Feed Conversion D0-14	Adj. Feed Conversion D0-14
1	7	134	17	0	1	0	16	5.600	0.350	0.307	1.260	1 247
2	7	101	17	0	0	0	17	5 580	0.328	0.283	1.334	1 334
3	7	112	17	1	0	0	16	5 500	0.344	0.301	1.223	1 204
4	7	121	17	0	0	0	17	6 060	0.356	0.313	1.235	1 235
5	7	125	17	0	0	0	17	5 940	0.349	0.306	1.200	1 200
6	7	178	17	0	0	0	17	5.720	0.336	0.292	1.256	1 256
7	7	142	17	0	0	0	17	6 060	0.356	0.313	1.208	1 208
8	7	151	17	0	0	0	17	6.100	0.359	0.314	1.221	1 221
9	7	166	17	0	0	0	17	5 980	0.352	0.307	1.206	1 206
10	7	174	17	0	0	0	17	6 200	0.365	0.320	1.245	1 245
11	7	187	17	2	0	0	15	5.120	0.341	0.298	1.243	1.199
12	7	189	17	0	0	0	17	5.720	0.336	0.294	1.200	1 200
Total & Averages			**204**	**3**	**1**	**0**	**200**	**5.798**	**0.348**	**0.304**	**1.236**	**1.229**
Standard Deviations								**0.315**	**0.011**	**0.011**	**0.037**	**0.039**
CVs								**5.431%**	**3.100%**	**3.539%**	**3.019%**	**3.151%**
1	8	98	17	0	0	0	17	6.120	0.360	0.316	1.199	1.199
2	8	102	17	2	0	0	15	5 520	0.368	0.323	1.253	1.191
3	8	113	17	1	0	0	16	6 000	0.375	0.331	1.212	1.190
4	8	117	17	0	0	0	17	6.160	0.362	0.316	1.197	1.197
5	8	129	17	0	1	0	16	5.660	0.354	0.312	1.267	1 241
6	8	177	17	1	0	0	16	5 840	0.365	0.320	1.219	1 203
7	8	144	17	0	0	0	17	6.480	0.381	0.336	1.200	1 200
8	8	152	17	0	0	0	17	6 540	0.385	0.341	1.167	1.167
9	8	165	17	1	0	0	16	5.700	0.356	0.311	1.248	1 239
10	8	173	17	0	0	0	17	6.180	0.364	0.319	1.201	1 201
11	8	182	17	0	0	0	17	5 840	0.344	0.299	1.200	1 200
12	8	196	17	1	0	0	16	5 520	0.345	0.300	1.243	1 221
Total & Averages			**204**	**6**	**1**	**0**	**197**	**5.963**	**0.363**	**0.319**	**1.217**	**1.204**
Standard Deviations								**0.343**	**0.013**	**0.013**	**0.029**	**0.021**
CVs								**5.756%**	**3.540%**	**3.997%**	**2.422%**	**1.714%**

Graph 1. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 14) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.250	1.319	Low Phosphate (LP)
2	0.289	1.287	High Phosphate (HP)
3	0.277	1.289	250 Units Phytase (LP)
4	0.285	1.244	500 Units Phytase (LP)
5	0.293	1.242	750 Units Phytase (LP)
6	0.299	1.238	1,000 Units Phytase (LP)
7	0.304	1.229	3,000 Units Phytase (LP)
8	0.319	1.204	30,000 Units Phytase (LP)

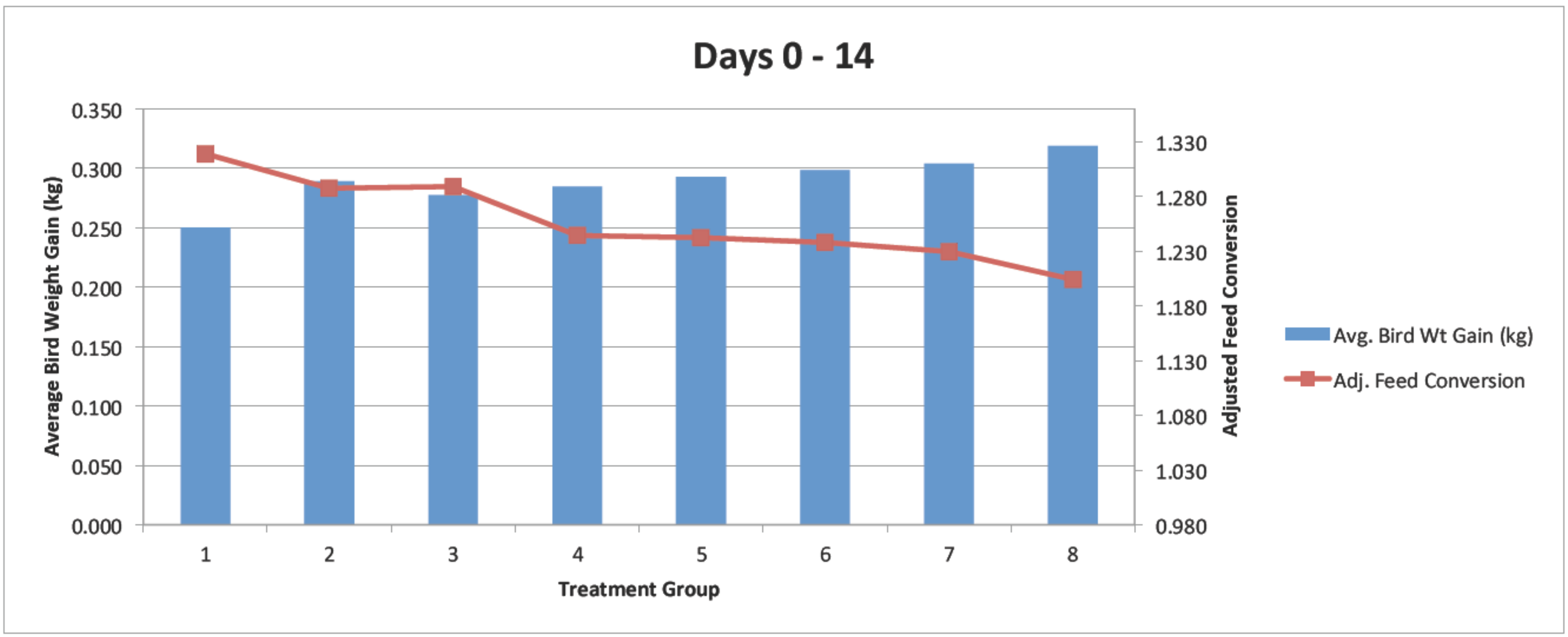


Table 6. Bird Weights and Feed Conversion Days 0 - 21 (19AUG15) Sorted by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	1	136	17	0	0	0	17	10.480	0.616	0.573	1.365	1.365
2	1	106	17	0	0	0	17	10.740	0.632	0.588	1.335	1.335
3	1	115	17	0	0	0	17	10.500	0.618	0.573	1.352	1.352
4	1	122	17	0	0	0	17	10.320	0.607	0.563	1.351	1.351
5	1	127	17	0	0	0	17	11.020	0.648	0.604	1.352	1.352
6	1	137	17	0	0	0	17	10.160	0.598	0.554	1.390	1.390
7	1	141	17	0	0	0	17	10.280	0.605	0.561	1.368	1.368
8	1	154	17	0	0	0	17	11.060	0.651	0.606	1.363	1.363
9	1	162	17	1	0	0	16	9.740	0.609	0.563	1.352	1.332
10	1	169	17	0	0	0	17	10.440	0.614	0.570	1.350	1.350
11	1	181	17	0	1	0	16	9.660	0.604	0.562	1.396	1.351
12	1	192	17	0	1	0	16	9.540	0.596	0.551	1.424	1.381
Total & Averages			**204**	**1**	**2**	**0**	**201**	**10.328**	**0.616**	**0.572**	**1.366**	**1.357**
Standard Deviation								**0.495**	**0.018**	**0.018**	**0.025**	**0.017**
CVs								**4.791%**	**2.945%**	**3.141%**	**1.824%**	**1.245%**
1	2	97	17	0	0	0	17	12.940	0.761	0.715	1.307	1.307
2	2	105	17	0	0	0	17	12.500	0.735	0.691	1.343	1.343
3	2	114	17	0	0	0	17	12.400	0.729	0.686	1.355	1.355
4	2	124	17	1	0	0	16	11.560	0.723	0.679	1.401	1.322
5	2	132	17	0	0	0	17	12.400	0.729	0.686	1.321	1.321
6	2	139	17	1	0	0	16	10.880	0.680	0.637	1.323	1.317
7	2	143	17	0	1	0	16	11.600	0.725	0.681	1.392	1.357
8	2	149	17	0	0	0	17	12.220	0.719	0.675	1.380	1.380
9	2	163	17	0	0	0	17	11.980	0.705	0.660	1.330	1.330
10	2	171	17	1	0	0	16	12.200	0.763	0.718	1.341	1.330
11	2	185	17	0	0	0	17	12.540	0.738	0.692	1.321	1.321
12	2	190	17	1	1	0	15	10.600	0.707	0.663	1.340	1.323
Total & Averages			**204**	**4**	**2**	**0**	**198**	**11.985**	**0.726**	**0.682**	**1.346**	**1.334**
Standard Deviation								**0.701**	**0.023**	**0.023**	**0.030**	**0.021**
CVs								**5.846%**	**3.169%**	**3.301%**	**2.250%**	**1.572%**
1	3	99	17	0	0	0	17	11.480	0.675	0.631	1.399	1.399
2	3	108	17	0	0	0	17	12.160	0.715	0.672	1.295	1.295
3	3	111	17	0	0	0	17	11.940	0.702	0.658	1.336	1.336
4	3	118	17	0	0	0	17	11.780	0.693	0.649	1.316	1.316
5	3	131	17	0	0	0	17	11.760	0.692	0.648	1.376	1.376
6	3	138	17	1	0	0	16	11.280	0.705	0.660	1.310	1.302
7	3	148	17	0	0	0	17	12.080	0.711	0.667	1.331	1.331
8	3	155	17	0	0	0	17	11.560	0.680	0.636	1.343	1.343
9	3	160	17	0	0	0	17	12.380	0.728	0.683	1.364	1.364
10	3	167	17	0	0	0	17	11.920	0.701	0.659	1.332	1.332
11	3	184	17	2	1	0	14	9.340	0.667	0.622	1.451	1.308
12	3	193	17	1	0	0	16	11.380	0.711	0.667	1.361	1.285
Total & Averages			**204**	**4**	**1**	**0**	**199**	**11.588**	**0.698**	**0.654**	**1.351**	**1.332**
Standard Deviation								**0.781**	**0.018**	**0.018**	**0.043**	**0.034**
CVs								**6.735%**	**2.546%**	**2.723%**	**3.185%**	**2.583%**

Table 6. Bird Weights and Feed Conversion Days 0 - 21 (19AUG15) Sorted by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	4	133	17	0	0	0	17	12.080	0.711	0.667	1.314	1.314
2	4	103	17	0	0	0	17	12.320	0.725	0.680	1.353	1.353
3	4	116	17	0	0	0	17	12.000	0.706	0.662	1.297	1.297
4	4	119	18	1	0	1	16	10.880	0.680	0.637	1.400	1.310
5	4	128	17	1	0	0	16	11.100	0.694	0.651	1.365	1.351
6	4	180	17	0	0	0	17	11.660	0.686	0.642	1.307	1.307
7	4	146	17	1	0	0	16	11.960	0.748	0.703	1.355	1.293
8	4	156	17	0	0	0	17	12.040	0.708	0.665	1.292	1.292
9	4	161	17	0	0	0	17	12.320	0.725	0.681	1.338	1.338
10	4	172	17	0	0	0	17	12.520	0.736	0.692	1.279	1.279
11	4	188	17	0	0	0	17	12.440	0.732	0.688	1.277	1.277
12	4	191	17	0	1	0	16	11.240	0.703	0.658	1.299	1.289
Total & Averages			**205**	**3**	**1**	**1**	**200**	**11.880**	**0.713**	**0.669**	**1.323**	**1.308**
Standard Deviation								**0.545**	**0.021**	**0.020**	**0.039**	**0.026**
CVs								**4.585%**	**2.916%**	**3.050%**	**2.924%**	**2.005%**
1	5	100	17	0	0	0	17	12.500	0.735	0.690	1.300	1.300
2	5	104	17	0	0	0	17	12.480	0.734	0.691	1.316	1.316
3	5	109	17	0	0	0	17	12.340	0.726	0.682	1.305	1.305
4	5	123	17	0	0	0	17	12.680	0.746	0.703	1.314	1.314
5	5	126	17	1	0	0	16	11.900	0.744	0.700	1.331	1.287
6	5	179	17	1	0	0	16	11.880	0.743	0.698	1.311	1.273
7	5	147	17	0	0	0	17	12.360	0.727	0.684	1.322	1.322
8	5	150	17	0	0	0	17	12.420	0.731	0.688	1.342	1.342
9	5	159	17	0	0	0	17	12.460	0.733	0.690	1.283	1.283
10	5	170	17	0	0	0	17	12.880	0.758	0.715	1.292	1.292
11	5	183	17	0	0	0	17	12.520	0.736	0.693	1.291	1.291
12	5	195	17	0	0	0	17	11.680	0.687	0.644	1.308	1.308
Total & Averages			**204**	**2**	**0**	**0**	**202**	**12.342**	**0.733**	**0.690**	**1.310**	**1.303**
Standard Deviation								**0.350**	**0.017**	**0.017**	**0.017**	**0.019**
CVs								**2.835%**	**2.326%**	**2.471%**	**1.301%**	**1.470%**
1	6	135	17	0	0	0	17	13.140	0.773	0.729	1.281	1.281
2	6	107	17	0	0	0	17	12.860	0.756	0.711	1.286	1.286
3	6	110	17	1	0	0	16	12.260	0.766	0.721	1.334	1.321
4	6	120	17	0	0	0	17	13.180	0.775	0.731	1.265	1.265
5	6	130	17	1	0	0	16	11.100	0.694	0.650	1.350	1.342
6	6	140	17	0	0	0	17	11.700	0.688	0.645	1.289	1.289
7	6	145	17	1	0	0	16	11.640	0.728	0.683	1.365	1.314
8	6	153	17	1	0	0	16	11.900	0.744	0.700	1.297	1.284
9	6	164	17	0	0	0	17	12.760	0.751	0.705	1.299	1.299
10	6	168	17	1	0	0	16	12.520	0.783	0.737	1.303	1.293
11	6	186	17	0	0	0	17	12.600	0.741	0.699	1.239	1.239
12	6	194	17	1	0	0	16	11.840	0.740	0.696	1.326	1.264
Total & Averages			**204**	**6**	**0**	**0**	**198**	**12.292**	**0.745**	**0.700**	**1.303**	**1.290**
Standard Deviation								**0.657**	**0.030**	**0.029**	**0.036**	**0.027**
CVs								**5.347%**	**4.031%**	**4.208%**	**2.738%**	**2.124%**

Table 6. Bird Weights and Feed Conversion Days 0 - 21 (19AUG15) Sorted by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	7	134	17	0	1	0	16	12.340	0.771	0.728	1.328	1.322
2	7	101	17	0	1	0	16	11.980	0.749	0.704	1.345	1.321
3	7	112	17	1	0	0	16	11.980	0.749	0.706	1.269	1.260
4	7	121	17	0	0	0	17	13.080	0.769	0.726	1.284	1.284
5	7	125	17	0	0	0	17	12.920	0.760	0.716	1.297	1.297
6	7	178	17	0	0	0	17	12.660	0.745	0.701	1.290	1.290
7	7	142	17	0	0	0	17	12.920	0.760	0.716	1.291	1.291
8	7	151	17	0	0	0	17	13.520	0.795	0.751	1.274	1.274
9	7	166	17	0	0	0	17	13.040	0.767	0.723	1.299	1.299
10	7	174	17	0	0	0	17	13.860	0.815	0.771	1.303	1.303
11	7	187	17	2	0	0	15	11.340	0.756	0.712	1.280	1.260
12	7	189	17	0	0	0	17	12.500	0.735	0.693	1.254	1.254
Total & Averages			**204**	**3**	**2**	**0**	**199**	**12.678**	**0.764**	**0.721**	**1.293**	**1.288**
Standard Deviation								**0.702**	**0.022**	**0.022**	**0.025**	**0.022**
CVs								**5.540%**	**2.914%**	**3.048%**	**1.917%**	**1.747%**

1	8	98	17	0	0	0	17	13.620	0.801	0.757	1.273	1.273
2	8	102	17	2	0	0	15	12.360	0.824	0.779	1.282	1.255
3	8	113	17	1	0	0	16	12.340	0.771	0.727	1.301	1.291
4	8	117	17	0	1	0	16	12.700	0.794	0.748	1.322	1.260
5	8	129	17	0	1	0	16	12.600	0.788	0.746	1.295	1.283
6	8	177	17	1	0	0	16	13.120	0.820	0.775	1.262	1.255
7	8	144	17	0	0	0	17	14.400	0.847	0.802	1.269	1.269
8	8	152	17	0	0	0	17	14.140	0.832	0.788	1.261	1.261
9	8	165	17	1	0	0	16	12.620	0.789	0.744	1.307	1.304
10	8	173	17	0	0	0	17	13.420	0.789	0.745	1.277	1.277
11	8	182	17	0	0	0	17	12.720	0.748	0.704	1.254	1.254
12	8	196	17	1	1	0	15	11.240	0.749	0.705	1.355	1.321
Total & Averages			**204**	**6**	**3**	**0**	**195**	**12.940**	**0.796**	**0.752**	**1.288**	**1.275**
Standard Deviation								**0.864**	**0.031**	**0.031**	**0.030**	**0.021**
CVs								**6.675%**	**3.885%**	**4.091%**	**2.292%**	**1.665%**

Graph 2. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 21) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.572	1.357	Low Phosphate (LP)
2	0.682	1.334	High Phosphate (HP)
3	0.654	1.332	250 Units Phytase (LP)
4	0.669	1.308	500 Units Phytase (LP)
5	0.690	1.303	750 Units Phytase (LP)
6	0.700	1.290	1,000 Units Phytase (LP)
7	0.721	1.288	3,000 Units Phytase (LP)
8	0.752	1.275	30,000 Units Phytase (LP)

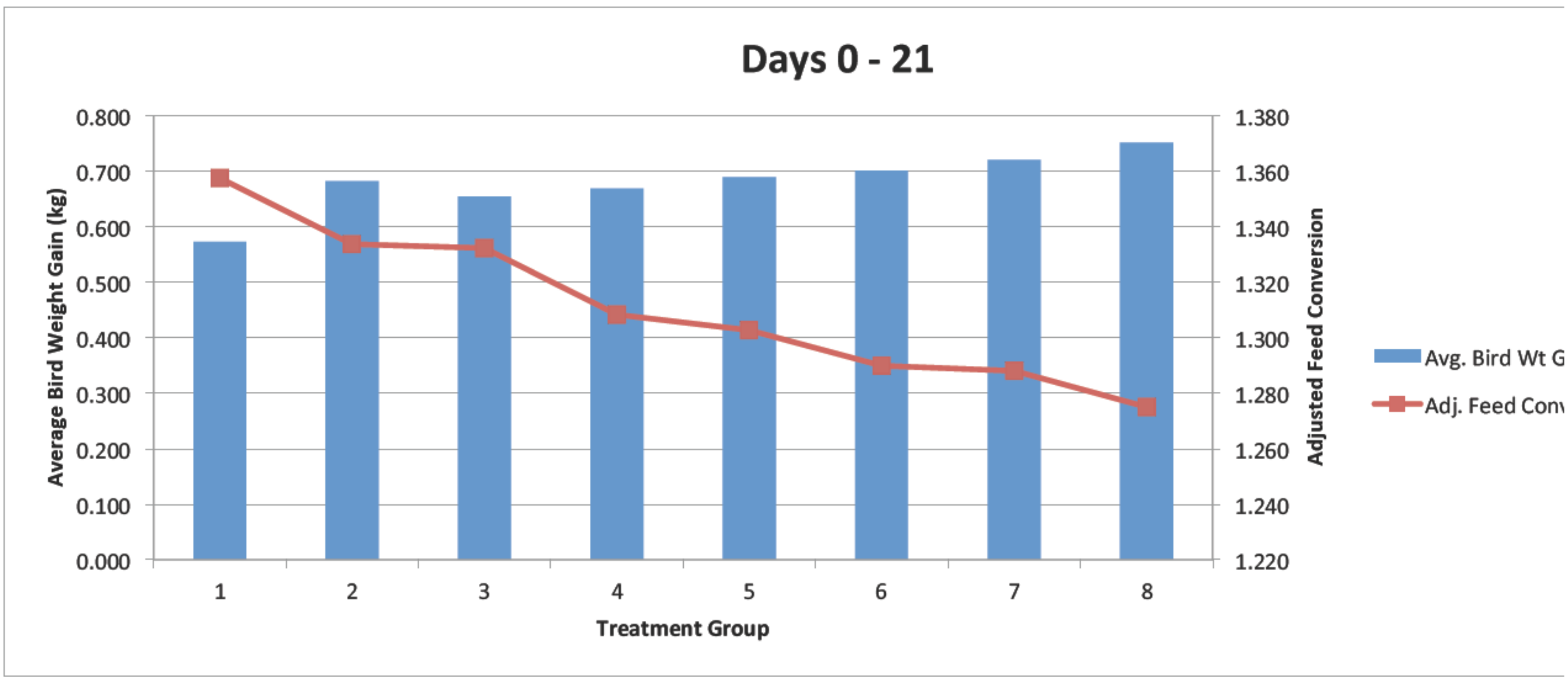


Table 8. Bird Weights and Feed Conversion Days 14 - 21 (19AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	1	136	17	0	0	0	17	10.480	0.616	0.325	1.399	1.399
2	1	106	17	0	0	0	17	10.740	0.632	0.328	1.369	1.369
3	1	115	17	0	0	0	17	10.500	0.618	0.314	1.363	1.363
4	1	122	17	0	0	0	17	10.320	0.607	0.314	1.397	1.397
5	1	127	17	0	0	0	17	11.020	0.648	0.341	1.393	1.393
6	1	137	17	0	0	0	17	10.160	0.598	0.315	1.418	1.418
7	1	141	17	0	0	0	17	10.280	0.605	0.315	1.396	1.396
8	1	154	17	0	0	0	17	11.060	0.651	0.342	1.430	1.430
9	1	162	16	0	0	0	16	9.740	0.609	0.316	1.344	1.344
10	1	169	17	0	0	0	17	10.440	0.614	0.326	1.354	1.354
11	1	181	17	0	1	0	16	9.660	0.604	0.319	1.419	1.337
12	1	192	17	0	1	0	16	9.540	0.596	0.308	1.543	1.457
Total & Averages			**203**	**0**	**2**	**0**	**201**	**10.328**	**0.616**	**0.322**	**1.402**	**1.388**
Standard Deviation								**0.495**	**0.018**	**0.011**	**0.052**	**0.036**
CVs								**4.791%**	**2.945%**	**3.369%**	**3.703%**	**2.601%**
1	2	97	17	0	0	0	17	12.940	0.761	0.413	1.328	1.328
2	2	105	17	0	0	0	17	12.500	0.735	0.404	1.362	1.362
3	2	114	17	0	0	0	17	12.400	0.729	0.384	1.442	1.442
4	2	124	17	1	0	0	16	11.560	0.723	0.388	1.514	1.363
5	2	132	17	0	0	0	17	12.400	0.729	0.395	1.357	1.357
6	2	139	16	0	0	0	16	10.880	0.680	0.375	1.283	1.283
7	2	143	17	0	1	0	16	11.600	0.725	0.401	1.466	1.401
8	2	149	17	0	0	0	17	12.220	0.719	0.388	1.439	1.439
9	2	163	17	0	0	0	17	11.980	0.705	0.367	1.378	1.378
10	2	171	16	0	0	0	16	12.200	0.763	0.420	1.357	1.357
11	2	185	17	0	0	0	17	12.540	0.738	0.405	1.349	1.349
12	2	190	15	0	0	0	15	10.600	0.707	0.375	1.370	1.370
Total & Averages			**200**	**1**	**1**	**0**	**198**	**11.985**	**0.726**	**0.393**	**1.387**	**1.369**
Standard Deviation								**0.701**	**0.023**	**0.016**	**0.065**	**0.044**
CVs								**5.846%**	**3.169%**	**4.146%**	**4.686%**	**3.204%**
1	3	99	17	0	0	0	17	11.480	0.675	0.373	1.413	1.413
2	3	108	17	0	0	0	17	12.160	0.715	0.388	1.324	1.324
3	3	111	17	0	0	0	17	11.940	0.702	0.388	1.336	1.336
4	3	118	17	0	0	0	17	11.780	0.693	0.374	1.352	1.352
5	3	131	17	0	0	0	17	11.760	0.692	0.360	1.415	1.415
6	3	138	16	0	0	0	16	11.280	0.705	0.388	1.319	1.319
7	3	148	17	0	0	0	17	12.080	0.711	0.381	1.358	1.358
8	3	155	17	0	0	0	17	11.560	0.680	0.364	1.408	1.408
9	3	160	17	0	0	0	17	12.380	0.728	0.392	1.387	1.387
10	3	167	17	0	0	0	17	11.920	0.701	0.386	1.366	1.366
11	3	184	16	1	1	0	14	9.340	0.667	0.352	1.642	1.370
12	3	193	17	1	0	0	16	11.380	0.711	0.378	1.479	1.334
Total & Averages			**202**	**2**	**1**	**0**	**199**	**11.588**	**0.698**	**0.377**	**1.400**	**1.365**
Standard Deviation								**0.781**	**0.018**	**0.013**	**0.089**	**0.034**
CVs								**6.735%**	**2.546%**	**3.386%**	**6.347%**	**2.512%**

Table 8. Bird Weights and Feed Conversion Days 14 - 21 (19AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	4	133	17	0	0	0	17	12.080	0.711	0.379	1.354	1.354
2	4	103	17	0	0	0	17	12.320	0.725	0.388	1.409	1.409
3	4	116	17	0	0	0	17	12.000	0.706	0.384	1.334	1.334
4	4	119	18	1	0	1	16	10.880	0.680	0.354	1.586	1.392
5	4	128	16	0	0	0	16	11.100	0.694	0.379	1.396	1.396
6	4	180	17	0	0	0	17	11.660	0.686	0.373	1.341	1.341
7	4	146	17	1	0	0	16	11.960	0.748	0.408	1.463	1.346
8	4	156	17	0	0	0	17	12.040	0.708	0.380	1.359	1.359
9	4	161	17	0	0	0	17	12.320	0.725	0.387	1.392	1.392
10	4	172	17	0	0	0	17	12.520	0.736	0.402	1.319	1.319
11	4	188	17	0	0	0	17	12.440	0.732	0.401	1.311	1.311
12	4	191	16	0	0	0	16	11.240	0.703	0.374	1.331	1.331
Total & Averages			**203**	**2**	**0**	**1**	**200**	**11.880**	**0.713**	**0.384**	**1.383**	**1.357**
Standard Deviation								**0.545**	**0.021**	**0.015**	**0.077**	**0.033**
CVs								**4.585%**	**2.916%**	**3.832%**	**5.600%**	**2.421%**
1	5	100	17	0	0	0	17	12.500	0.735	0.398	1.314	1.314
2	5	104	17	0	0	0	17	12.480	0.734	0.395	1.375	1.375
3	5	109	17	0	0	0	17	12.340	0.726	0.387	1.350	1.350
4	5	123	17	0	0	0	17	12.680	0.746	0.407	1.367	1.367
5	5	126	17	1	0	0	16	11.900	0.744	0.398	1.435	1.349
6	5	179	17	1	0	0	16	11.880	0.743	0.407	1.382	1.311
7	5	147	17	0	0	0	17	12.360	0.727	0.399	1.357	1.357
8	5	150	17	0	0	0	17	12.420	0.731	0.405	1.384	1.384
9	5	159	17	0	0	0	17	12.460	0.733	0.396	1.335	1.335
10	5	170	17	0	0	0	17	12.880	0.758	0.415	1.334	1.334
11	5	183	17	0	0	0	17	12.520	0.736	0.387	1.365	1.365
12	5	195	17	0	0	0	17	11.680	0.687	0.371	1.337	1.337
Total & Averages			**204**	**2**	**0**	**0**	**202**	**12.342**	**0.733**	**0.397**	**1.361**	**1.348**
Standard Deviation								**0.350**	**0.017**	**0.012**	**0.032**	**0.023**
CVs								**2.835%**	**2.326%**	**2.943%**	**2.331%**	**1.694%**
1	6	135	17	0	0	0	17	13.140	0.773	0.414	1.338	1.338
2	6	107	17	0	0	0	17	12.860	0.756	0.414	1.321	1.321
3	6	110	16	0	0	0	16	12.260	0.766	0.421	1.353	1.353
4	6	120	17	0	0	0	17	13.180	0.775	0.421	1.304	1.304
5	6	130	16	0	0	0	16	11.100	0.694	0.346	1.419	1.419
6	6	140	17	0	0	0	17	11.700	0.688	0.371	1.302	1.302
7	6	145	17	1	0	0	16	11.640	0.728	0.390	1.458	1.359
8	6	153	16	0	0	0	16	11.900	0.744	0.409	1.324	1.324
9	6	164	17	0	0	0	17	12.760	0.751	0.409	1.322	1.322
10	6	168	16	0	0	0	16	12.520	0.783	0.428	1.336	1.336
11	6	186	17	0	0	0	17	12.600	0.741	0.400	1.274	1.274
12	6	194	17	1	0	0	16	11.840	0.740	0.399	1.417	1.300
Total & Averages			**200**	**2**	**0**	**0**	**198**	**12.292**	**0.745**	**0.402**	**1.347**	**1.329**
Standard Deviation								**0.657**	**0.030**	**0.023**	**0.055**	**0.037**
CVs								**5.347%**	**4.031%**	**5.831%**	**4.105%**	**2.788%**

Table 8. Bird Weights and Feed Conversion Days 14 - 21 (19AUG15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	7	134	16	0	0	0	16	12.340	0.771	0.421	1.377	1.377
2	7	101	17	0	1	0	16	11.980	0.749	0.421	1.353	1.312
3	7	112	16	0	0	0	16	11.980	0.749	0.405	1.302	1.302
4	7	121	17	0	0	0	17	13.080	0.769	0.413	1.322	1.322
5	7	125	17	0	0	0	17	12.920	0.760	0.411	1.370	1.370
6	7	178	17	0	0	0	17	12.660	0.745	0.408	1.314	1.314
7	7	142	17	0	0	0	17	12.920	0.760	0.404	1.356	1.356
8	7	151	17	0	0	0	17	13.520	0.795	0.436	1.313	1.313
9	7	166	17	0	0	0	17	13.040	0.767	0.415	1.368	1.368
10	7	174	17	0	0	0	17	13.860	0.815	0.451	1.345	1.345
11	7	187	15	0	0	0	15	11.340	0.756	0.415	1.305	1.305
12	7	189	17	0	0	0	17	12.500	0.735	0.399	1.295	1.295
Total & Averages			**200**	**0**	**1**	**0**	**199**	**12.678**	**0.764**	**0.416**	**1.335**	**1.332**
Standard Deviation								**0.702**	**0.022**	**0.015**	**0.029**	**0.030**
CVs								**5.540%**	**2.914%**	**3.497%**	**2.206%**	**2.219%**

1	8	98	17	0	0	0	17	13.620	0.801	0.441	1.325	1.325
2	8	102	15	0	0	0	15	12.360	0.824	0.456	1.301	1.301
3	8	113	16	0	0	0	16	12.340	0.771	0.396	1.375	1.375
4	8	117	17	0	1	0	16	12.700	0.794	0.431	1.425	1.308
5	8	129	16	0	0	0	16	12.600	0.788	0.434	1.314	1.314
6	8	177	16	0	0	0	16	13.120	0.820	0.455	1.291	1.291
7	8	144	17	0	0	0	17	14.400	0.847	0.466	1.318	1.318
8	8	152	17	0	0	0	17	14.140	0.832	0.447	1.332	1.332
9	8	165	16	0	0	0	16	12.620	0.789	0.433	1.350	1.350
10	8	173	17	0	0	0	17	13.420	0.789	0.426	1.334	1.334
11	8	182	17	0	0	0	17	12.720	0.748	0.405	1.294	1.294
12	8	196	16	0	1	0	15	11.240	0.749	0.404	1.448	1.403
Total & Averages			**197**	**0**	**2**	**0**	**195**	**12.940**	**0.796**	**0.433**	**1.342**	**1.329**
Standard Deviation								**0.864**	**0.031**	**0.022**	**0.050**	**0.033**
CVs								**6.675%**	**3.885%**	**5.112%**	**3.732%**	**2.518%**

Graph 3. Average Bird Weight Gain and Adjusted Feed Conversion (Days 14 - 21) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.322	1.388	Low Phosphate (LP)
2	0.393	1.369	High Phosphate (HP)
3	0.377	1.365	250 Units Phytase (LP)
4	0.384	1.357	500 Units Phytase (LP)
5	0.397	1.348	750 Units Phytase (LP)
6	0.402	1.329	1,000 Units Phytase (LP)
7	0.416	1.332	3,000 Units Phytase (LP)
8	0.433	1.329	30,000 Units Phytase (LP)

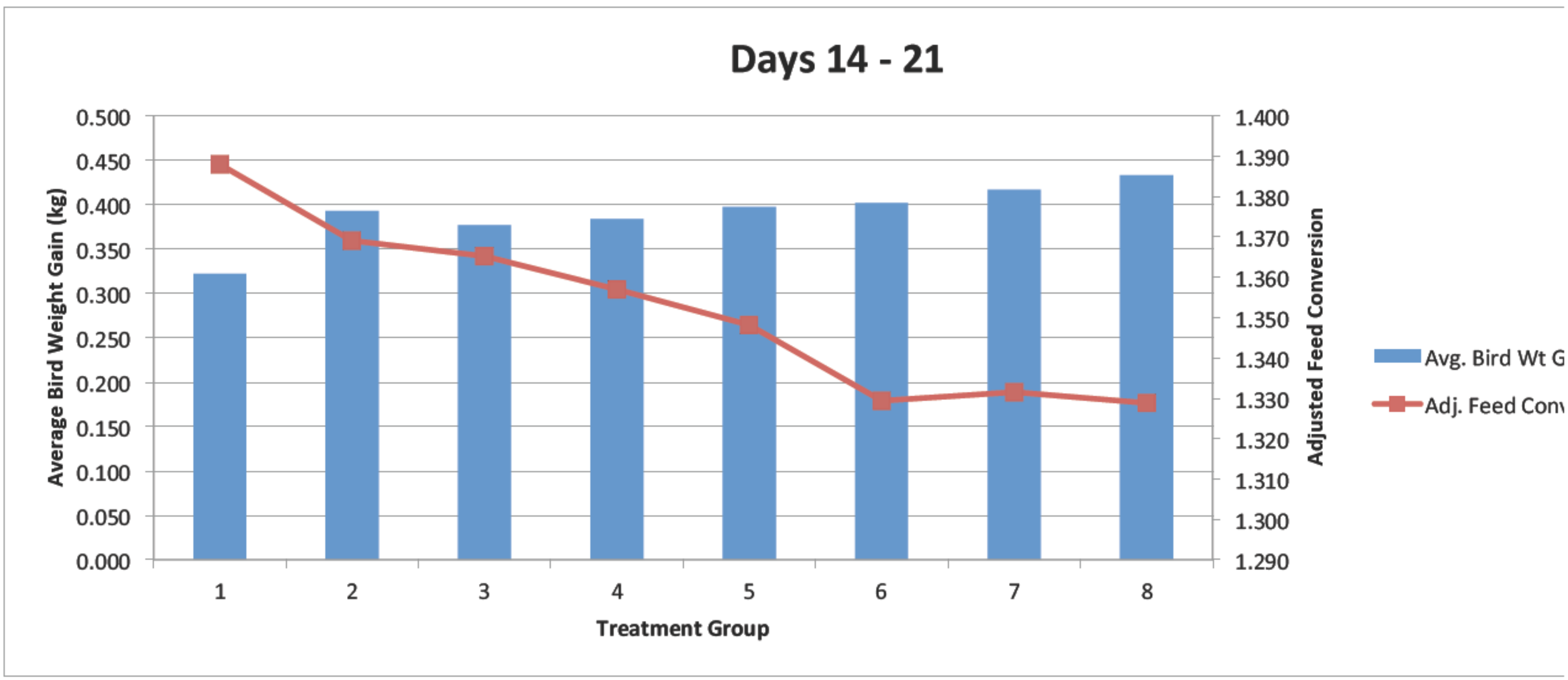


Table 10. Bird Weights and Feed Conversion Days 0 - 42 (09SEP15) Summaried by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	1	136	17	0	0	3	14	33.980	2.427	2.384	1.655	1.569
2	1	106	17	0	0	3	14	35.940	2.567	2.523	1.610	1.526
3	1	115	17	1	0	3	13	31.020	2.386	2.342	1.733	1.542
4	1	122	17	0	0	3	14	35.280	2.520	2.476	1.619	1.545
5	1	127	17	1	0	3	13	31.940	2.457	2.413	1.683	1.558
6	1	137	17	0	0	3	14	33.340	2.381	2.338	1.681	1.594
7	1	141	17	0	0	3	14	32.920	2.351	2.308	1.616	1.534
8	1	154	17	0	0	3	14	34.200	2.443	2.398	1.642	1.549
9	1	162	17	1	0	3	13	31.820	2.448	2.402	1.609	1.513
10	1	169	17	0	0	3	14	34.760	2.483	2.439	1.622	1.539
11	1	181	17	0	1	3	13	29.840	2.295	2.253	1.622	1.504
12	1	192	17	0	2	3	12	28.120	2.343	2.299	1.654	1.511
Total & Averages			**204**	**3**	**3**	**36**	**162**	**32.763**	**2.425**	**2.381**	**1.646**	**1.540**
Standard Deviation								**2.316**	**0.078**	**0.078**	**0.038**	**0.026**
CVs								**7.070%**	**3.211%**	**3.255%**	**2.301%**	**1.661%**
1	2	97	17	0	0	3	14	41.220	2.944	2.899	1.646	1.554
2	2	105	17	0	0	3	14	41.260	2.947	2.903	1.635	1.543
3	2	114	17	0	0	3	14	40.360	2.883	2.839	1.626	1.544
4	2	124	17	1	0	3	13	38.620	2.971	2.927	1.635	1.519
5	2	132	17	0	0	3	14	39.220	2.801	2.758	1.623	1.535
6	2	139	17	1	1	3	12	33.440	2.787	2.744	1.683	1.525
7	2	143	17	1	1	3	12	34.900	2.908	2.864	1.767	1.547
8	2	149	17	1	0	3	13	38.180	2.937	2.893	1.669	1.556
9	2	163	17	0	0	3	14	40.140	2.867	2.822	1.631	1.549
10	2	171	17	2	0	3	12	36.160	3.013	2.969	1.721	1.531
11	2	185	17	0	0	3	14	39.580	2.827	2.781	1.620	1.526
12	2	190	17	1	1	3	12	34.200	2.850	2.806	1.641	1.538
Total & Averages			**204**	**7**	**3**	**36**	**158**	**38.107**	**2.895**	**2.851**	**1.658**	**1.539**
Standard Deviation								**2.757**	**0.071**	**0.070**	**0.045**	**0.012**
CVs								**7.236%**	**2.440%**	**2.471%**	**2.728%**	**0.781%**
1	3	99	17	0	0	3	14	39.360	2.811	2.767	1.631	1.542
2	3	108	17	0	0	3	14	40.900	2.921	2.878	1.612	1.517
3	3	111	17	1	0	3	13	37.720	2.902	2.857	1.689	1.544
4	3	118	17	0	0	3	14	38.120	2.723	2.679	1.615	1.531
5	3	131	17	2	0	3	12	33.940	2.828	2.784	1.782	1.531
6	3	138	17	1	0	3	13	32.160	2.474	2.429	1.711	1.597
7	3	148	17	0	0	3	14	40.400	2.886	2.843	1.610	1.529
8	3	155	17	0	2	3	12	33.220	2.768	2.724	1.758	1.535
9	3	160	17	1	0	3	13	35.940	2.765	2.719	1.706	1.560
10	3	167	17	0	0	3	14	40.200	2.871	2.829	1.612	1.518
11	3	184	17	2	1	3	11	29.600	2.691	2.646	1.639	1.482
12	3	193	17	1	0	3	13	34.940	2.688	2.643	1.648	1.523
Total & Averages			**204**	**8**	**3**	**36**	**157**	**36.375**	**2.777**	**2.733**	**1.668**	**1.534**
Standard Deviation								**3.654**	**0.125**	**0.125**	**0.060**	**0.027**
CVs								**10.045%**	**4.494%**	**4.584%**	**3.609%**	**1.784%**

Table 10. Bird Weights and Feed Conversion Days 0 - 42 (09SEP15) Summaried by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	4	133	17	0	0	3	14	38.880	2.777	2.734	1.591	1.508
2	4	103	17	0	1	3	13	38.860	2.989	2.945	1.625	1.530
3	4	116	17	0	0	3	14	40.200	2.871	2.828	1.586	1.503
4	4	119	18	2	1	4	11	30.520	2.775	2.731	1.761	1.512
5	4	128	17	1	0	3	13	37.740	2.903	2.861	1.601	1.509
6	4	180	17	0	0	3	14	38.600	2.757	2.714	1.576	1.487
7	4	146	17	1	0	3	13	39.180	3.014	2.969	1.618	1.505
8	4	156	17	0	0	3	14	39.460	2.819	2.775	1.600	1.512
9	4	161	17	0	1	3	13	38.040	2.926	2.882	1.639	1.525
10	4	172	17	0	0	3	14	40.740	2.910	2.865	1.583	1.494
11	4	188	17	0	0	3	14	39.680	2.834	2.791	1.588	1.499
12	4	191	17	0	1	3	13	36.600	2.815	2.771	1.577	1.484
Total & Averages			**205**	**4**	**4**	**37**	**160**	**38.208**	**2.866**	**2.822**	**1.612**	**1.506**
Standard Deviation								**2.663**	**0.084**	**0.084**	**0.051**	**0.014**
CVs								**6.971%**	**2.937%**	**2.971%**	**3.152%**	**0.922%**
1	5	100	17	0	1	3	13	38.880	2.991	2.946	1.632	1.508
2	5	104	17	0	0	3	14	40.140	2.867	2.824	1.616	1.535
3	5	109	17	1	0	3	13	38.200	2.938	2.894	1.628	1.510
4	5	123	17	0	0	3	14	41.900	2.993	2.950	1.584	1.507
5	5	126	17	1	0	3	13	38.540	2.965	2.921	1.595	1.489
6	5	179	17	1	0	3	13	38.000	2.923	2.878	1.578	1.475
7	5	147	17	0	0	3	14	40.720	2.909	2.866	1.624	1.532
8	5	150	17	3	0	3	11	32.240	2.931	2.889	1.740	1.530
9	5	159	17	0	0	3	14	41.180	2.941	2.898	1.590	1.504
10	5	170	17	0	0	3	14	41.400	2.957	2.914	1.630	1.536
11	5	183	17	0	2	3	12	35.980	2.998	2.954	1.693	1.510
12	5	195	17	0	0	3	14	37.380	2.670	2.627	1.608	1.515
Total & Averages			**204**	**6**	**3**	**36**	**159**	**38.713**	**2.924**	**2.880**	**1.627**	**1.512**
Standard Deviation								**2.722**	**0.088**	**0.088**	**0.047**	**0.019**
CVs								**7.031%**	**3.025%**	**3.066%**	**2.896%**	**1.236%**
1	6	135	17	1	0	3	13	39.760	3.058	3.015	1.623	1.497
2	6	107	17	0	0	3	14	41.600	2.971	2.926	1.599	1.512
3	6	110	17	1	0	3	13	38.120	2.932	2.887	1.626	1.519
4	6	120	17	0	0	3	14	39.280	2.806	2.761	1.633	1.541
5	6	130	17	4	0	3	10	28.740	2.874	2.830	1.819	1.491
6	6	140	17	1	0	3	13	36.380	2.798	2.755	1.631	1.500
7	6	145	17	1	1	3	12	35.260	2.938	2.894	1.650	1.501
8	6	153	17	1	0	3	13	37.360	2.874	2.830	1.605	1.505
9	6	164	17	0	0	3	14	42.020	3.001	2.955	1.600	1.512
10	6	168	17	1	0	3	13	38.820	2.986	2.940	1.618	1.520
11	6	186	17	0	0	3	14	40.860	2.919	2.876	1.574	1.485
12	6	194	17	1	0	3	13	35.500	2.731	2.686	1.643	1.521
Total & Averages			**204**	**11**	**1**	**36**	**156**	**37.808**	**2.907**	**2.863**	**1.635**	**1.509**
Standard Deviation								**3.628**	**0.095**	**0.095**	**0.062**	**0.015**
CVs								**9.597%**	**3.268%**	**3.307%**	**3.779%**	**1.017%**

Table 10. Bird Weights and Feed Conversion Days 0 - 42 (09SEP15) Summaried by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	7	134	17	0	1	3	13	39.080	3.006	2.963	1.581	1.487
2	7	101	17	0	1	3	13	38.420	2.955	2.910	1.606	1.507
3	7	112	17	1	0	3	13	39.800	3.062	3.019	1.572	1.484
4	7	121	17	0	0	3	14	39.860	2.847	2.804	1.602	1.516
5	7	125	17	1	0	3	13	38.360	2.951	2.907	1.687	1.513
6	7	178	17	1	0	3	13	37.620	2.894	2.850	1.633	1.517
7	7	142	17	1	0	3	13	39.740	3.057	3.013	1.662	1.493
8	7	151	17	0	1	3	13	39.640	3.049	3.005	1.683	1.517
9	7	166	17	1	0	3	13	40.680	3.129	3.085	1.618	1.488
10	7	174	17	0	0	3	14	42.780	3.056	3.011	1.609	1.515
11	7	187	17	2	0	3	12	33.660	2.805	2.761	1.635	1.519
12	7	189	17	0	0	3	14	39.700	2.836	2.793	1.583	1.494
Total & Averages			**204**	**7**	**3**	**36**	**158**	**39.112**	**2.971**	**2.927**	**1.623**	**1.504**
Standard Deviation								**2.152**	**0.106**	**0.105**	**0.039**	**0.014**
CVs								**5.503%**	**3.559%**	**3.603%**	**2.384%**	**0.918%**

1	8	98	17	0	0	3	14	42.700	3.050	3.006	1.598	1.505
2	8	102	17	2	0	3	12	37.280	3.107	3.062	1.614	1.496
3	8	113	17	2	0	3	12	36.320	3.027	2.982	1.631	1.506
4	8	117	17	0	1	3	13	38.740	2.980	2.934	1.609	1.489
5	8	129	17	1	1	3	12	36.660	3.055	3.014	1.652	1.505
6	8	177	17	1	1	3	12	35.140	2.928	2.883	1.688	1.547
7	8	144	17	0	0	3	14	43.380	3.099	3.054	1.613	1.520
8	8	152	17	2	0	3	12	33.860	2.822	2.778	1.801	1.513
9	8	165	17	2	0	3	12	36.900	3.075	3.030	1.653	1.514
10	8	173	17	0	0	3	14	43.580	3.113	3.069	1.572	1.485
11	8	182	17	0	0	3	14	40.300	2.879	2.834	1.577	1.492
12	8	196	17	1	2	3	11	29.940	2.722	2.677	1.739	1.569
Total & Averages			**204**	**11**	**5**	**36**	**152**	**37.900**	**2.988**	**2.944**	**1.646**	**1.512**
Standard Deviation								**4.096**	**0.126**	**0.126**	**0.068**	**0.024**
CVs								**10.806%**	**4.202%**	**4.270%**	**4.128%**	**1.619%**

Graph 4. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 42) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	2.381	1.540	Low Phosphate (LP)
2	2.851	1.539	High Phosphate (HP)
3	2.733	1.534	250 Units Phytase (LP)
4	2.822	1.506	500 Units Phytase (LP)
5	2.880	1.512	750 Units Phytase (LP)
6	2.863	1.509	1,000 Units Phytase (LP)
7	2.927	1.504	3,000 Units Phytase (LP)
8	2.944	1.512	30,000 Units Phytase (LP)

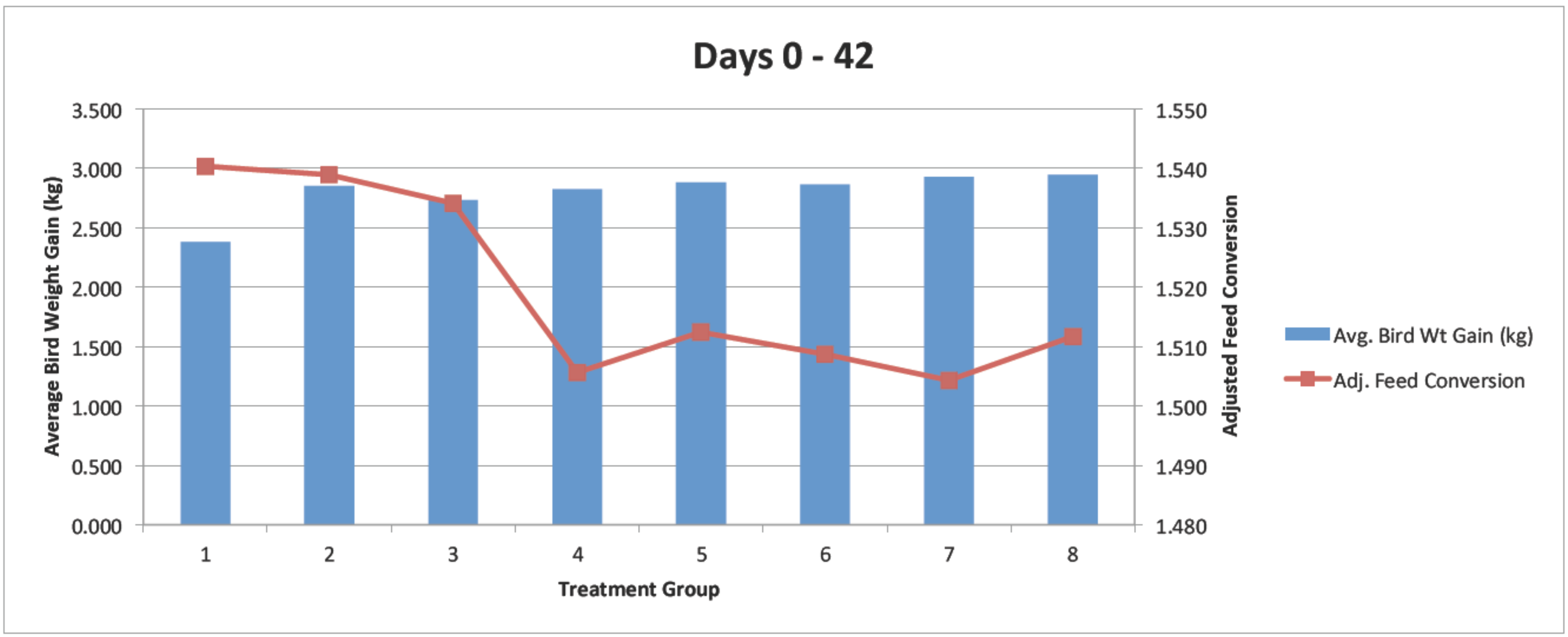


Table 12. Bird Weights and Feed Conversion Days 21 - 42 (09SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	1	136	17	0	0	3	14	33.980	2.427	1.811	1.775	1.648
2	1	106	17	0	0	3	14	35.940	2.567	1.935	1.719	1.597
3	1	115	17	1	0	3	13	31.020	2.386	1.769	1.914	1.619
4	1	122	17	0	0	3	14	35.280	2.520	1.913	1.722	1.615
5	1	127	17	1	0	3	13	31.940	2.457	1.809	1.845	1.648
6	1	137	17	0	0	3	14	33.340	2.381	1.784	1.800	1.670
7	1	141	17	0	0	3	14	32.920	2.351	1.747	1.721	1.598
8	1	154	17	0	0	3	14	34.200	2.443	1.792	1.766	1.625
9	1	162	16	0	0	3	13	31.820	2.448	1.839	1.714	1.582
10	1	169	17	0	0	3	14	34.760	2.483	1.869	1.730	1.609
11	1	181	16	0	0	3	13	29.840	2.295	1.692	1.722	1.568
12	1	192	16	0	1	3	12	28.120	2.343	1.747	1.763	1.568
Total & Averages			**201**	**2**	**1**	**36**	**162**	**32.763**	**2.425**	**1.809**	**1.766**	**1.612**
Standard Deviation								**2.316**	**0.078**	**0.071**	**0.061**	**0.032**
CVs								**7.070%**	**3.211%**	**3.919%**	**3.480%**	**1.995%**

Table 12. Bird Weights and Feed Conversion Days 21 - 42 (09SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	2	97	17	0	0	3	14	41.220	2.944	2.183	1.792	1.652
2	2	105	17	0	0	3	14	41.260	2.947	2.212	1.754	1.619
3	2	114	17	0	0	3	14	40.360	2.883	2.153	1.739	1.617
4	2	124	16	0	0	3	13	38.620	2.971	2.248	1.729	1.596
5	2	132	17	0	0	3	14	39.220	2.801	2.072	1.755	1.622
6	2	139	16	0	1	3	12	33.440	2.787	2.107	1.845	1.607
7	2	143	16	1	0	3	12	34.900	2.908	2.183	1.942	1.623
8	2	149	17	1	0	3	13	38.180	2.937	2.218	1.797	1.626
9	2	163	17	0	0	3	14	40.140	2.867	2.162	1.751	1.631
10	2	171	16	1	0	3	12	36.160	3.013	2.251	1.902	1.612
11	2	185	17	0	0	3	14	39.580	2.827	2.089	1.751	1.607
12	2	190	15	0	0	3	12	34.200	2.850	2.143	1.766	1.621
Total & Averages			**198**	**3**	**1**	**36**	**158**	**38.107**	**2.895**	**2.169**	**1.793**	**1.619**
Standard Deviation								**2.757**	**0.071**	**0.059**	**0.068**	**0.014**
CVs								**7.236%**	**2.440%**	**2.717%**	**3.798%**	**0.868%**

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	3	99	17	0	0	3	14	39.360	2.811	2.136	1.720	1.593
2	3	108	17	0	0	3	14	40.900	2.921	2.206	1.738	1.598
3	3	111	17	1	0	3	13	37.720	2.902	2.199	1.842	1.623
4	3	118	17	0	0	3	14	38.120	2.723	2.030	1.740	1.615
5	3	131	17	2	0	3	12	33.940	2.828	2.137	1.983	1.592
6	3	138	16	0	0	3	13	32.160	2.474	1.769	1.913	1.732
7	3	148	17	0	0	3	14	40.400	2.886	2.175	1.722	1.603
8	3	155	17	0	2	3	12	33.220	2.768	2.088	1.965	1.614
9	3	160	17	1	0	3	13	35.940	2.765	2.036	1.874	1.645
10	3	167	17	0	0	3	14	40.200	2.871	2.170	1.723	1.587
11	3	184	14	0	0	3	11	29.600	2.691	2.024	1.719	1.555
12	3	193	16	0	0	3	13	34.940	2.688	1.976	1.778	1.627
Total & Averages			**199**	**4**	**2**	**36**	**157**	**36.375**	**2.777**	**2.079**	**1.810**	**1.615**
Standard Deviation								**3.654**	**0.125**	**0.124**	**0.101**	**0.043**
CVs								**10.045%**	**4.494%**	**5.959%**	**5.593%**	**2.683%**

Table 12. Bird Weights and Feed Conversion Days 21 - 42 (09SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

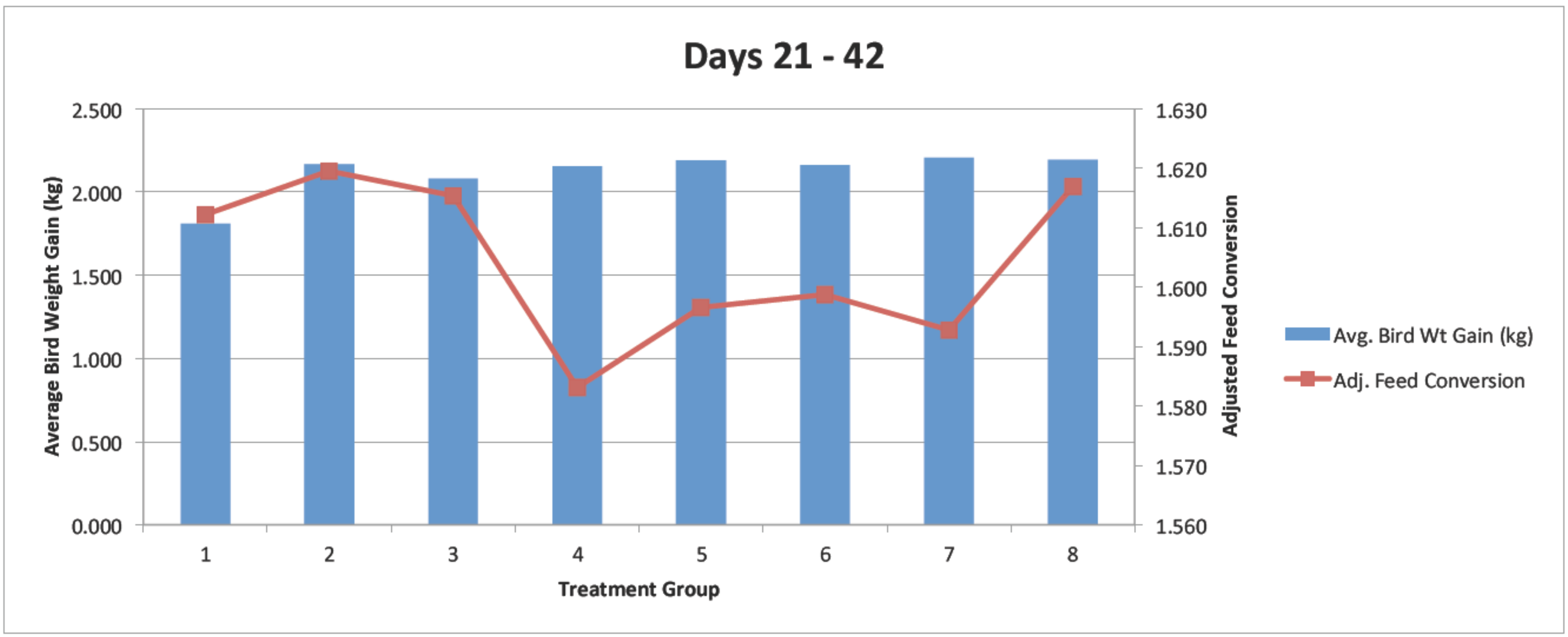
Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	4	133	17	0	0	3	14	38.880	2.777	2.067	1.708	1.584
2	4	103	17	0	1	3	13	38.860	2.989	2.265	1.743	1.601
3	4	116	17	0	0	3	14	40.200	2.871	2.166	1.701	1.579
4	4	119	16	1	1	3	11	30.520	2.775	2.095	1.946	1.603
5	4	128	16	0	0	3	13	37.740	2.903	2.209	1.693	1.567
6	4	180	17	0	0	3	14	38.600	2.757	2.071	1.684	1.554
7	4	146	16	0	0	3	13	39.180	3.014	2.266	1.727	1.590
8	4	156	17	0	0	3	14	39.460	2.819	2.110	1.727	1.596
9	4	161	17	0	1	3	13	38.040	2.926	2.201	1.775	1.602
10	4	172	17	0	0	3	14	40.740	2.910	2.174	1.709	1.576
11	4	188	17	0	0	3	14	39.680	2.834	2.103	1.722	1.587
12	4	191	16	0	0	3	13	36.600	2.815	2.113	1.692	1.559
Total & Averages			**200**	**1**	**3**	**36**	**160**	**38.208**	**2.866**	**2.153**	**1.736**	**1.583**
Standard Deviation								**2.663**	**0.084**	**0.071**	**0.071**	**0.017**
CVs								**6.971%**	**2.937%**	**3.282%**	**4.081%**	**1.059%**
1	5	100	17	0	1	3	13	38.880	2.991	2.255	1.779	1.590
2	5	104	17	0	0	3	14	40.140	2.867	2.133	1.743	1.621
3	5	109	17	1	0	3	13	38.200	2.938	2.213	1.773	1.592
4	5	123	17	0	0	3	14	41.900	2.993	2.247	1.694	1.581
5	5	126	16	0	0	3	13	38.540	2.965	2.221	1.705	1.569
6	5	179	16	0	0	3	13	38.000	2.923	2.181	1.692	1.556
7	5	147	17	0	0	3	14	40.720	2.909	2.182	1.748	1.612
8	5	150	17	3	0	3	11	32.240	2.931	2.200	1.976	1.621
9	5	159	17	0	0	3	14	41.180	2.941	2.208	1.716	1.587
10	5	170	17	0	0	3	14	41.400	2.957	2.199	1.774	1.631
11	5	183	17	0	2	3	12	35.980	2.998	2.262	1.895	1.603
12	5	195	17	0	0	3	14	37.380	2.670	1.983	1.736	1.595
Total & Averages			**202**	**4**	**3**	**36**	**159**	**38.713**	**2.924**	**2.190**	**1.769**	**1.597**
Standard Deviation								**2.722**	**0.088**	**0.074**	**0.085**	**0.022**
CVs								**7.031%**	**3.025%**	**3.399%**	**4.805%**	**1.390%**
1	6	135	17	1	0	3	13	39.760	3.058	2.286	1.782	1.587
2	6	107	17	0	0	3	14	41.600	2.971	2.215	1.731	1.599
3	6	110	16	0	0	3	13	38.120	2.932	2.166	1.756	1.600
4	6	120	17	0	0	3	14	39.280	2.806	2.030	1.808	1.662
5	6	130	16	3	0	3	10	28.740	2.874	2.180	2.095	1.557
6	6	140	17	1	0	3	13	36.380	2.798	2.110	1.783	1.583
7	6	145	16	0	1	3	12	35.260	2.938	2.211	1.782	1.580
8	6	153	16	0	0	3	13	37.360	2.874	2.130	1.740	1.595
9	6	164	17	0	0	3	14	42.020	3.001	2.251	1.723	1.592
10	6	168	16	0	0	3	13	38.820	2.986	2.204	1.759	1.614
11	6	186	17	0	0	3	14	40.860	2.919	2.177	1.714	1.580
12	6	194	16	0	0	3	13	35.500	2.731	1.991	1.791	1.636
Total & Averages			**198**	**5**	**1**	**36**	**156**	**37.808**	**2.907**	**2.163**	**1.789**	**1.599**
Standard Deviation								**3.628**	**0.095**	**0.086**	**0.101**	**0.028**
CVs								**9.597%**	**3.268%**	**3.968%**	**5.643%**	**1.737%**

Table 12. Bird Weights and Feed Conversion Days 21 - 42 (09SEP15) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	7	134	16	0	0	3	13	39.080	3.006	2.235	1.690	1.553
2	7	101	16	0	0	3	13	38.420	2.955	2.207	1.716	1.581
3	7	112	16	0	0	3	13	39.800	3.062	2.313	1.694	1.569
4	7	121	17	0	0	3	14	39.860	2.847	2.078	1.748	1.615
5	7	125	17	1	0	3	13	38.360	2.951	2.191	1.874	1.602
6	7	178	17	1	0	3	13	37.620	2.894	2.149	1.797	1.615
7	7	142	17	1	0	3	13	39.740	3.057	2.297	1.830	1.571
8	7	151	17	0	1	3	13	39.640	3.049	2.254	1.882	1.620
9	7	166	17	1	0	3	13	40.680	3.129	2.362	1.759	1.563
10	7	174	17	0	0	3	14	42.780	3.056	2.240	1.748	1.604
11	7	187	15	0	0	3	12	33.660	2.805	2.049	1.804	1.632
12	7	189	17	0	0	3	14	39.700	2.836	2.100	1.725	1.589
Total & Averages			**199**	**4**	**1**	**36**	**158**	**39.112**	**2.971**	**2.206**	**1.772**	**1.593**
Standard Deviation								**2.152**	**0.106**	**0.097**	**0.065**	**0.025**
CVs								**5.503%**	**3.559%**	**4.409%**	**3.682%**	**1.588%**
1	8	98	17	0	0	3	14	42.700	3.050	2.249	1.741	1.600
2	8	102	15	0	0	3	12	37.280	3.107	2.283	1.769	1.599
3	8	113	16	1	0	3	12	36.320	3.027	2.255	1.790	1.599
4	8	117	16	0	0	3	13	38.740	2.980	2.186	1.740	1.589
5	8	129	16	1	0	3	12	36.660	3.055	2.268	1.829	1.603
6	8	177	16	0	1	3	12	35.140	2.928	2.108	1.927	1.692
7	8	144	17	0	0	3	14	43.380	3.099	2.252	1.776	1.629
8	8	152	17	2	0	3	12	33.860	2.822	1.990	2.167	1.643
9	8	165	16	1	0	3	12	36.900	3.075	2.286	1.822	1.605
10	8	173	17	0	0	3	14	43.580	3.113	2.323	1.696	1.565
11	8	182	17	0	0	3	14	40.300	2.879	2.130	1.718	1.587
12	8	196	15	0	1	3	11	29.940	2.722	1.972	1.955	1.692
Total & Averages			**195**	**5**	**2**	**36**	**152**	**37.900**	**2.988**	**2.192**	**1.827**	**1.617**
Standard Deviation								**4.096**	**0.126**	**0.117**	**0.133**	**0.040**
CVs								**10.806%**	**4.202%**	**5.341%**	**7.264%**	**2.478%**

Graph 5. Average Bird Weight Gain and Adjusted Feed Conversion (Days 21 - 42) Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	1.809	1.612	Low Phosphate (LP)
2	2.169	1.619	High Phosphate (HP)
3	2.079	1.615	250 Units Phytase (LP)
4	2.153	1.583	500 Units Phytase (LP)
5	2.190	1.597	750 Units Phytase (LP)
6	2.163	1.599	1,000 Units Phytase (LP)
7	2.206	1.593	3,000 Units Phytase (LP)
8	2.192	1.617	30,000 Units Phytase (LP)



Abbreviations for Causes of Mortality in Poultry Feeding Studies*

Abbrev.	Cause of Death	Abbrev.	Cause of Death
ACT	Ascites	IE	Intestinal enteritis
ACT-S	Ascites + SDS	INJ	Injury
AS	Airsacculitis	NE	Necrotic enteritis
BAC	Bacterial	PRO	Prolapsed
CAN	Cannibalism	RH	Round heart (ascites)
CC	Coccidiosis	SDS	Sudden death syndrome
CD	Cervical dislocation	SM	Smothered
DH	Dehydrated	SO	Starve-out
EC	*E. coli*	UNK	Unknown cause of death
M	Mortality; R1 = removed, bird moribund bound R2 = removed; bird not moribund bound		
Comments/Findings Codes			
Code	**Comment/Finding**	**Code**	**Comment/Finding**
BL	Bad leg	LS	Lesion score
C	Cull	NGL	No gross lesions
C-SB	Cull, small bird	RCT	Recount bird
DC	Decomposed	SMPL	Sample bird
FHN	Femoral head necrosis	SS	Sex slip

*This table was added to the Final Study Report after the report was finalized in order to define the abbreviations for causes of mortality in birds that were removed from the study. The data on bird mortality is contained in Tables 13 and 14 that follow.

Table 13. Mortality and Removal Weights (Day 0 - Study End)
CQR Study Number AGV-15-4
Facility Number 7

				Days 0 - 14 (30JUL15 - 12AUG15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
1	2	97	17							0.000	17
1	8	98	17							0.000	17
1	3	99	17							0.000	17
1	5	100	17							0.000	17
2	7	101	17							0.000	17
2	8	102	17	2			BAC; SDS	0.250		0.250	15
2	4	103	17							0.000	17
2	5	104	17							0.000	17
2	2	105	17							0.000	17
2	1	106	17							0.000	17
2	6	107	17							0.000	17
2	3	108	17							0.000	17
3	5	109	17							0.000	17
3	6	110	17	1			SDS	0.116		0.116	16
3	3	111	17							0.000	17
3	7	112	17	1			BAC	0.074		0.074	16
3	8	113	17	1			SDS	0.095		0.095	16
3	2	114	17							0.000	17
3	1	115	17							0.000	17
3	4	116	17							0.000	17
4	8	117	17							0.000	17
4	3	118	17							0.000	17
4	4	119[1]	18							0.000	18
4	6	120	17							0.000	17
4	7	121	17							0.000	17
4	1	122	17							0.000	17
4	5	123	17							0.000	17
4	2	124	17							0.000	17
5	7	125	17							0.000	17
5	5	126	17							0.000	17
5	1	127	17							0.000	17
5	4	128	17	1			DH	0.106		0.106	16
5	8	129	17		1		CD-BAC		0.107	0.107	16
5	6	130	17	1			DH-BAC	0.059		0.059	16
5	3	131	17							0.000	17
5	2	132	17							0.000	17
1	4	133	17							0.000	17
1	7	134	17		1		CD-C/BAC		0.052	0.052	16
1	6	135	17							0.000	17
1	1	136	17							0.000	17
6	1	137	17							0.000	17
6	3	138	17	1			BAC	0.070		0.070	16
6	2	139	17	1			BAC	0.052		0.052	16
6	6	140	17							0.000	17
7	1	141	17							0.000	17
7	7	142	17							0.000	17
7	2	143	17							0.000	17
7	8	144	17							0.000	17
7	6	145	17							0.000	17
7	4	146	17							0.000	17
7	5	147	17							0.000	17
7	3	148	17							0.000	17
8	2	149	17							0.000	17
8	5	150	17							0.000	17
8	7	151	17							0.000	17
8	8	152	17							0.000	17
8	6	153	17	1			BAC	0.108		0.108	16
8	1	154	17							0.000	17
8	3	155	17							0.000	17
8	4	156	17							0.000	17
9	5	159	17							0.000	17
9	3	160	17							0.000	17
9	4	161	17							0.000	17

				Days 0 - 14 (30JUL15 - 12AUG15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
9	1	162	17	1			BAC	0.135		0.135	16
9	2	163	17							0.000	17
9	6	164	17							0.000	17
9	8	165	17	1			BAC	0.034		0.034	16
9	7	166	17							0.000	17
10	3	167	17							0.000	17
10	6	168	17	1			BAC-DH	0.087		0.087	16
10	1	169	17							0.000	17
10	5	170	17							0.000	17
10	2	171	17	1			SDS	0.097		0.097	16
10	4	172	17							0.000	17
10	8	173	17							0.000	17
10	7	174	17							0.000	17
6	8	177	17	1			BAC	0.067		0.067	16
6	7	178	17							0.000	17
6	5	179	17							0.000	17
6	4	180	17							0.000	17
11	1	181	17							0.000	17
11	8	182	17							0.000	17
11	5	183	17							0.000	17
11	3	184	17	1			BAC	0.084		0.084	16
11	2	185	17							0.000	17
11	6	186	17							0.000	17
11	7	187	17	2			BAC; SDS	0.163		0.163	15
11	4	188	17							0.000	17
12	7	189	17							0.000	17
12	2	190	17	1	1		BAC; CD-C/BAC	0.042	0.083	0.125	15
12	4	191	17		1		CD-C/SB/BL		0.077	0.077	16
12	1	192	17							0.000	17
12	3	193	17							0.000	17
12	6	194	17							0.000	17
12	5	195	17							0.000	17
12	8	196	17	1			BAC	0.087		0.087	16

Table 13. Mortality
CQR Study Number
Facility Number 7

			Days 14 - 21 (12AUG15 - 19AUG15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
1	2	97							0.000	17
1	8	98							0.000	17
1	3	99							0.000	17
1	5	100							0.000	17
2	7	101		1		CD-BAC		0.201	0.201	16
2	8	102							0.000	15
2	4	103							0.000	17
2	5	104							0.000	17
2	2	105							0.000	17
2	1	106							0.000	17
2	6	107							0.000	17
2	3	108							0.000	17
3	5	109							0.000	17
3	6	110							0.000	16
3	3	111							0.000	17
3	7	112							0.000	16
3	8	113							0.000	16
3	2	114							0.000	17
3	1	115							0.000	17
3	4	116							0.000	17
4	8	117		1		CD-BL/Splay Leg		0.584	0.584	16
4	3	118							0.000	17
4	4	119[1]	1		1	CD; SDS	0.333	0.366	0.699	16
4	6	120							0.000	17
4	7	121							0.000	17
4	1	122							0.000	17
4	5	123							0.000	17
4	2	124	1			BAC	0.648		0.648	16
5	7	125							0.000	17
5	5	126	1			BAC	0.384		0.384	16
5	1	127							0.000	17
5	4	128							0.000	16
5	8	129							0.000	16
5	6	130							0.000	16
5	3	131							0.000	17
5	2	132							0.000	17
1	4	133							0.000	17
1	7	134							0.000	16
1	6	135							0.000	17
1	1	136							0.000	17
6	1	137							0.000	17
6	3	138							0.000	16
6	2	139							0.000	16
6	6	140							0.000	17
7	1	141							0.000	17
7	7	142							0.000	17
7	2	143		1		CD-BAC		0.282	0.282	16
7	8	144							0.000	17
7	6	145	1			SDS	0.426		0.426	16
7	4	146	1			SDS	0.538		0.538	16
7	5	147							0.000	17
7	3	148							0.000	17
8	2	149							0.000	17
8	5	150							0.000	17
8	7	151							0.000	17
8	8	152							0.000	17
8	6	153							0.000	16
8	1	154							0.000	17
8	3	155							0.000	17
8	4	156							0.000	17
9	5	159							0.000	17
9	3	160							0.000	17
9	4	161							0.000	17

			Days 14 - 21 (12AUG15 - 19AUG15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
9	1	162							0 000	16
9	2	163							0 000	17
9	6	164							0 000	17
9	8	165							0 000	16
9	7	166							0 000	17
10	3	167							0 000	17
10	6	168							0 000	16
10	1	169							0 000	17
10	5	170							0 000	17
10	2	171							0 000	16
10	4	172							0 000	17
10	8	173							0 000	17
10	7	174							0 000	17
6	8	177							0 000	16
6	7	178							0 000	17
6	5	179	1			SDS	0 332		0 332	16
6	4	180							0 000	17
11	1	181		1		CD-BAC		0.297	0 297	16
11	8	182							0 000	17
11	5	183							0 000	17
11	3	184	1	1		BAC; CD-BAC	0.481	0.373	0 854	14
11	2	185							0 000	17
11	6	186							0 000	17
11	7	187							0 000	15
11	4	188							0 000	17
12	7	189							0 000	17
12	2	190							0 000	15
12	4	191							0 000	16
12	1	192		1		CD-BAC		0.275	0 275	16
12	3	193	1			SDS	0.623		0.623	16
12	6	194	1			SDS	0 544		0 544	16
12	5	195							0 000	17
12	8	196		1		CD-BAC		0.182	0.182	15

Table 13. Mortality
CQR Study Number
Facility Number 7

Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 21 - 42	No. Birds Remaining Day 42
			Days 21 - 42 (19AUG15 - 09SEP15)							
1	2	97			3	3 CD-SMPL		2.389	2 389	14
1	8	98			3	3 CD-SMPL		2.568	2 568	14
1	3	99			3	3 CD-SMPL		2.212	2 212	14
1	5	100		1	3	CD-C/BL; 3 CD-SMPL		3.141	3.141	13
2	7	101			3	3 CD-SMPL		2.262	2 262	13
2	8	102			3	3 CD-SMPL		2.646	2.646	12
2	4	103		1	3	CD-C/BAC; 3 CD-SMPL		2.349	2 349	13
2	5	104			3	3 CD-SMPL		2.080	2 080	14
2	2	105			3	3 CD-SMPL		2.394	2 394	14
2	1	106			3	3 CD-SMPL		1.932	1 932	14
2	6	107			3	3 CD-SMPL		2.358	2 358	14
2	3	108			3	3 CD-SMPL		2.523	2 523	14
3	5	109	1		3	3 CD-SMPL; SDS	0.702	2.240	2 942	13
3	6	110			3	3 CD-SMPL		2.522	2 522	13
3	3	111	1		3	BAC; 3 CD-SMPL	1.428	2.047	3.475	13
3	7	112			3	3 CD-SMPL		2.230	2 230	13
3	8	113	1		3	3 CD-SMPL; Twisted Gut	0.490	2.371	2 861	12
3	2	114			3	3 CD-SMPL		2.115	2.115	14
3	1	115	1		3	3 CD-SMPL; SDS	1.775	1.968	3.743	13
3	4	116			3	3 CD-SMPL		2.166	2.166	14
4	8	117			3	3 CD-SMPL		2.464	2.464	13
4	3	118			3	3 CD-SMPL		2.032	2 032	14
4	4	119[1]	1	1	3	BAC; CD-BL/FHN; 3 CD-SMPL	0.443	3.759	4 202	11
4	6	120			3	3 CD-SMPL		2.288	2 288	14
4	7	121			3	3 CD-SMPL		2.217	2 217	14
4	1	122			3	3 CD-SMPL		1.654	1.654	14
4	5	123			3	3 CD-SMPL		2.091	2 091	14
4	2	124			3	3 CD-SMPL		2.242	2 242	13
5	7	125	1		3	3 CD-SMPL; SDS	1 870	2.461	4 331	13
5	5	126			3	3 CD-SMPL		2.309	2 309	13
5	1	127	1		3	BAC; 3 CD-SMPL	0 574	1.929	2 503	13
5	4	128			3	3 CD-SMPL		2.149	2.149	13
5	8	129	1		3	3 CD-SMPL; SDS	0 873	2.523	3 396	12
5	6	130	3		3	ACT; BAC; 3 CD-SMPL; SDS	3.712	2.393	6.105	10
5	3	131	2		3	ACT; 3 CD-SMPL; SDS	3 268	2.172	5.440	12
5	2	132			3	3 CD-SMPL		2.200	2 200	14
1	4	133			3	3 CD-SMPL		2.108	2.108	14
1	7	134			3	3 CD-SMPL		2.362	2 362	13
1	6	135	1		3	3 CD-SMPL; SDS	0 979	2.287	3 266	13
1	1	136			3	3 CD-SMPL		1.818	1 818	14
6	1	137			3	3 CD-SMPL		1.797	1.797	14
6	3	138			3	3 CD-SMPL		2.176	2.176	13
6	2	139		1	3	CD-C/SB; 3 CD-SMPL		3.346	3 346	12
6	6	140	1		3	3 CD-SMPL; SDS	0 924	2.191	3.115	13
7	1	141			3	3 CD-SMPL		1.735	1.735	14
7	7	142	1		3	3 CD-SMPL; SDS	2.158	2.264	4.422	13
7	2	143	1		3	ACT-BL; 3 CD-SMPL	2 270	2.301	4 571	12
7	8	144			3	3 CD-SMPL		2.616	2.616	14
7	6	145		1	3	CD-BAC; 3 CD-SMPL		3.010	3 010	12
7	4	146			3	3 CD-SMPL		2.341	2 341	13
7	5	147			3	3 CD-SMPL		2.392	2 392	14
7	3	148			3	3 CD-SMPL		2.098	2 098	14
8	2	149	1		3	BAC; 3 CD-SMPL	0.403	2.318	2.721	13
8	5	150	3		3	BAC; 3 CD-SMPL; 2 SDS	2 019	2.321	4 340	11
8	7	151		1	3	CD-BL/FHN; 3 CD-SMPL		4.232	4 232	13
8	8	152	2		3	3 CD-SMPL; 2 SDS	3 503	2.788	6 291	12
8	6	153			3	3 CD-SMPL		2.315	2 315	13
8	1	154			3	3 CD-SMPL		2.005	2 005	14
8	3	155		2	3	CD-BAC; CD-BL/FHN; 3 CD-SMPL		4.712	4.712	12
8	4	156			3	3 CD-SMPL		2.248	2 248	14
9	5	159			3	3 CD-SMPL		2.330	2 330	14
9	3	160	1		3	3 CD-SMPL; SDS	0 942	2.347	3 289	13
9	4	161		1	3	CD-BAC; 3 CD-SMPL		2.788	2.788	13

			Days 21 - 42 (19AUG15 - 09SEP15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 21 - 42	No. Birds Remaining Day 42
9	1	162			3	3 CD-SMPL		1.840	1 840	13
9	2	163			3	3 CD-SMPL		2.088	2 088	14
9	6	164			3	3 CD-SMPL		2.407	2.407	14
9	8	165	1		3	3 CD-SMPL; SDS	0 987	2.299	3 286	12
9	7	166	1		3	3 CD-SMPL; SDS	1 005	2.457	3.462	13
10	3	167			3	3 CD-SMPL		2.427	2.427	14
10	6	168			3	3 CD-SMPL		2.369	2 369	13
10	1	169			3	3 CD-SMPL		1.840	1 840	14
10	5	170			3	3 CD-SMPL		2.501	2 501	14
10	2	171	1		3	ACT; 3 CD-SMPL	1 993	2.315	4 308	12
10	4	172			3	3 CD-SMPL		2.386	2 386	14
10	8	173			3	3 CD-SMPL		2.507	2 507	14
10	7	174			3	3 CD-SMPL		2.608	2.608	14
6	8	177		1	3	CD-BL/FHN; 3 CD-SMPL		3.062	3 062	12
6	7	178	1		3	DH-BL; 3 CD-SMPL	0 511	2.307	2 818	13
6	5	179			3	3 CD-SMPL		2.280	2 280	13
6	4	180			3	3 CD-SMPL		2.263	2 263	14
11	1	181			3	3 CD-SMPL		1.986	1 986	13
11	8	182			3	3 CD-SMPL		2.274	2 274	14
11	5	183		2	3	2 CD-BAC; 3 CD-SMPL		4.274	4 274	12
11	3	184			3	3 CD-SMPL		2.129	2.129	11
11	2	185			3	3 CD-SMPL		2.410	2.410	14
11	6	186			3	3 CD-SMPL		2.389	2 389	14
11	7	187			3	3 CD-SMPL		2.356	2 356	12
11	4	188			3	3 CD-SMPL		2.320	2 320	14
12	7	189			3	3 CD-SMPL		2.320	2 320	14
12	2	190			3	3 CD-SMPL		2.111	2.111	12
12	4	191			3	3 CD-SMPL		2.178	2.178	13
12	1	192		1	3	CD-C/DH/BL; 3 CD-SMPL		2.310	2 310	12
12	3	193			3	3 CD-SMPL		2.174	2.174	13
12	6	194			3	3 CD-SMPL		2.249	2 249	13
12	5	195			3	3 CD-SMPL		2.270	2 270	14
12	8	196		1	3	CD-BL/FHN; 3 CD-SMPL		2.909	2 909	11

Table 14. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number AGV-15-4
Facility Number 7

				Days 0 - 14 (30JUL15 - 12AUG15)								
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D 0-14	% Removal-1 D 0-14	% Removal-2 D 0-14	Total M & R-1 % D 0 - 14	No. Birds Remaining Day 14
1	1	136	17					0.000%	0.000%	0.000%	0.000%	17
2	1	106	17					0.000%	0.000%	0.000%	0.000%	17
3	1	115	17					0.000%	0.000%	0.000%	0.000%	17
4	1	122	17					0.000%	0.000%	0.000%	0.000%	17
5	1	127	17					0.000%	0.000%	0.000%	0.000%	17
6	1	137	17					0.000%	0.000%	0.000%	0.000%	17
7	1	141	17					0.000%	0.000%	0.000%	0.000%	17
8	1	154	17					0.000%	0.000%	0.000%	0.000%	17
9	1	162	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
10	1	169	17					0.000%	0.000%	0.000%	0.000%	17
11	1	181	17					0.000%	0.000%	0.000%	0.000%	17
12	1	192	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 1			**204**	**1**	**0**	**0**	**BAC**	**0.490%**	**0.000%**	**0.000%**	**0.490%**	**203**
1	2	97	17					0.000%	0.000%	0.000%	0.000%	17
2	2	105	17					0.000%	0.000%	0.000%	0.000%	17
3	2	114	17					0.000%	0.000%	0.000%	0.000%	17
4	2	124	17					0.000%	0.000%	0.000%	0.000%	17
5	2	132	17					0.000%	0.000%	0.000%	0.000%	17
6	2	139	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
7	2	143	17					0.000%	0.000%	0.000%	0.000%	17
8	2	149	17					0.000%	0.000%	0.000%	0.000%	17
9	2	163	17					0.000%	0.000%	0.000%	0.000%	17
10	2	171	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
11	2	185	17					0.000%	0.000%	0.000%	0.000%	17
12	2	190	17	1	1		BAC; CD-C/BAC	5.882%	5.882%	0.000%	11.765%	15
Treatment Group 2			**204**	**3**	**1**	**0**	**2 BAC; CD-C/BAC; SDS**	**1.471%**	**0.490%**	**0.000%**	**1.961%**	**200**
1	3	99	17					0.000%	0.000%	0.000%	0.000%	17
2	3	108	17					0.000%	0.000%	0.000%	0.000%	17
3	3	111	17					0.000%	0.000%	0.000%	0.000%	17
4	3	118	17					0.000%	0.000%	0.000%	0.000%	17
5	3	131	17					0.000%	0.000%	0.000%	0.000%	17
6	3	138	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
7	3	148	17					0.000%	0.000%	0.000%	0.000%	17
8	3	155	17					0.000%	0.000%	0.000%	0.000%	17
9	3	160	17					0.000%	0.000%	0.000%	0.000%	17
10	3	167	17					0.000%	0.000%	0.000%	0.000%	17
11	3	184	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
12	3	193	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 3			**204**	**2**	**0**	**0**	**2 BAC**	**0.980%**	**0.000%**	**0.000%**	**0.980%**	**202**

				Days 0 - 14 (30JUL15 - 12AUG15)								
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D 0-14	% Removal-1 D 0-14	% Removal-2 D 0-14	Total M & R-1 % D 0 - 14	No. Birds Remaining Day 14
1	4	133	17					0.000%	0.000%	0.000%	0.000%	17
2	4	103	17					0.000%	0.000%	0.000%	0.000%	17
3	4	116	17					0.000%	0.000%	0.000%	0.000%	17
4	4	119[1]	18					0.000%	0.000%	0.000%	0.000%	18
5	4	128	17	1			DH	5.882%	0.000%	0.000%	5.882%	16
6	4	180	17					0.000%	0.000%	0.000%	0.000%	17
7	4	146	17					0.000%	0.000%	0.000%	0.000%	17
8	4	156	17					0.000%	0.000%	0.000%	0.000%	17
9	4	161	17					0.000%	0.000%	0.000%	0.000%	17
10	4	172	17					0.000%	0.000%	0.000%	0.000%	17
11	4	188	17					0.000%	0.000%	0.000%	0.000%	17
12	4	191	17		1		CD-C/SB/BL	0.000%	5.882%	0.000%	5.882%	16
Treatment Group 4			**205**	**1**	**1**	**0**	**CD-C/SB/BL; DH**	**0.488%**	**0.488%**	**0.000%**	**0.976%**	**203**
1	5	100	17					0.000%	0.000%	0.000%	0.000%	17
2	5	104	17					0.000%	0.000%	0.000%	0.000%	17
3	5	109	17					0.000%	0.000%	0.000%	0.000%	17
4	5	123	17					0.000%	0.000%	0.000%	0.000%	17
5	5	126	17					0.000%	0.000%	0.000%	0.000%	17
6	5	179	17					0.000%	0.000%	0.000%	0.000%	17
7	5	147	17					0.000%	0.000%	0.000%	0.000%	17
8	5	150	17					0.000%	0.000%	0.000%	0.000%	17
9	5	159	17					0.000%	0.000%	0.000%	0.000%	17
10	5	170	17					0.000%	0.000%	0.000%	0.000%	17
11	5	183	17					0.000%	0.000%	0.000%	0.000%	17
12	5	195	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 5			**204**	**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**0.000%**	**204**
1	6	135	17					0.000%	0.000%	0.000%	0.000%	17
2	6	107	17					0.000%	0.000%	0.000%	0.000%	17
3	6	110	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
4	6	120	17					0.000%	0.000%	0.000%	0.000%	17
5	6	130	17	1			DH-BAC	5.882%	0.000%	0.000%	5.882%	16
6	6	140	17					0.000%	0.000%	0.000%	0.000%	17
7	6	145	17					0.000%	0.000%	0.000%	0.000%	17
8	6	153	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
9	6	164	17					0.000%	0.000%	0.000%	0.000%	17
10	6	168	17	1			BAC-DH	5.882%	0.000%	0.000%	5.882%	16
11	6	186	17					0.000%	0.000%	0.000%	0.000%	17
12	6	194	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 6			**204**	**4**	**0**	**0**	**BAC; BAC-DH; DH-BAC; SDS**	**1.961%**	**0.000%**	**0.000%**	**1.961%**	**200**

				Days 0 - 14 (30JUL15 - 12AUG15)								
Block	**Trt**	**Pen No.**	**No. Birds Started Day 0**	**Mortality**	**Removal-1**	**Removal-2**	**Cause of Death**	**% Mortality D 0-14**	**% Removal-1 D 0-14**	**% Removal-2 D 0-14**	**Total M & R-1 % D 0 - 14**	**No. Birds Remaining Day 14**
1	7	134	17		1		CD-C/BAC	0.000%	5.882%	0.000%	5.882%	16
2	7	101	17					0.000%	0.000%	0.000%	0.000%	17
3	7	112	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
4	7	121	17					0.000%	0.000%	0.000%	0.000%	17
5	7	125	17					0.000%	0.000%	0.000%	0.000%	17
6	7	178	17					0.000%	0.000%	0.000%	0.000%	17
7	7	142	17					0.000%	0.000%	0.000%	0.000%	17
8	7	151	17					0.000%	0.000%	0.000%	0.000%	17
9	7	166	17					0.000%	0.000%	0.000%	0.000%	17
10	7	174	17					0.000%	0.000%	0.000%	0.000%	17
11	7	187	17	2			BAC; SDS	11.765%	0.000%	0.000%	11.765%	15
12	7	189	17					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 7			**204**	**3**	**1**	**0**	**2 BAC; CD-C/BAC; SDS**	**1.471%**	**0.490%**	**0.000%**	**1.961%**	**200**

1	8	98	17					0.000%	0.000%	0.000%	0.000%	17
2	8	102	17	2			BAC; SDS	11.765%	0.000%	0.000%	11.765%	15
3	8	113	17	1			SDS	5.882%	0.000%	0.000%	5.882%	16
4	8	117	17					0.000%	0.000%	0.000%	0.000%	17
5	8	129	17		1		CD-BAC	0.000%	5.882%	0.000%	5.882%	16
6	8	177	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
7	8	144	17					0.000%	0.000%	0.000%	0.000%	17
8	8	152	17					0.000%	0.000%	0.000%	0.000%	17
9	8	165	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
10	8	173	17					0.000%	0.000%	0.000%	0.000%	17
11	8	182	17					0.000%	0.000%	0.000%	0.000%	17
12	8	196	17	1			BAC	5.882%	0.000%	0.000%	5.882%	16
Treatment Group 8			**204**	**6**	**1**	**0**	**4 BAC; CD-BAC; 2 SDS**	**2.941%**	**0.490%**	**0.000%**	**3.431%**	**197**

[1]CL: Pen 119 started with one extra bird. See Deviation 3 for details. SG 10SEP15

Table 14. Summary
CQR Study Number
Facility Number 7

			Days 14 - 21 (12AUG15 - 19AUG15)								
Block	**Trt**	**Pen No.**	**Mortality**	**Removal-1**	**Removal-2**	**Cause of Death**	**% Mortality D 14-21**	**% Removal-1 D 14-21**	**% Removal-2 D 14-21**	**Total M & R-1 % D 14 - 21**	**No. Birds Remaining Day 21**
1	1	136					0.000%	0.000%	0.000%	0.000%	17
2	1	106					0.000%	0.000%	0.000%	0.000%	17
3	1	115					0.000%	0.000%	0.000%	0.000%	17
4	1	122					0.000%	0.000%	0.000%	0.000%	17
5	1	127					0.000%	0.000%	0.000%	0.000%	17
6	1	137					0.000%	0.000%	0.000%	0.000%	17
7	1	141					0.000%	0.000%	0.000%	0.000%	17
8	1	154					0.000%	0.000%	0.000%	0.000%	17
9	1	162					0.000%	0.000%	0.000%	0.000%	16
10	1	169					0.000%	0.000%	0.000%	0.000%	17
11	1	181		1		CD-BAC	0.000%	5.882%	0.000%	5.882%	16
12	1	192		1		CD-BAC	0.000%	5.882%	0.000%	5.882%	16
Treatment Group 1			**0**	**2**	**0**	**2 CD-BAC**	**0.000%**	**0.985%**	**0.000%**	**0.985%**	**201**
1	2	97					0.000%	0.000%	0.000%	0.000%	17
2	2	105					0.000%	0.000%	0.000%	0.000%	17
3	2	114					0.000%	0.000%	0.000%	0.000%	17
4	2	124	1			BAC	5.882%	0.000%	0.000%	5.882%	16
5	2	132					0.000%	0.000%	0.000%	0.000%	17
6	2	139					0.000%	0.000%	0.000%	0.000%	16
7	2	143		1		CD-BAC	0.000%	5.882%	0.000%	5.882%	16
8	2	149					0.000%	0.000%	0.000%	0.000%	17
9	2	163					0.000%	0.000%	0.000%	0.000%	17
10	2	171					0.000%	0.000%	0.000%	0.000%	16
11	2	185					0.000%	0.000%	0.000%	0.000%	17
12	2	190					0.000%	0.000%	0.000%	0.000%	15
Treatment Group 2			**1**	**1**	**0**	**BAC; CD-BAC**	**0.500%**	**0.500%**	**0.000%**	**1.000%**	**198**
1	3	99					0.000%	0.000%	0.000%	0.000%	17
2	3	108					0.000%	0.000%	0.000%	0.000%	17
3	3	111					0.000%	0.000%	0.000%	0.000%	17
4	3	118					0.000%	0.000%	0.000%	0.000%	17
5	3	131					0.000%	0.000%	0.000%	0.000%	17
6	3	138					0.000%	0.000%	0.000%	0.000%	16
7	3	148					0.000%	0.000%	0.000%	0.000%	17
8	3	155					0.000%	0.000%	0.000%	0.000%	17
9	3	160					0.000%	0.000%	0.000%	0.000%	17
10	3	167					0.000%	0.000%	0.000%	0.000%	17
11	3	184	1	1		BAC; CD-BAC	6.250%	6.250%	0.000%	12.500%	14
12	3	193	1			SDS	5.882%	0.000%	0.000%	5.882%	16
Treatment Group 3			**2**	**1**	**0**	**BAC; CD-BAC; SDS**	**0.990%**	**0.495%**	**0.000%**	**1.485%**	**199**

Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D 14-21	% Removal-1 D 14-21	% Removal-2 D 14-21	Total M & R-1 % D 14 - 21	No. Birds Remaining Day 21
			Days 14 - 21 (12AUG15 - 19AUG15)								
1	4	133					0.000%	0.000%	0.000%	0.000%	17
2	4	103					0.000%	0.000%	0.000%	0.000%	17
3	4	116					0.000%	0.000%	0.000%	0.000%	17
4	4	119[1]	1		1	CD; SDS	5.556%	0.000%	5.556%	5.556%	16
5	4	128					0.000%	0.000%	0.000%	0.000%	16
6	4	180					0.000%	0.000%	0.000%	0.000%	17
7	4	146	1			SDS	5.882%	0.000%	0.000%	5.882%	16
8	4	156					0.000%	0.000%	0.000%	0.000%	17
9	4	161					0.000%	0.000%	0.000%	0.000%	17
10	4	172					0.000%	0.000%	0.000%	0.000%	17
11	4	188					0.000%	0.000%	0.000%	0.000%	17
12	4	191					0.000%	0.000%	0.000%	0.000%	16
Treatment Group 4			**2**	**0**	**1**	**CD; 2 SDS**	**0.985%**	**0.000%**	**0.493%**	**0.985%**	**200**
1	5	100					0.000%	0.000%	0.000%	0.000%	17
2	5	104					0.000%	0.000%	0.000%	0.000%	17
3	5	109					0.000%	0.000%	0.000%	0.000%	17
4	5	123					0.000%	0.000%	0.000%	0.000%	17
5	5	126	1			BAC	5.882%	0.000%	0.000%	5.882%	16
6	5	179	1			SDS	5.882%	0.000%	0.000%	5.882%	16
7	5	147					0.000%	0.000%	0.000%	0.000%	17
8	5	150					0.000%	0.000%	0.000%	0.000%	17
9	5	159					0.000%	0.000%	0.000%	0.000%	17
10	5	170					0.000%	0.000%	0.000%	0.000%	17
11	5	183					0.000%	0.000%	0.000%	0.000%	17
12	5	195					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 5			**2**	**0**	**0**	**BAC; SDS**	**0.980%**	**0.000%**	**0.000%**	**0.980%**	**202**
1	6	135					0.000%	0.000%	0.000%	0.000%	17
2	6	107					0.000%	0.000%	0.000%	0.000%	17
3	6	110					0.000%	0.000%	0.000%	0.000%	16
4	6	120					0.000%	0.000%	0.000%	0.000%	17
5	6	130					0.000%	0.000%	0.000%	0.000%	16
6	6	140					0.000%	0.000%	0.000%	0.000%	17
7	6	145	1			SDS	5.882%	0.000%	0.000%	5.882%	16
8	6	153					0.000%	0.000%	0.000%	0.000%	16
9	6	164					0.000%	0.000%	0.000%	0.000%	17
10	6	168					0.000%	0.000%	0.000%	0.000%	16
11	6	186					0.000%	0.000%	0.000%	0.000%	17
12	6	194	1			SDS	5.882%	0.000%	0.000%	5.882%	16
Treatment Group 6			**2**	**0**	**0**	**2 SDS**	**1.000%**	**0.000%**	**0.000%**	**1.000%**	**198**

			Days 14 - 21 (12AUG15 - 19AUG15)								
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D 14-21	% Removal-1 D 14-21	% Removal-2 D 14-21	Total M & R-1 % D 14 - 21	No. Birds Remaining Day 21
1	7	134					0.000%	0.000%	0.000%	0.000%	16
2	7	101		1		CD-BAC	0.000%	5.882%	0.000%	5.882%	16
3	7	112					0.000%	0.000%	0.000%	0.000%	16
4	7	121					0.000%	0.000%	0.000%	0.000%	17
5	7	125					0.000%	0.000%	0.000%	0.000%	17
6	7	178					0.000%	0.000%	0.000%	0.000%	17
7	7	142					0.000%	0.000%	0.000%	0.000%	17
8	7	151					0.000%	0.000%	0.000%	0.000%	17
9	7	166					0.000%	0.000%	0.000%	0.000%	17
10	7	174					0.000%	0.000%	0.000%	0.000%	17
11	7	187					0.000%	0.000%	0.000%	0.000%	15
12	7	189					0.000%	0.000%	0.000%	0.000%	17
Treatment Group 7			**0**	**1**	**0**	**CD-BAC**	**0.000%**	**0.500%**	**0.000%**	**0.500%**	**199**
1	8	98					0.000%	0.000%	0.000%	0.000%	17
2	8	102					0.000%	0.000%	0.000%	0.000%	15
3	8	113					0.000%	0.000%	0.000%	0.000%	16
4	8	117		1		CD-BL/Splay Leg	0.000%	5.882%	0.000%	5.882%	16
5	8	129					0.000%	0.000%	0.000%	0.000%	16
6	8	177					0.000%	0.000%	0.000%	0.000%	16
7	8	144					0.000%	0.000%	0.000%	0.000%	17
8	8	152					0.000%	0.000%	0.000%	0.000%	17
9	8	165					0.000%	0.000%	0.000%	0.000%	16
10	8	173					0.000%	0.000%	0.000%	0.000%	17
11	8	182					0.000%	0.000%	0.000%	0.000%	17
12	8	196		1		CD-BAC	0.000%	6.250%	0.000%	6.250%	15
Treatment Group 8			**0**	**2**	**0**	**CD-BAC; CD-BL/Splay Leg**	**0.000%**	**1.015%**	**0.000%**	**1.015%**	**195**

[1]CL: Pen 119 started with

Table 14. Summary
CQR Study Number
Facility Number 7

			Days 21 - 42 (19AUG15 - 09SEP15)									Days 0 - 42			
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D 21-42	% Removal-1 D 21-42	% Removal-2 D 21-42	Total M & R-1 % D 21 - 42	No. Birds Remaining Day 42	% Mortality D 0-42	% Removal-1 D 0-42	% Removal-2 D 0-42	Total M & R-1 % D 0 - 42
1	1	136			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
2	1	106			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
3	1	115	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
4	1	122			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
5	1	127	1		3	BAC; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
6	1	137			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
7	1	141			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
8	1	154			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
9	1	162			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
10	1	169			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
11	1	181			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	5.882%	17.647%	5.882%
12	1	192		1	3	CD-C/DH/BL; 3 CD-SMPL	0.000%	6.250%	18.750%	6.250%	12	0.000%	11.765%	17.647%	11.765%
Treatment Group 1			**2**	**1**	**36**	**BAC; CD-C/DH/BL; 36 CD-SMPL; SDS**	**0.995%**	**0.498%**	**17.910%**	**1.493%**	**162**	**1.471%**	**1.471%**	**17.647%**	**2.941%**
1	2	97			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
2	2	105			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
3	2	114			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
4	2	124			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
5	2	132			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
6	2	139		1	3	CD-C/SB; 3 CD-SMPL	0.000%	6.250%	18.750%	6.250%	12	5.882%	5.882%	17.647%	11.765%
7	2	143	1		3	ACT-BL; 3 CD-SMPL	6.250%	0.000%	18.750%	6.250%	12	5.882%	5.882%	17.647%	11.765%
8	2	149	1		3	BAC; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
9	2	163			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
10	2	171	1		3	ACT; 3 CD-SMPL	6.250%	0.000%	18.750%	6.250%	12	11.765%	0.000%	17.647%	11.765%
11	2	185			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
12	2	190			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	5.882%	5.882%	17.647%	11.765%
Treatment Group 2			**3**	**1**	**36**	**ACT; ACT-BL; BAC; CD-C/SB; 36 CD-SMPL**	**1.515%**	**0.505%**	**18.182%**	**2.020%**	**158**	**3.431%**	**1.471%**	**17.647%**	**4.902%**
1	3	99			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
2	3	108			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
3	3	111	1		3	BAC; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
4	3	118			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
5	3	131	2		3	ACT; 3 CD-SMPL; SDS	11.765%	0.000%	17.647%	11.765%	12	11.765%	0.000%	17.647%	11.765%
6	3	138			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
7	3	148			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
8	3	155		2	3	CD-BAC; CD-BL/FHN; 3 CD-SMPL	0.000%	11.765%	17.647%	11.765%	12	0.000%	11.765%	17.647%	11.765%
9	3	160	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
10	3	167			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
11	3	184			3	3 CD-SMPL	0.000%	0.000%	21.429%	0.000%	11	11.765%	5.882%	17.647%	17.647%
12	3	193			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
Treatment Group 3			**4**	**2**	**36**	**ACT; BAC; CD-BAC; CD-BL/FHN; 36 CD-SMPL; 2 SDS**	**2.010%**	**1.005%**	**18.090%**	**3.015%**	**157**	**3.922%**	**1.471%**	**17.647%**	**5.392%**

			Days 21 - 42 (19AUG15 - 09SEP15)									Days 0 - 42			
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D 21-42	% Removal-1 D 21-42	% Removal-2 D 21-42	Total M & R-1 % D 21 - 42	No. Birds Remaining Day 42	% Mortality D 0-42	% Removal-1 D 0-42	% Removal-2 D 0-42	Total M & R-1 % D 0 - 42
1	4	133			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
2	4	103		1	3	CD-C/BAC; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	0.000%	5.882%	17.647%	5.882%
3	4	116			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
4	4	119[1]	1	1	3	BAC; CD-BL/FHN; 3 CD-SMPL	6.250%	6.250%	18.750%	12.500%	11	11.111%	5.556%	22.222%	16.667%
5	4	128			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
6	4	180			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
7	4	146			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
8	4	156			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
9	4	161		1	3	CD-BAC; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	0.000%	5.882%	17.647%	5.882%
10	4	172			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
11	4	188			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
12	4	191			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	5.882%	17.647%	5.882%
Treatment Group 4			**1**	**3**	**36**	**BAC; 2 CD-BAC; CD-BL/FHN; 36 CD-SMPL**	**0.500%**	**1.500%**	**18.000%**	**2.000%**	**160**	**1.951%**	**1.951%**	**18.049%**	**3.902%**
1	5	100		1	3	CD-C/BL; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	0.000%	5.882%	17.647%	5.882%
2	5	104			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
3	5	109	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
4	5	123			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
5	5	126			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
6	5	179			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
7	5	147			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
8	5	150	3		3	BAC; 3 CD-SMPL; 2 SDS	17.647%	0.000%	17.647%	17.647%	11	17.647%	0.000%	17.647%	17.647%
9	5	159			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
10	5	170			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
11	5	183		2	3	2 CD-BAC; 3 CD-SMPL	0.000%	11.765%	17.647%	11.765%	12	0.000%	11.765%	17.647%	11.765%
12	5	195			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
Treatment Group 5			**4**	**3**	**36**	**BAC; 2 CD-BAC; CD-C/BL; 36 CD-SMPL; 3 SDS**	**1.980%**	**1.485%**	**17.822%**	**3.465%**	**159**	**2.941%**	**1.471%**	**17.647%**	**4.412%**
1	6	135	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
2	6	107			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
3	6	110			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
4	6	120			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
5	6	130	3		3	ACT; BAC; 3 CD-SMPL; SDS	18.750%	0.000%	18.750%	18.750%	10	23.529%	0.000%	17.647%	23.529%
6	6	140	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
7	6	145		1	3	CD-BAC; 3 CD-SMPL	0.000%	6.250%	18.750%	6.250%	12	5.882%	5.882%	17.647%	11.765%
8	6	153			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
9	6	164			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
10	6	168			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
11	6	186			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
12	6	194			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
Treatment Group 6			**5**	**1**	**36**	**ACT; BAC; CD-BAC; 36 CD-SMPL; 3 SDS**	**2.525%**	**0.505%**	**18.182%**	**3.030%**	**156**	**5.392%**	**0.490%**	**17.647%**	**5.882%**

			Days 21 - 42 (19AUG15 - 09SEP15)									Days 0 - 42			
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality D 21-42	% Removal-1 D 21-42	% Removal-2 D 21-42	Total M & R-1 % D 21 - 42	No. Birds Remaining Day 42	% Mortality D 0-42	% Removal-1 D 0-42	% Removal-2 D 0-42	Total M & R-1 % D 0 - 42
1	7	134			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	5.882%	17.647%	5.882%
2	7	101			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	5.882%	17.647%	5.882%
3	7	112			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	5.882%	0.000%	17.647%	5.882%
4	7	121			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
5	7	125	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
6	7	178	1		3	DH-BL; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
7	7	142	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
8	7	151		1	3	CD-BL/FHN; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13	0.000%	5.882%	17.647%	5.882%
9	7	166	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13	5.882%	0.000%	17.647%	5.882%
10	7	174			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
11	7	187			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	11.765%	0.000%	17.647%	11.765%
12	7	189			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
Treatment Group 7			**4**	**1**	**36**	**CD-BL/FHN; 36 CD-SMPL; DH-BL; 3 SDS**	**2.010%**	**0.503%**	**18.090%**	**2.513%**	**158**	**3.431%**	**1.471%**	**17.647%**	**4.902%**
1	8	98			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
2	8	102			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12	11.765%	0.000%	17.647%	11.765%
3	8	113	1		3	3 CD-SMPL; Twisted Gut	6.250%	0.000%	18.750%	6.250%	12	11.765%	0.000%	17.647%	11.765%
4	8	117			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13	0.000%	5.882%	17.647%	5.882%
5	8	129	1		3	3 CD-SMPL; SDS	6.250%	0.000%	18.750%	6.250%	12	5.882%	5.882%	17.647%	11.765%
6	8	177		1	3	CD-BL/FHN; 3 CD-SMPL	0.000%	6.250%	18.750%	6.250%	12	5.882%	5.882%	17.647%	11.765%
7	8	144			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
8	8	152	2		3	3 CD-SMPL; 2 SDS	11.765%	0.000%	17.647%	11.765%	12	11.765%	0.000%	17.647%	11.765%
9	8	165	1		3	3 CD-SMPL; SDS	6.250%	0.000%	18.750%	6.250%	12	11.765%	0.000%	17.647%	11.765%
10	8	173			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
11	8	182			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14	0.000%	0.000%	17.647%	0.000%
12	8	196		1	3	CD-BL/FHN; 3 CD-SMPL	0.000%	6.667%	20.000%	6.667%	11	5.882%	11.765%	17.647%	17.647%
Treatment Group 8			**5**	**2**	**36**	**2 CD-BL/FHN; 36 CD-SMPL; 4 SDS; Twisted Gut**	**2.564%**	**1.026%**	**18.462%**	**3.590%**	**152**	**5.392%**	**2.451%**	**17.647%**	**7.843%**

[1]CL: Pen 119 started with

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-4
Facility Number 7

			Starter 1 (Days 0 - 14)			Starter 2 (Days 14 - 21)		
Block	**Trt**	**Pen No.**	**Feed 1 27-Jul-15**	**WB 12-Aug-15**	**D 0 - 14 Consumed**	**Feed 2 12-Aug-15**	**WB 19-Aug-15**	**D 14 - 21 Consumed**
1	2	97	10.00	*3.42*	**6.58**	13.00	*3.68*	**9.32**
1	8	98	10.00	*3.56*	**6.44**	13.00	*3.06*	**9.94**
1	3	99	10.00	*3.94*	**6.06**	13.00	*4.04*	**8.96**
1	5	100	10.00	*3.62*	**6.38**	13.00	*4.12*	**8.88**
2	7	101	10.00	*3.58*	**6.42**	13.00	*4.34*	**8.66**
2	8	102	10.00	*4.04*	**5.96**	13.00	*4.10*	**8.90**
2	4	103	10.00	*3.66*	**6.34**	13.00	*3.70*	**9.30**
2	5	104	10.00	*3.78*	**6.22**	13.00	*3.76*	**9.24**
2	2	105	10.00	*3.56*	**6.44**	13.00	*3.66*	**9.34**
2	1	106	10.00	*4.30*	**5.70**	13.00	*5.36*	**7.64**
2	6	107	10.00	*3.76*	**6.24**	13.00	*3.70*	**9.30**
2	3	108	10.00	*3.96*	**6.04**	13.00	*4.26*	**8.74**
3	5	109	10.00	*3.76*	**6.24**	13.00	*4.12*	**8.88**
3	6	110	10.00	*3.78*	**6.22**	13.00	*3.88*	**9.12**
3	3	111	10.00	*3.88*	**6.12**	13.00	*4.18*	**8.82**
3	7	112	10.00	*4.16*	**5.84**	13.00	*4.56*	**8.44**
3	8	113	10.00	*3.64*	**6.36**	13.00	*4.28*	**8.72**
3	2	114	10.00	*3.60*	**6.40**	13.00	*3.60*	**9.40**
3	1	115	10.00	*4.10*	**5.90**	13.00	*5.72*	**7.28**
3	4	116	10.00	*4.10*	**5.90**	13.00	*4.30*	**8.70**
4	8	117	10.00	*3.56*	**6.44**	13.00	*3.68*	**9.32**
4	3	118	10.00	*4.08*	**5.92**	13.00	*4.40*	**8.60**
4	4	119	10.00	*3.82*	**6.18**	13.00	*5.04*	**7.96**
4	6	120	10.00	*3.62*	**6.38**	13.00	*3.66*	**9.34**
4	7	121	10.00	*3.42*	**6.58**	13.00	*3.72*	**9.28**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-4
Facility Number 7

			Starter 1 (Days 0 - 14)			Starter 2 (Days 14 - 21)		
Block	Trt	Pen No.	Feed 1 27-Jul-15	WB 12-Aug-15	D 0 - 14 Consumed	Feed 2 12-Aug-15	WB 19-Aug-15	D 14 - 21 Consumed
4	1	122	10.00	*4.54*	**5.46**	13.00	*5.54*	**7.46**
4	5	123	10.00	*3.74*	**6.26**	13.00	*3.54*	**9.46**
4	2	124	10.00	*3.74*	**6.26**	13.00	*4.10*	**8.90**
5	7	125	10.00	*3.76*	**6.24**	13.00	*3.44*	**9.56**
5	5	126	10.00	*3.78*	**6.22**	13.00	*4.36*	**8.64**
5	1	127	10.00	*4.20*	**5.80**	13.00	*4.92*	**8.08**
5	4	128	10.00	*4.30*	**5.70**	13.00	*4.54*	**8.46**
5	8	129	10.00	*3.72*	**6.28**	13.00	*3.88*	**9.12**
5	6	130	10.00	*3.88*	**6.12**	13.00	*5.14*	**7.86**
5	3	131	10.00	*3.50*	**6.50**	13.00	*4.34*	**8.66**
5	2	132	10.00	*3.72*	**6.28**	13.00	*3.88*	**9.12**
1	4	133	10.00	*3.82*	**6.18**	13.00	*4.28*	**8.72**
1	7	134	10.00	*3.86*	**6.14**	13.00	*3.72*	**9.28**
1	6	135	10.00	*3.54*	**6.46**	13.00	*3.58*	**9.42**
1	1	136	10.00	*4.42*	**5.58**	13.00	*5.28*	**7.72**
6	1	137	10.00	*4.50*	**5.50**	13.00	*5.40*	**7.60**
6	3	138	10.00	*4.40*	**5.60**	13.00	*4.82*	**8.18**
6	2	139	10.00	*4.26*	**5.74**	13.00	*5.30*	**7.70**
6	6	140	10.00	*4.06*	**5.94**	13.00	*4.80*	**8.20**
7	1	141	10.00	*4.44*	**5.56**	13.00	*5.52*	**7.48**
7	7	142	10.00	*3.58*	**6.42**	13.00	*3.70*	**9.30**
7	2	143	10.00	*3.84*	**6.16**	13.00	*4.06*	**8.94**
7	8	144	10.00	*3.14*	**6.86**	13.00	*2.56*	**10.44**
7	6	145	10.00	*3.74*	**6.26**	13.00	*4.40*	**8.60**
7	4	146	10.00	*3.86*	**6.14**	13.00	*3.96*	**9.04**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-4
Facility Number 7

			Starter 1 (Days 0 - 14)			Starter 2 (Days 14 - 21)		
Block	Trt	Pen No.	Feed 1 27-Jul-15	WB 12-Aug-15	D 0 - 14 Consumed	Feed 2 12-Aug-15	WB 19-Aug-15	D 14 - 21 Consumed
7	5	147	10.00	*3.82*	**6.18**	13.00	*3.80*	**9.20**
7	3	148	10.00	*3.70*	**6.30**	13.00	*4.20*	**8.80**
8	2	149	10.00	*3.66*	**6.34**	13.00	*3.50*	**9.50**
8	5	150	10.00	*3.82*	**6.18**	13.00	*3.48*	**9.52**
8	7	151	10.00	*3.48*	**6.52**	13.00	*3.26*	**9.74**
8	8	152	10.00	*3.24*	**6.76**	13.00	*2.88*	**10.12**
8	6	153	10.00	*4.20*	**5.80**	13.00	*4.34*	**8.66**
8	1	154	10.00	*4.28*	**5.72**	13.00	*4.68*	**8.32**
8	3	155	10.00	*4.18*	**5.82**	13.00	*4.30*	**8.70**
8	4	156	10.00	*4.18*	**5.82**	13.00	*4.22*	**8.78**
9	5	159	10.00	*3.96*	**6.04**	13.00	*4.00*	**9.00**
9	3	160	10.00	*3.40*	**6.60**	13.00	*3.76*	**9.24**
9	4	161	10.00	*3.68*	**6.32**	13.00	*3.84*	**9.16**
9	1	162	10.00	*4.68*	**5.32**	13.00	*6.20*	**6.80**
9	2	163	10.00	*3.68*	**6.32**	13.00	*4.40*	**8.60**
9	6	164	10.00	*3.64*	**6.36**	13.00	*3.80*	**9.20**
9	8	165	10.00	*3.84*	**6.16**	13.00	*3.66*	**9.34**
9	7	166	10.00	*3.70*	**6.30**	13.00	*3.34*	**9.66**
10	3	167	10.00	*4.04*	**5.96**	13.00	*4.04*	**8.96**
10	6	168	10.00	*3.84*	**6.16**	13.00	*3.86*	**9.14**
10	1	169	10.00	*4.42*	**5.58**	13.00	*5.50*	**7.50**
10	5	170	10.00	*3.72*	**6.28**	13.00	*3.58*	**9.42**

Table 15. Feed Added and Removed by Pen (Day 0 - Study End)
CQR Study Number AGV-15-4
Facility Number 7

			Starter 1 (Days 0 - 14)			Starter 2 (Days 14 - 21)		
Block	Trt	Pen No.	Feed 1 27-Jul-15	WB 12-Aug-15	D 0 - 14 Consumed	Feed 2 12-Aug-15	WB 19-Aug-15	D 14 - 21 Consumed
10	2	171	10.00	*3.76*	**6.24**	13.00	*3.88*	**9.12**
10	4	172	10.00	*3.98*	**6.02**	13.00	*3.98*	**9.02**
10	8	173	10.00	*3.48*	**6.52**	13.00	*3.34*	**9.66**
10	7	174	10.00	*3.22*	**6.78**	13.00	*2.70*	**10.30**
6	8	177	10.00	*3.82*	**6.18**	13.00	*3.60*	**9.40**
6	7	178	10.00	*3.76*	**6.24**	13.00	*3.88*	**9.12**
6	5	179	10.00	*3.96*	**6.04**	13.00	*4.46*	**8.54**
6	4	180	10.00	*4.22*	**5.78**	13.00	*4.50*	**8.50**
11	1	181	10.00	*4.36*	**5.64**	13.00	*6.16*	**6.84**
11	8	182	10.00	*3.90*	**6.10**	13.00	*4.10*	**8.90**
11	5	183	10.00	*3.78*	**6.22**	13.00	*4.02*	**8.98**
11	3	184	10.00	*4.62*	**5.38**	13.00	*5.94*	**7.06**
11	2	185	10.00	*3.74*	**6.26**	13.00	*3.72*	**9.28**
11	6	186	10.00	*3.94*	**6.06**	13.00	*4.34*	**8.66**
11	7	187	10.00	*4.56*	**5.44**	13.00	*4.88*	**8.12**
11	4	188	10.00	*4.00*	**6.00**	13.00	*4.06*	**8.94**
12	7	189	10.00	*4.00*	**6.00**	13.00	*4.22*	**8.78**
12	2	190	10.00	*4.50*	**5.50**	13.00	*5.30*	**7.70**
12	4	191	10.00	*4.34*	**5.66**	13.00	*5.04*	**7.96**
12	1	192	10.00	*4.66*	**5.34**	13.00	*5.84*	**7.16**
12	3	193	10.00	*4.00*	**6.00**	13.00	*4.54*	**8.46**
12	6	194	10.00	*3.86*	**6.14**	13.00	*4.44*	**8.56**
12	5	195	10.00	*4.10*	**5.90**	13.00	*4.58*	**8.42**
12	8	196	10.00	*4.08*	**5.92**	13.00	*4.72*	**8.28**

Table 15. Feed Added
CQR Study Number A(
Facility Number 7

Block	Trt	Pen No.	Grower/Finisher (Days 21 - 42) Feed 3 19-Aug-15	Feed 4 26-Aug-15	Feed 5 31-Aug-15	Feed 6 3-Sep-15	WB 9-Sep-15	D 21 - 42 Consumed
1	2	97	20.00	13.00	13.00	8.00	*3.32*	**50.68**
1	8	98	20.00	13.00	13.00	8.00	*3.36*	**50.64**
1	3	99	20.00	13.00	13.00	8.00	*6.06*	**47.94**
1	5	100	20.00	13.00	13.00	8.00	*7.06*	**46.94**
2	7	101	20.00	13.00	13.00	8.00	*8.62*	**45.38**
2	8	102	20.00	13.00	13.00	8.00	*9.92*	**44.08**
2	4	103	20.00	13.00	13.00	8.00	*7.74*	**46.26**
2	5	104	20.00	13.00	13.00	8.00	*5.80*	**48.20**
2	2	105	20.00	13.00	13.00	8.00	*3.56*	**50.44**
2	1	106	20.00	13.00	13.00	0.00	*2.68*	**43.32**
2	6	107	20.00	13.00	13.00	8.00	*4.26*	**49.74**
2	3	108	20.00	13.00	13.00	8.00	*4.04*	**49.96**
3	5	109	20.00	13.00	13.00	8.00	*8.14*	**45.86**
3	6	110	20.00	13.00	13.00	8.00	*8.60*	**45.40**
3	3	111	20.00	13.00	13.00	8.00	*6.52*	**47.48**
3	7	112	20.00	13.00	13.00	8.00	*6.86*	**47.14**
3	8	113	20.00	13.00	13.00	8.00	*11.08*	**42.92**
3	2	114	20.00	13.00	13.00	8.00	*5.38*	**48.62**
3	1	115	20.00	13.00	13.00	0.00	*6.72*	**39.28**
3	4	116	20.00	13.00	13.00	8.00	*6.04*	**47.96**
4	8	117	20.00	13.00	13.00	8.00	*8.70*	**45.30**
4	3	118	20.00	13.00	13.00	8.00	*8.18*	**45.82**
4	4	119	20.00	13.00	13.00	8.00	*15.78*	**38.22**
4	6	120	20.00	13.00	13.00	8.00	*6.82*	**47.18**
4	7	121	20.00	13.00	13.00	8.00	*7.18*	**46.82**

Table 15. Feed Added
CQR Study Number A(
Facility Number 7

			Grower/Finisher (Days 21 - 42)					
Block	Trt	Pen No.	Feed 3 19-Aug-15	Feed 4 26-Aug-15	Feed 5 31-Aug-15	Feed 6 3-Sep-15	WB 9-Sep-15	D 21 - 42 Consumed
4	1	122	20.00	13.00	13.00	0.00	*3.02*	**42.98**
4	5	123	20.00	13.00	13.00	8.00	*4.50*	**49.50**
4	2	124	20.00	13.00	13.00	8.00	*7.22*	**46.78**
5	7	125	20.00	13.00	13.00	8.00	*6.32*	**47.68**
5	5	126	20.00	13.00	13.00	8.00	*8.58*	**45.42**
5	1	127	20.00	13.00	13.00	0.00	*7.40*	**38.60**
5	4	128	20.00	13.00	13.00	8.00	*8.90*	**45.10**
5	8	129	20.00	13.00	13.00	8.00	*10.00*	**44.00**
5	6	130	20.00	13.00	13.00	8.00	*17.04*	**36.96**
5	3	131	20.00	13.00	13.00	8.00	*10.02*	**43.98**
5	2	132	20.00	13.00	13.00	8.00	*6.94*	**47.06**
1	4	133	20.00	13.00	13.00	8.00	*8.22*	**45.78**
1	7	134	20.00	13.00	13.00	8.00	*8.80*	**45.20**
1	6	135	20.00	13.00	13.00	8.00	*6.56*	**47.44**
1	1	136	20.00	13.00	13.00	0.00	*4.28*	**41.72**
6	1	137	20.00	13.00	13.00	0.00	*4.28*	**41.72**
6	3	138	20.00	13.00	13.00	8.00	*14.06*	**39.94**
6	2	139	20.00	13.00	13.00	8.00	*12.38*	**41.62**
6	6	140	20.00	13.00	13.00	8.00	*10.00*	**44.00**
7	1	141	20.00	13.00	13.00	0.00	*7.04*	**38.96**
7	7	142	20.00	13.00	13.00	8.00	*4.92*	**49.08**
7	2	143	20.00	13.00	13.00	8.00	*8.76*	**45.24**
7	8	144	20.00	13.00	13.00	8.00	*2.54*	**51.46**
7	6	145	20.00	13.00	13.00	8.00	*11.92*	**42.08**
7	4	146	20.00	13.00	13.00	8.00	*7.00*	**47.00**

Table 15. Feed Added
CQR Study Number A(
Facility Number 7

Block	Trt	Pen No.	Grower/Finisher (Days 21 - 42)					
			Feed 3 19-Aug-15	Feed 4 26-Aug-15	Feed 5 31-Aug-15	Feed 6 3-Sep-15	WB 9-Sep-15	D 21 - 42 Consumed
7	5	147	20.00	13.00	13.00	8.00	*4.44*	**49.56**
7	3	148	20.00	13.00	13.00	8.00	*5.24*	**48.76**
8	2	149	20.00	13.00	13.00	8.00	*7.36*	**46.64**
8	5	150	20.00	13.00	13.00	8.00	*14.84*	**39.16**
8	7	151	20.00	13.00	13.00	8.00	*4.84*	**49.16**
8	8	152	20.00	13.00	13.00	8.00	*11.26*	**42.74**
8	6	153	20.00	13.00	13.00	8.00	*9.70*	**44.30**
8	1	154	20.00	13.00	13.00	0.00	*5.14*	**40.86**
8	3	155	20.00	13.00	13.00	8.00	*11.44*	**42.56**
8	4	156	20.00	13.00	13.00	8.00	*6.64*	**47.36**
9	5	159	20.00	13.00	13.00	8.00	*4.72*	**49.28**
9	3	160	20.00	13.00	13.00	8.00	*9.84*	**44.16**
9	4	161	20.00	13.00	13.00	8.00	*8.34*	**45.66**
9	1	162	20.00	13.00	13.00	0.00	*8.16*	**37.84**
9	2	163	20.00	13.00	13.00	8.00	*4.68*	**49.32**
9	6	164	20.00	13.00	13.00	8.00	*3.58*	**50.42**
9	8	165	20.00	13.00	13.00	8.00	*9.76*	**44.24**
9	7	166	20.00	13.00	13.00	8.00	*5.38*	**48.62**
10	3	167	20.00	13.00	13.00	8.00	*5.28*	**48.72**
10	6	168	20.00	13.00	13.00	8.00	*7.74*	**46.26**
10	1	169	20.00	13.00	13.00	0.00	*3.92*	**42.08**
10	5	170	20.00	13.00	13.00	8.00	*3.40*	**50.60**

Table 15. Feed Added
CQR Study Number A(
Facility Number 7

			Grower/Finisher (Days 21 - 42)					
Block	Trt	Pen No.	Feed 3 19-Aug-15	Feed 4 26-Aug-15	Feed 5 31-Aug-15	Feed 6 3-Sep-15	WB 9-Sep-15	D 21 - 42 Consumed
10	2	171	20.00	13.00	13.00	8.00	*8.42*	**45.58**
10	4	172	20.00	13.00	13.00	8.00	*5.76*	**48.24**
10	8	173	20.00	13.00	13.00	8.00	*2.86*	**51.14**
10	7	174	20.00	13.00	13.00	8.00	*3.44*	**50.56**
6	8	177	20.00	13.00	13.00	8.00	*11.56*	**42.44**
6	7	178	20.00	13.00	13.00	8.00	*9.14*	**44.86**
6	5	179	20.00	13.00	13.00	8.00	*9.80*	**44.20**
6	4	180	20.00	13.00	13.00	8.00	*8.62*	**45.38**
11	1	181	20.00	13.00	13.00	0.00	*11.24*	**34.76**
11	8	182	20.00	13.00	13.00	8.00	*6.62*	**47.38**
11	5	183	20.00	13.00	13.00	8.00	*9.54*	**44.46**
11	3	184	20.00	13.00	13.00	8.00	*19.18*	**34.82**
11	2	185	20.00	13.00	13.00	8.00	*6.66*	**47.34**
11	6	186	20.00	13.00	13.00	8.00	*5.56*	**48.44**
11	7	187	20.00	13.00	13.00	8.00	*13.74*	**40.26**
11	4	188	20.00	13.00	13.00	8.00	*7.10*	**46.90**
12	7	189	20.00	13.00	13.00	8.00	*7.08*	**46.92**
12	2	190	20.00	13.00	13.00	8.00	*12.32*	**41.68**
12	4	191	20.00	13.00	13.00	8.00	*11.08*	**42.92**
12	1	192	20.00	13.00	13.00	0.00	*13.24*	**32.76**
12	3	193	20.00	13.00	13.00	8.00	*12.12*	**41.88**
12	6	194	20.00	13.00	13.00	8.00	*11.62*	**42.38**
12	5	195	20.00	13.00	13.00	8.00	*9.38*	**44.62**
12	8	196	20.00	13.00	13.00	8.00	*17.44*	**36.56**

Table 16. Average % Ash Results of Tibias Collected on Study Days 21 and 42
Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Day 21				Day 42			
Block	**Trt**	**Pen No.**	**% Ash**	**Block**	**Trt**	**Pen No.**	**% Ash**
1	1	136	20.2	1	1	136	33.9
2	1	106	23.1	2	1	106	34.3
3	1	115	24.2	3	1	115	34.2
4	1	122	22.4	4	1	122	33.6
5	1	127	21.4	5	1	127	35.0
6	1	137	20.2	6	1	137	29.9
7	1	141	21.5	7	1	141	35.6
8	1	154	21.4	8	1	154	35.4
9	1	162	20.6	9	1	162	34.9
10	1	169	18.4	10	1	169	39.4
11	1	181	21.4	11	1	181	35.7
12	1	192	20.7	12	1	192	38.1
Average			**21.3**	**Average**			**35.0**
Standard Deviation			**1.5**	**Standard Deviation**			**2.4**
CV			**7.0%**	**CV**			**6.7%**
1	2	97	25.7	1	2	97	36.8
2	2	105	27.2	2	2	105	35.7
3	2	114	25.3	3	2	114	36.2
4	2	124	24.8	4	2	124	37.1
5	2	132	26.9	5	2	132	40.4
6	2	139	24.7	6	2	139	39.3
7	2	143	23.5	7	2	143	38.5
8	2	149	24.1	8	2	149	37.6
9	2	163	23.0	9	2	163	36.3
10	2	171	24.5	10	2	171	37.2
11	2	185	23.9	11	2	185	39.2
12	2	190	24.7	12	2	190	36.7
Average			**24.9**	**Average**			**37.6**
Standard Deviation			**1.3**	**Standard Deviation**			**1.5**
CV			**5.1%**	**CV**			**3.9%**
1	3	99	22.7	1	3	99	37.2
2	3	108	28.4	2	3	108	37.6
3	3	111	23.3	3	3	111	38.2
4	3	118	23.9	4	3	118	45.1
5	3	131	23.7	5	3	131	36.8
6	3	138	22.6	6	3	138	36.7
7	3	148	24.7	7	3	148	36.1
8	3	155	23.2	8	3	155	38.7
9	3	160	24.3	9	3	160	37.6
10	3	167	23.1	10	3	167	38.1
11	3	184	24.5	11	3	184	37.1
12	3	193	22.2	12	3	193	40.3
Average			**23.9**	**Average**			**38.3**
Standard Deviation			**1.6**	**Standard Deviation**			**2.4**
CV			**6.8%**	**CV**			**6.3%**

Table 16. Average % Ash Results of Tibias Collected on Study Days 21 and 42
Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Day 21				Day 42			
Block	Trt	Pen No.	% Ash	Block	Trt	Pen No.	% Ash
1	4	133	24.4	1	4	133	37.4
2	4	103	25.9	2	4	103	39.4
3	4	116	27.6	3	4	116	39.1
4	4	119	24.7	4	4	119	41.2
5	4	128	24.3	5	4	128	37.5
6	4	180	24.2	6	4	180	41.8
7	4	146	26.0	7	4	146	42.6
8	4	156	24.2	8	4	156	39.7
9	4	161	24.4	9	4	161	36.4
10	4	172	23.7	10	4	172	37.6
11	4	188	24.6	11	4	188	37.5
12	4	191	23.3	12	4	191	37.7
Average			**24.8**	**Average**			**39.0**
Standard Deviation			**1.2**	**Standard Deviation**			**2.0**
CV			**4.8%**	**CV**			**5.1%**
1	5	100	24.4	1	5	100	35.3
2	5	104	25.5	2	5	104	36.9
3	5	109	23.5	3	5	109	36.8
4	5	123	23.9	4	5	123	37.9
5	5	126	26.5	5	5	126	35.5
6	5	179	24.6	6	5	179	38.6
7	5	147	24.4	7	5	147	36.1
8	5	150	24.3	8	5	150	38.7
9	5	159	26.6	9	5	159	37.6
10	5	170	21.6	10	5	170	36.9
11	5	183	26.5	11	5	183	38.3
12	5	195	22.7	12	5	195	37.2
Average			**24.5**	**Average**			**37.1**
Standard Deviation			**1.6**	**Standard Deviation**			**1.1**
CV			**6.4%**	**CV**			**3.0%**
1	6	135	23.6	1	6	135	38.0
2	6	107	27.8	2	6	107	36.3
3	6	110	23.3	3	6	110	37.6
4	6	120	25.0	4	6	120	44.9
5	6	130	24.2	5	6	130	37.6
6	6	140	24.4	6	6	140	35.3
7	6	145	24.2	7	6	145	40.6
8	6	153	22.9	8	6	153	40.0
9	6	164	25.9	9	6	164	39.7
10	6	168	25.8	10	6	168	38.3
11	6	186	25.9	11	6	186	42.3
12	6	194	25.3	12	6	194	40.1
Average			**24.9**	**Average**			**39.2**
Standard Deviation			**1.4**	**Standard Deviation**			**2.6**
CV			**5.5%**	**CV**			**6.7%**

Table 16. Average % Ash Results of Tibias Collected on Study Days 21 and 42
Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Day 21				Day 42			
Block	**Trt**	**Pen No.**	**% Ash**	**Block**	**Trt**	**Pen No.**	**% Ash**
1	7	134	24.1	1	7	134	38.5
2	7	101	25.3	2	7	101	37.6
3	7	112	24.7	3	7	112	36.9
4	7	121	25.2	4	7	121	43.1
5	7	125	26.3	5	7	125	38.3
6	7	178	24.2	6	7	178	38.7
7	7	142	26.2	7	7	142	40.3
8	7	151	24.3	8	7	151	41.4
9	7	166	24.9	9	7	166	38.7
10	7	174	28.7	10	7	174	38.4
11	7	187	24.5	11	7	187	36.9
12	7	189	26.6	12	7	189	40.6
Average			**25.4**	**Average**			**39.1**
Standard Deviation			**1.3**	**Standard Deviation**			**1.9**
CV			**5.3%**	**CV**			**4.8%**

1	8	98	22.3	1	8	98	38.5
2	8	102	27.6	2	8	102	38.1
3	8	113	25.5	3	8	113	37.3
4	8	117	25.6	4	8	117	43.3
5	8	129	26.7	5	8	129	37.4
6	8	177	25.5	6	8	177	38.4
7	8	144	25.5	7	8	144	40.9
8	8	152	30.6	8	8	152	36.2
9	8	165	24.9	9	8	165	38.9
10	8	173	23.5	10	8	173	40.8
11	8	182	25.6	11	8	182	40.3
12	8	196	23.6	12	8	196	37.9
Average			**25.6**	**Average**			**39.0**
Standard Deviation			**2.1**	**Standard Deviation**			**2.0**
CV			**8.4%**	**CV**			**5.1%**

Graph 6. Average % Ash of Day 21 and Day 42 Tibias Summarized by Treatment Group
CQR Study Number AGV-15-4
Facility Number 7

Trt Group	D21 % Ash	D42 % Ash	Treatment Description
1	21.299	34.991	Low Phosphate (LP)
2	24.869	37.587	High Phosphate (HP)
3	23.895	38.292	250 Units Phytase (LP)
4	24.757	38.981	500 Units Phytase (LP)
5	24.542	37.146	750 Units Phytase (LP)
6	24.856	39.229	1,000 Units Phytase (LP)
7	25.409	39.116	3,000 Units Phytase (LP)
8	25.578	38.997	30,000 Units Phytase (LP)

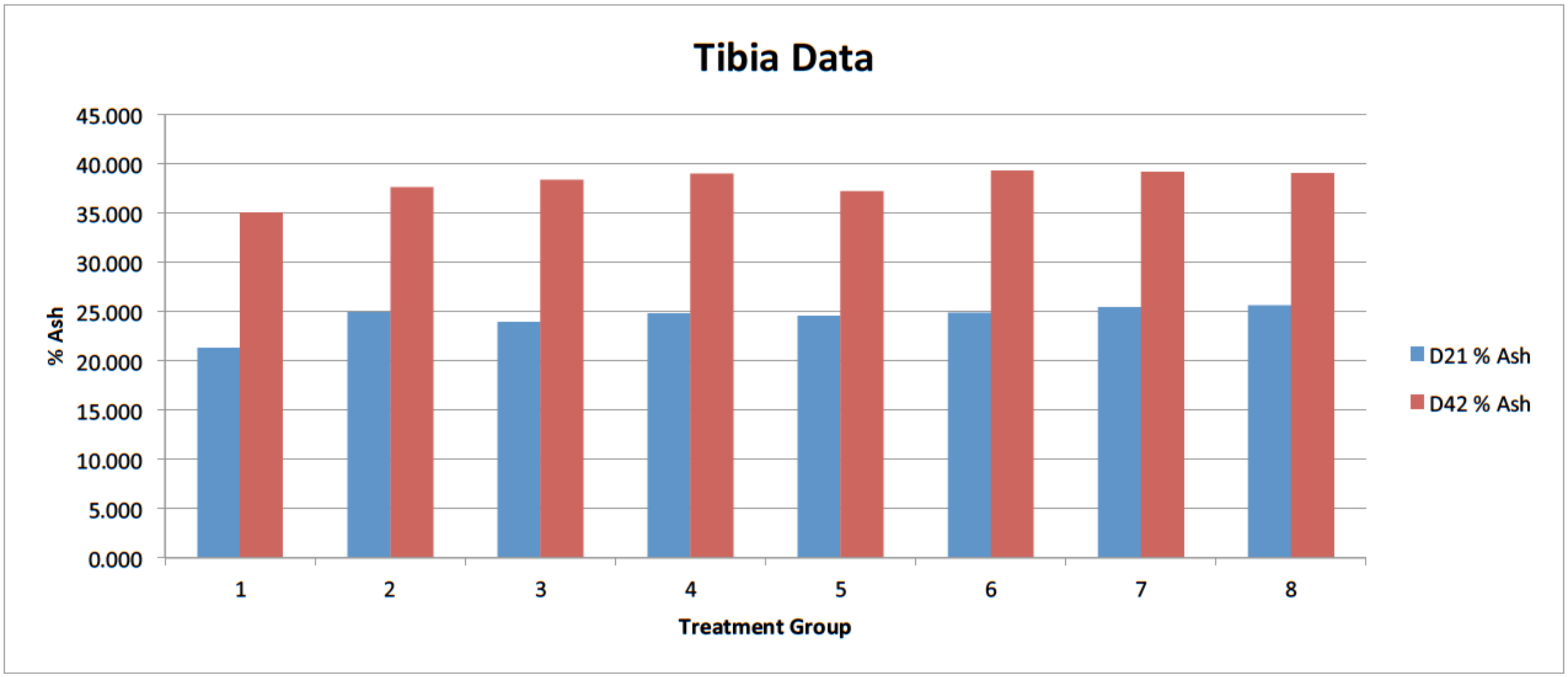


Table 22. Original Hematology Results from Marshfield Labs Summarized by Trt Group

CQR Study Number AGV-15-4

Facility Number 7

Pen	Animal ID	Trt Group	Bird Selection	HGB	HCT	RBC	MCV	MCH	MCHC	RDW	WBC	TE	BHET	HET	LYMPH	ACTLYM
				g/dL	%	x10^6/uL	fL	pg	g/dL	%	x10^3/uL		%	%	%	%
			Reference Interval >>>>	9.8-12.1	25.9-32.6	2.42-2.99	100.3-115.7	38.2-43.0	36.3-38.9	8.0-10.2	5.5-24.2	20-80				
98	1495	8	1	13.3	37.1	3.07	120.8	43.3	35.8	9.7	16.8	*		29	55	0
98	1488	8	2	12.2	33.3	2.71	122.9	45	36.6	8.6	14.4	*		25	62	0
98	1491	8	3	13.6	36.2	3.02	119.9	45	37.6	10.4	8.4	*		35	58	0
102	1522	8	1	11.8	32.6	2.79	116.8	42.3	36.2	8.9	6.3	*		34	47	0
102	1525	8	2	12.1	33.3	2.73	122	44.3	36.3	9	4.6	*		33	58	0
102	1521	8	3	11.9	32.9	2.83	116.3	42	36.2	9.3	15.6	*		32	61	0
113	6223	8	1	12.5	35.5	2.92	121.6	42.8	35.2	8.8	13.3	*		41	46	0
113	6231	8	2	11.9	34.2	2.72	125.7	43.8	34.8	9	18.9	*		28	65	0
113	6227	8	3	13.5	36.1	2.98	121.1	45.3	37.4	9.5	10.6	*		29	54	0
117	6263	8	1	13.1	36.4	2.94	123.8	44.6	36	9.4	14.4	*		43	41	0
117	6255	8	2	12.2	34.6	2.97	116.5	41.1	35.3	9.1	8.9	*		60	26	0
117	6265	8	3	12.8	34.9	2.92	119.5	43.8	36.7	9.3	11.4	*		19	69	0
129	6360	8	Alt-1	11.8	33.3	2.74	121.5	43.1	35.4	9.2	15.5	*		33	62	0
129	6358	8	2	14.1	38.9	3.28	118.6	43	36.2	9	10.3	*		23	71	0
129	6363	8	3	12.1	34.2	2.89	118.3	41.9	35.4	8.9	9.2	*		41	65	0
144	1876	8	1	13	36.1	3.03	119.1	42.9	36	9.3	8.5	*		47	41	0
144	1886	8	2	11.9	33.5	2.78	120.5	42.8	35.5	8.9	*	*		14	65	0
144	1873	8	3	*	*	*	*	*	*	*	*	*		37	53	0
152	1941	8	1	13.7	38.7	3.24	119.4	42.3	35.4	8.4	39.3	*		34	56	0
152	1952	8	2	13.8	38.3	3.19	120.1	43.3	36	9.5	22.8	*		31	57	0
152	1954	8	3	10.6	29.7	2.54	116.9	41.7	35.7	8.7	9.4	*		23	72	0
165	6649	8	1	13.1	35.2	2.96	118.9	44.3	37.2	9	17.9	*		32	58	0
165	6659	8	Alt-2	12.1	33.6	2.77	121.3	43.7	36	8.8	17.5	*		31	63	0
165	6660	8	3	12.7	34.2	2.76	123.9	46	37.1	8.9	21.6	*		17	66	0
173	6720	8	1	13	37.1	3.14	118.2	41.4	35	9.1	15.9	*		22	64	0
173	6724	8	2	11.6	32.3	2.69	120.1	43.1	35.9	9.5	10.1	*		26	66	0
173	6726	8	3	13.1	36.6	2.94	124.5	44.6	35.8	8.9	9.3	*		38	59	0
177	6732	8	1	13.4	38	3.16	120.3	42.4	35.3	8.7	19.5	*		28	64	0
177	6731	8	2	12.8	35.7	2.88	124	44.4	35.9	9.2	15.3	*		36	60	0
177	6733	8	3	12.8	35.1	2.72	129	47.1	36.5	9.9	20	*		36	48	0
182	2162	8	1	13.6	38	3.07	123.8	44.3	35.8	9.5	12	*		34	61	0
182	2172	8	2	12.3	35.3	2.92	120.9	42.1	34.8	9.4	11.4	*		31	63	0
182	2167	8	3	12.4	34.8	2.87	121.3	43.2	35.6	9.3	7	*		53	35	0
196	2282	8	1	13.9	38.2	3.12	122.4	44.6	36.4	8.7	14.7	*		22	68	0
196	2296	8	2	12.8	35	2.91	120.3	44	36.6	9.3	12.8	*		28	68	0
196	2292	8	3	12	33	2.63	125.5	45.6	36.4	8.8	*	*		14	86	0
			Averages (where calculable):	12.7	35.2	2.91	121.0	43.6	36.0	9.1	14.0	NA	NA	32	59	0
			Std Dev (where calculable):	0.8	2.1	0.18	2.8	1.4	0.7	0.4	6.4	NA	NA	10	11	0
			CV (where calculable):	6.2%	6.0%	6.17%	2.3%	3.2%	1.9%	4.4%	45.8%	NA	NA	31%	19%	NA

				HGB	HCT	RBC	MCV	MCH	MCHC	RDW	WBC	TE	BHET	HET	LYMPH	ACTLYM
		Reference Interval >>>>		g/dL	%	x10^6/uL	fL	pg	g/dL	%	x10^3/uL		%	%	%	%
Pen	Animal ID	Trt Group	Bird Selection	9.8-12.1	25.9-32.6	2.42-2.99	100.3-115.7	38.2-43.0	36.3-38.9	8.0-10.2	5.5-24.2	20-80				
97	6100	2	1	12.7	36.6	3.05	120	41.6	34.7	9	22.5	*		23	66	0
97	6087	2	2	11.5	31.8	2.64	120.5	43.6	36.2	8.9	13.6	*		21	65	0
97	6086	2	3	13.5	36.6	2.85	128.4	47.4	36.9	9.2	*	*		13	66	3
105	6157	2	1	14.7	40.5	3.21	126.2	45.8	36.3	12.7	17.7	*		34	57	0
105	6154	2	2	13.8	37.6	3	125.3	46	36.7	10.6	17.2	*		16	73	0
105	6160	2	3	11.9	33.6	2.86	117.5	41.6	35.4	9.2	14.8	*		26	59	0
114	1620	2	1	12.3	33.8	2.65	127.5	46.4	36.4	9.1	10.4	*		37	54	0
114	1621	2	2	11.5	33	2.76	119.6	41.7	34.8	9.7	19	*		43	49	0
114	1618	2	3	12.8	34	2.96	114.9	43.2	37.6	9.8	12.2	*		28	59	0
124	1713	2	1	12	33.2	2.73	121.6	44	36.1	9.4	10.8	*		38	57	0
124	1716	2	2	12.2	34.5	2.87	120.2	42.5	35.4	9.8	14	*		22	3	0
124	1708	2	3	11.8	32.6	2.72	119.9	43.4	36.2	8.9	14.7	*		30	60	0
132	1784	2	1	11.1	31.4	2.49	126.1	44.6	35.4	9.1	20	*		18	68	0
132	1773	2	2	11.1	31.1	2.62	118.7	42.4	35.7	9	7.5	*		72	20	0
132	1781	2	3	12.7	34.8	2.85	122.1	44.6	36.5	8.7	15.7	*		36	53	0
139	6454	2	Alt-1	12.9	36.9	3.07	120.2	42	35	9.3	13.4	*		30	54	0
139	6458	2	2	13.2	36.1	3.07	117.6	43	36.6	9.4	10.4	*		35	45	0
139	6447	2	3	11.1	31.3	2.55	122.7	43.5	35.5	9.6	*	*		12	79	0
143	6476	2	1	13.7	38.8	3.02	128.5	45.4	35.3	11.1	9	*		74	24	0
143	6482	2	2	12.4	34.1	2.93	116.4	42.3	36.4	10.3	6	*		20	62	2
143	6483	2	3	12.7	35.2	2.93	120.1	43.3	36.1	10.8	11.4	*		31	53	0
149	6528	2	1	12.9	35.8	2.93	122.2	44	36	9.9	14.4	*		23	63	0
149	6542	2	2	13	35.5	2.87	123.7	45.3	36.6	8.9	10.4	*		40	46	0
149	6534	2	3	12.9	35.6	3	118.7	43	36.2	9	11.6	*		40	53	0
163	6635	2	1	13.1	36.1	3.08	117.2	42.5	36.3	9.1	7.7	*		37	53	0
163	6637	2	2	12.7	35.1	2.85	123.2	44.6	36.2	8.3	17.9	*		24	64	0
163	6643	2	3	12.6	35.6	2.9	122.8	43.4	35.4	9.3	4.9	*		42	47	0
171	6708	2	1	12	33.6	2.89	116.3	41.5	35.7	9.1	12.6	*		33	64	0
171	6700	2	2	12.6	34.7	2.85	121.8	44.2	36.3	9.2	11.6	*		54	44	0
171	6701	2	3	12.8	35.5	2.86	124.1	44.8	36.1	8.6	33.6	*		29	65	0
185	6807	2	1	11	31.5	2.6	121.2	42.3	34.9	9.7	16.1	*		26	64	0
185	6799	2	2	13.5	37	3.02	122.5	44.7	36.5	8.4	6	*		68	21	0
185	6806	2	3	11.4	32.7	2.71	120.7	42.1	34.9	8.4	33.2	*		24	64	0
190	2245	2	1	12.1	34.6	2.81	123.1	43.1	35	9.5	13.6	*		30	56	0
190	2234	2	2	11.3	32.6	2.61	124.9	43.3	34.7	8.6	10	*		28	50	0
190	2242	2	3	12.8	35.9	3.03	118.5	42.2	35.7	8.9	8.3	*		56	34	0
	Averages (where calculable):			**12.5**	**34.7**	**2.86**	**121.5**	**43.6**	**35.9**	**9.4**	**13.9**	**NA**	**NA**	**34**	**53**	**0**
	Std Dev (where calculable):			**0.9**	**2.2**	**0.17**	**3.4**	**1.5**	**0.7**	**0.9**	**6.4**	**NA**	**NA**	**15**	**16**	**1**
	CV (where calculable):			**7.0%**	**6.2%**	**6.00%**	**2.8%**	**3.4%**	**1.9%**	**9.1%**	**46.4%**	**NA**	**NA**	**45%**	**30%**	**427%**

Table 22. Original Hematology Results from Marshfield Labs

CQR Study Number AGV-15-4

Facility Number 7

				MONO	EOS	BASO	MORPH	ABBHET	ABHET	ABLYMP
		Reference Interval >>>>		%	%	%		x10^3/uL	x10^3/uL	x10^3/uL
Pen	Animal ID	Trt Group	Bird Selection						2.99-10.10	0.21-14.17
98	1495	8	1	3	12	1	*	0	4.87	9.24
98	1488	8	2	4	7	2		0	3.6	8.93
98	1491	8	3	3	3	1	*	0	2.94	4.87
102	1522	8	1	5	12	2	*	0	2.14	2.96
102	1525	8	2	3	3	3		0	1.52	2.67
102	1521	8	3	2	1	4	*	0	4.99	9.52
113	6223	8	1	5	7	1	*	0	5.45	6.12
113	6231	8	2	3	1	3	*	0	5.29	12.29
113	6227	8	3	4	10	3		0	3.07	5.72
117	6263	8	1	4	3	9	*	0	6.19	5.9
117	6255	8	2	9	2	3	*	0	5.34	2.31
117	6265	8	3	7	2	3	*	0	2.17	7.87
129	6360	8	Alt-1	3	0	2	*	0	5.12	9.61
129	6358	8	2	3	0	3	*	0	2.37	7.31
129	6363	8	3	1	0	3		0	3.77	5.98
144	1876	8	1	6	2	4	*	0	4	3.49
144	1886	8	2	10	4	7		0	0	0
144	1873	8	3	1	6	3	*	0	0	0
152	1941	8	1	0	0	10	*	0	13.36	22.01
152	1952	8	2	9	2	1	*	0	7.07	13
152	1954	8	3	2	2	1		0	2.16	6.77
165	6649	8	1	0	8	2	*	0	5.73	10.38
165	6659	8	Alt-2	3	0	3	*	0	5.43	11.03
165	6660	8	3	5	8	4	*	0	3.67	14.26
173	6720	8	1	2	10	2	*	0	3.5	10.18
173	6724	8	2	2	0	6	*	0	2.63	6.67
173	6726	8	3	2	0	1	*	0	3.53	5.49
177	6732	8	1	0	4	4	*	0	5.46	12.48
177	6731	8	2	0	2	2	*	0	5.51	9.18
177	6733	8	3	10	0	6	*	0	7.2	9.6
182	2162	8	1	2	0	3	*	0	4.08	7.32
182	2172	8	2	6	0	0		0	3.53	7.18
182	2167	8	3	7	1	4	*	0	3.71	2.45
196	2282	8	1	4	6	0	*	0	3.23	10
196	2296	8	2	0	0	4	*	0	3.58	8.7
196	2292	8	3	0	0	0	*	0	0	0
			Averages (where calculable):	**4**	**3**	**3**	**NA**	**0**	**4.06**	**7.54**
			Std Dev (where calculable):	**3**	**4**	**2**	**NA**	**0**	**2.41**	**4.45**
			CV (where calculable):	**80%**	**114%**	**75%**	**NA**	**NA**	**59.25%**	**59.06%**

Pen	Animal ID	Trt Group	Bird Selection	MONO	EOS	BASO	MORPH	ABBHET	ABHET	ABLYMP
				%	%	%		x10^3/uL	x10^3/uL	x10^3/uL
			Reference Interval >>>>						2.99-10.10	0.21-14.17
97	6100	2	1	1	4	6	*	0	5.18	14.85
97	6087	2	2	6	5	3	*	0	2.86	8.84
97	6086	2	3	12	4	2	*	0	0	0
105	6157	2	1	1	4	4	*	0	6.02	10.09
105	6154	2	2	6	4	1	*	0	2.75	12.56
105	6160	2	3	5	7	3		0	3.85	8.73
114	1620	2	1	4	3	2	*	0	3.85	5.62
114	1621	2	2	4	3	1	*	0	8.17	9.31
114	1618	2	3	3	5	5	*	0	3.42	7.2
124	1713	2	1	2	1	2		0	4.1	6.16
124	1716	2	2	5	10	2		0	3.08	0.42
124	1708	2	3	2	6	2	*	0	4.41	8.82
132	1784	2	1	5	8	1	*	0	3.6	13.6
132	1773	2	2	1	5	2	*	0	5.4	1.5
132	1781	2	3	6	3	2	*	0	5.65	8.32
139	6454	2	Alt-1	5	5	6	*	0	4.02	7.24
139	6458	2	2	8	8	4	*	0	3.64	4.68
139	6447	2	3	3	1	5		0	0	0
143	6476	2	1	0	2	0	*	0	6.66	2.16
143	6482	2	2	7	6	3	*	0	1.2	3.72
143	6483	2	3	11	1	4		0	3.53	6.04
149	6528	2	1	3	7	4	*	0	3.31	9.07
149	6542	2	2	8	6	0	*	0	4.16	4.78
149	6534	2	3	0	5	2	*	0	4.64	6.15
163	6635	2	1	3	5	2	*	0	2.85	4.08
163	6637	2	2	3	5	4	*	0	4.3	11.46
163	6643	2	3	1	5	5	*	0	2.06	2.3
171	6708	2	1	2	0	1	*	0	4.16	8.06
171	6700	2	2	2	0	0	*	0	6.26	5.1
171	6701	2	3	5	1	0	*	0	9.74	21.84
185	6807	2	1	4	4	2	*	0	4.19	10.3
185	6799	2	2	1	9	1		0	4.08	1.26
185	6806	2	3	2	6	4	*	0	7.97	21.25
190	2245	2	1	2	8	4	*	0	4.08	7.62
190	2234	2	2	4	14	4	*	0	2.8	5
190	2242	2	3	0	8	2	*	0	4.65	2.82
Averages (where calculable):				**4**	**5**	**3**	**NA**	**0**	**4.18**	**7.25**
Std Dev (where calculable):				**3**	**3**	**2**	**NA**	**0**	**2.00**	**5.15**
CV (where calculable):				**76%**	**60%**	**64%**	**NA**	**NA**	**47.77%**	**71.08%**

Table 22. Original Hematology Results from Marshfield Labs

CQR Study Number AGV-15-4

Facility Number 7

Pen	Animal ID	Trt Group	Bird Selection	ABACTL	ABMONO	ABEOS	ABBASO	TP	ALB	GLOBU	A/G	CK	ALT	PHOS	GLU
				x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	g/dL	g/dL	g/dL		U/L	U/L	mg/dL	mg/dL
			Reference Interval >>>>	0.00-0.18	0.00-2.03	0.00-1.42	0.03-1.73	2.8-3.4	NA	NA	NA	1003-2318	<5	6.7-8.6	202-262
98	1495	8	1	0	0.5	2.02	0.17	3.1	1.1	2	0.6	>22500	<5	7	259
98	1488	8	2	0	0.58	1.01	0.29	2.5	<1.0	1.7	0.5	>22500	<5	6.7	314
98	1491	8	3	0	0.25	0.25	0.08	2.9	1	1.9	0.5	>22500	<5	5.6	259
102	1522	8	1	0	0.32	0.76	0.13	2.8	<1.0	1.9	0.5	>22500	<5	6.4	267
102	1525	8	2	0	0.14	0.14	0.14	2.6	<1.0	1.7	0.5	>22500	<5	5.8	259
102	1521	8	3	0	0.31	0.16	0.62	2.6	<1.0	1.7	0.5	>22500	<5	6.1	263
113	6223	8	1	0	0.67	0.93	0.13	2.9	1	1.9	0.5	>22500	<5	6.4	253
113	6231	8	2	0	0.57	0.19	0.57	2.6	1	1.6	0.6	18422	<5	6.6	262
113	6227	8	3	0	0.42	1.06	0.32	2.8	1	1.8	0.6	>22500	<5	6.8	273
117	6263	8	1	0	0.58	0.43	1.3	2.7	1	1.7	0.6	>22500	<5	6.1	293
117	6255	8	2	0	0.8	0.18	0.27	2.8	1	1.8	0.6	>22500	<5	6.2	262
117	6265	8	3	0	0.8	0.23	0.34	2.8	1	1.8	0.6	>22500	<5	6	268
129	6360	8	Alt-1	0	0.47	0	0.31	2.5	<1.0	1.7	0.5	20494	<5	6.9	272
129	6358	8	2	0	0.31	0	0.31	3.4	1.2	2.2	0.5	15913	<5	7.6	259
129	6363	8	3	0	0.09	0	0.28	2.7	<1.0	1.8	0.5	>22500	<5	6	269
144	1876	8	1	0	0.51	0.17	0.34	3	1	2	0.5	>22500	<5	6.2	241
144	1886	8	2	0	0	0	0	3.3	1.1	2.2	0.5	16067	<5	6.1	245
144	1873	8	3	0	0	0	0	2.9	1	1.9	0.5	>22500	<5	6.5	241
152	1941	8	1	0	0	0	3.93	3.5	1.3	2.2	0.6	13241	<5	6.7	244
152	1952	8	2	0	2.05	0.46	0.23	3.4	1.2	2.2	0.5	11734	<5	5.8	238
152	1954	8	3	0	0.19	0.19	0.09	2.6	<1.0	1.8	0.4	16803	<5	6.2	253
165	6649	8	1	0	0	1.43	0.36	2.8	1	1.8	0.6	>22500	<5	6.6	249
165	6659	8	Alt-2	0	0.53	0	0.53	3.7	1.1	2.6	0.4	>22500	<5	5.7	273
165	6660	8	3	0	1.08	1.73	0.86	3	1.2	1.8	0.7	12615	<5	7.1	252
173	6720	8	1	0	0.32	1.59	0.32	2.6	<1.0	1.7	0.5	>22500	<5	7	262
173	6724	8	2	0	0.2	0	0.61	2.6	<1.0	1.7	0.5	>22500	<5	6.1	235
173	6726	8	3	0	0.19	0	0.09	3	1.1	1.9	0.6	20790	<5	5.1	252
177	6732	8	1	0	0	0.78	0.78	2.8	1	1.8	0.6	>22500	<5	6.9	232
177	6731	8	2	0	0	0.31	0.31	3	1.1	1.9	0.6	>22500	<5	6.2	259
177	6733	8	3	0	2	0	1.2	2.8	1	1.8	0.6	15711	<5	6.4	246
182	2162	8	1	0	0.24	0	0.36	2.7	1	1.7	0.6	>22500	<5	7.2	249
182	2172	8	2	0	0.68	0	0	2.3	<1.0	1.5	0.5	18543	<5	6.5	247
182	2167	8	3	0	0.49	0.07	0.28	2.5	<1.0	1.6	0.6	11270	<5	6.4	251
196	2282	8	1	0	0.59	0.88	0	2.9	1	1.9	0.5	>22500	<5	6.3	242
196	2296	8	2	0	0	0	0.51	2.8	<1.0	1.9	0.5	>22500	<5	6.4	239
196	2292	8	3	0	0	0	0	2.7	1	1.7	0.6	>22500	<5	5.9	229
			Averages (where calculable):	0	0.44	0.42	0.45	2.9	NA	1.9	0.5	NA	<5	6.4	256
			Std Dev (where calculable):	0	0.48	0.57	0.67	0.3	NA	0.2	0.1	NA	NA	0.5	17
			CV (where calculable):	NA	108.29%	135.93%	150.78%	10.7%	NA	11.5%	12.0%	NA	NA	7.9%	7%

				ABACTL	ABMONO	ABEOS	ABBASO	TP	ALB	GLOBU	A/G	CK	ALT	PHOS	GLU
		Reference Interval >>>>		x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	g/dL	g/dL	g/dL		U/L	U/L	mg/dL	mg/dL
Pen	Animal ID	Trt Group	Bird Selection	0.00-0.18	0.00-2.03	0.00-1.42	0.03-1.73	2.8-3.4	NA	NA	NA	1003-2318	<5	6.7-8.6	202-262
97	6100	2	1	0	0.23	0.9	1.35	3	1.1	1.9	0.6	>22500	<5	6.9	228
97	6087	2	2	0	0.82	0.68	0.41	2.8	<1.0	1.9	0.5	>22500	<5	6.9	273
97	6086	2	3	0	0	0	0	3	1.1	1.9	0.6	>22500	<5	6.2	261
105	6157	2	1	0	0.18	0.71	0.71	2.9	1	1.9	0.5	15670	<5	7.8	260
105	6154	2	2	0	1.03	0.69	0.17	3.1	1.1	2	0.6	>22500	<5	6.8	261
105	6160	2	3	0	0.74	1.04	0.44	2.7	1	1.7	0.6	>22500	<5	6	337
114	1620	2	1	0	0.42	0.31	0.21	2.6	<1.0	NC	NC	22052	<5	6.1	235
114	1621	2	2	0	0.76	0.57	0.19	2.9	1	1.9	0.5	>22500	<5	6.9	280
114	1618	2	3	0	0.37	0.61	0.61	3	1	2	0.5	>22500	<5	7.2	259
124	1713	2	1	0	0.22	0.11	0.22	2.8	1	1.8	0.6	>22500	<5	6.7	265
124	1716	2	2	0	0.7	1.4	0.28	2.9	1.1	1.8	0.6	>22500	<5	6.6	251
124	1708	2	3	0	0.29	0.88	0.29	2.8	<1.0	1.9	0.5	>22500	<5	5.9	268
132	1784	2	1	0	1	1.6	0.2	2.7	1	1.7	0.6	>22500	<5	5.9	246
132	1773	2	2	0	0.08	0.38	0.15	2.3	<1.0	1.6	0.4	>22500	<5	6.1	253
132	1781	2	3	0	0.94	0.47	0.31	2.7	1	1.7	0.6	>22500	<5	5.9	259
139	6454	2	Alt-1	0	0.67	0.67	0.8	2.9	1	1.9	0.5	20061	<5	8.6	237
139	6458	2	2	0	0.83	0.83	0.42	3.1	1.1	2	0.6	>22500	<5	7.4	241
139	6447	2	3	0	0	0	0	2.8	<1.0	1.9	0.5	>22500	<5	7.4	262
143	6476	2	1	0	0	0.18	0	3	1.1	1.9	0.6	>22500	<5	7.4	250
143	6482	2	2	0.12	0.42	0.36	0.18	2.8	1	1.8	0.6	17351	<5	7.9	262
143	6483	2	3	0	1.25	0.11	0.46	2.6	<1.0	1.7	0.5	>22500	<5	6.5	246
149	6528	2	1	0	0.43	1.01	0.58	3	1	2	0.5	>22500	<5	7.7	265
149	6542	2	2	0	0.83	0.62	0	2.9	1	1.9	0.5	>22500	<5	7.1	237
149	6534	2	3	0	0	0.58	0.23	2.8	1	1.8	0.6	>22500	<5	6.7	252
163	6635	2	1	0	0.23	0.39	0.15	2.9	1	1.9	0.5	>22500	<5	8.3	263
163	6637	2	2	0	0.54	0.9	0.72	2.9	1.1	1.8	0.6	21127	<5	5.6	237
163	6643	2	3	0	0.05	0.25	0.25	2.7	1	1.7	0.6	>22500	<5	7.3	259
171	6708	2	1	0	0.25	0	0.13	2.4	<1.0	1.5	0.6	>22500	<5	6.6	268
171	6700	2	2	0	0.23	0	0	2.8	<1.0	1.9	0.5	>22500	<5	7.2	265
171	6701	2	3	0	1.68	0.34	0	2.8	1	1.8	0.6	>22500	<5	5.8	253
185	6807	2	1	0	0.64	0.64	0.32	2.5	<1.0	1.6	0.6	21689	<5	6.5	263
185	6799	2	2	0	0.06	0.54	0.06	2.8	1.1	1.7	0.6	>22500	<5	6.9	264
185	6806	2	3	0	0.66	1.99	1.33	2.7	1	1.7	0.6	>22500	<5	7	233
190	2245	2	1	0	0.27	1.09	0.54	3	1.1	1.9	0.6	>22500	<5	6.3	242
190	2234	2	2	0	0.4	1.4	0.4	2.9	1	1.9	0.5	>22500	<5	6.2	243
190	2242	2	3	0	0	0.66	0.17	2.6	1	1.6	0.6	>22500	<5	6.2	223
	Averages (where calculable):			**0**	**0.48**	**0.64**	**0.34**	**2.8**	**NA**	**1.8**	**0.6**	**NA**	**<5**	**6.8**	**256**
	Std Dev (where calculable):			**0**	**0.40**	**0.47**	**0.33**	**0.2**	**NA**	**0.1**	**0.1**	**NA**	**NA**	**0.7**	**19**
	CV (where calculable):			**NA**	**83.99%**	**73.50%**	**96.29%**	**6.5%**	**NA**	**7.1%**	**10.0%**	**NA**	**NA**	**10.7%**	**8%**

Table 22. Original Hematology Results from Marshfield Labs

CQR Study Number AGV-15-4

Facility Number 7

Pen	Animal ID	Trt Group	Bird Selection	Chemistry Comments
			Reference Interval >>>>	
98	1495	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
98	1488	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
98	1491	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
102	1522	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
102	1525	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
102	1521	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
113	6223	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
113	6231	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
113	6227	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
117	6263	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
117	6255	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
117	6265	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
129	6360	8	Alt-1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
129	6358	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
129	6363	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
144	1876	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
144	1886	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
144	1873	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
152	1941	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
152	1952	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
152	1954	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
165	6649	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
165	6659	8	Alt-2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
165	6660	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
173	6720	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
173	6724	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
173	6726	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
177	6732	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
177	6731	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
177	6733	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
182	2162	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
182	2172	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
182	2167	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
196	2282	8	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
196	2296	8	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
196	2292	8	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
			Averages (where calculable):	NA
			Std Dev (where calculable):	NA
			CV (where calculable):	NA

			Reference Interval >>>>	Chemistry Comments
Pen	Animal ID	Trt Group	Bird Selection	
97	6100	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
97	6087	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
97	6086	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
105	6157	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
105	6154	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
105	6160	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
114	1620	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
114	1621	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
114	1618	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
124	1713	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
124	1716	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
124	1708	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
132	1784	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
132	1773	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
132	1781	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
139	6454	2	Alt-1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
139	6458	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
139	6447	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
143	6476	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
143	6482	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
143	6483	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
149	6528	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
149	6542	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
149	6534	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
163	6635	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
163	6637	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
163	6643	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
171	6708	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
171	6700	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
171	6701	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
185	6807	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
185	6799	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
185	6806	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
190	2245	2	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
190	2234	2	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
190	2242	2	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of
	Averages (where calculable):			**NA**
	Std Dev (where calculable):			**NA**
	CV (where calculable):			**NA**

Table 22. Original Hematology Results from Marshfield Lab:

CQR Study Number AGV-15-4

Facility Number 7

			Reference Interval >>>>	Hematology Comments
Pen	**Animal ID**	**Trt Group**	**Bird Selection**	
98	1495	8	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
98	1488	8	2	TE: Thrombocyte estimate from smear appears to be 20,000-40,000. VDIFA2: No blood parasites seen.
98	1491	8	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen.
102	1522	8	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
102	1525	8	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
102	1521	8	3	TE: Thrombocyte estimate from smear appears to be 20,000-40,000. MORPH: No blood parasites seen.
113	6223	8	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
113	6231	8	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
113	6227	8	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. VDIFA2: No blood parasites seen.
117	6263	8	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
117	6255	8	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
117	6265	8	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
129	6360	8	Alt-1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
129	6358	8	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
129	6363	8	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000.VDIFA2: No blood parasites seen.
144	1876	8	1	TE: Thrombocyte estimate from smear appears to be 20,000-40,000. MORPH: No blood parasites seen.
144	1886	8	2	WBC: Unable to quantitate WBC due to high percentage of Lymphocytes and/or Monocytes in the differential. WBC estimate from smear appears to be 10-14,000. TE: Thrombocyte estimate from smear appears to be 80,000-100,000. VDIFA2: No blood parasi
144	1873	8	3	VCLTA2: *Specimen rejected, clotted VDIFA2: WBC estimate from smear appears to be 7-10,000. TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen.
152	1941	8	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
152	1952	8	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
152	1954	8	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. VDIFA2: No blood parasites seen.
165	6649	8	1	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen.
165	6659	8	Alt-2	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen.
165	6660	8	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
173	6720	8	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
173	6724	8	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen.
173	6726	8	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen.
177	6732	8	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
177	6731	8	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
177	6733	8	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
182	2162	8	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
182	2172	8	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. VDIFA2: No blood parasites seen.
182	2167	8	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
196	2282	8	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
196	2296	8	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
196	2292	8	3	WBC: Unable to quantitate WBC due to high percentage of Lymphocytes and/or Monocytes in the differential. WBC estimate from smear appears to be 7-10,000. TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasite
			Averages (where calculable):	**NA**
			Std Dev (where calculable):	**NA**
			CV (where calculable):	**NA**

			Reference Interval >>>>	Hematology Comments
Pen	Animal ID	Trt Group	Bird Selection	
97	6100	2	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
97	6087	2	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
97	6086	2	3	WBC: Unable to quantitate WBC due to high percentage of Lymphocytes and/or Monocytes in the differential. WBC estimate from smear appears to be 10-14,000. TE: Thrombocyte esti
105	6157	2	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
105	6154	2	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen.
105	6160	2	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. VDIFA2: No blood parasites seen.
114	1620	2	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
114	1621	2	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
114	1618	2	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
124	1713	2	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. VDIFA2: No blood parasites seen.
124	1716	2	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. VDIFA2: No blood parasites seen.
124	1708	2	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
132	1784	2	1	TE: Thrombocyte estimate from smear appears to be 20,000-40,000. MORPH: No blood parasites seen.
132	1773	2	2	TE: Thrombocyte estimate from smear appears to be 20,000-40,000. MORPH: No blood parasites seen.
132	1781	2	3	TE: Thrombocyte estimate from smear appears to be 20,000-40,000. MORPH: No blood parasites seen.
139	6454	2	Alt-1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
139	6458	2	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
139	6447	2	3	WBC: Unable to quantitate WBC due to high percentage of Lymphocytes and/or Monocytes in the differential. WBC estimate from slide is 10-14,000. TE: Thrombocyte estimate from sm
143	6476	2	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
143	6482	2	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
143	6483	2	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. VDIFA2: No blood parasites seen.
149	6528	2	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
149	6542	2	2	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen.
149	6534	2	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
163	6635	2	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
163	6637	2	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen.
163	6643	2	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
171	6708	2	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
171	6700	2	2	TE: Thrombocyte estimate from smear appears to be 20,000-40,000. MORPH: No blood parasites seen.
171	6701	2	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
185	6807	2	1	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen.
185	6799	2	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. VDIFA2: No blood parasites seen.
185	6806	2	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
190	2245	2	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen.
190	2234	2	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen.
190	2242	2	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen.
			Averages (where calculable):	NA
			Std Dev (where calculable):	NA
			CV (where calculable):	NA

Table 23. Summary of Hematological Data
AGV-15-4
Facility 7

Treatment Code	Haemoglobin (HGB)	Haematocrit (HCT)	Red Blood Cells (RBC)	Mean Corpuscular Volume (MCV)	Mean Corpuscular Hemoglobin (MCH)	Mean Corpuscular Hemoglobin Concentration (MCHC)
	g/dL	%	x10^6/uL	fL	pg	g/dL
8	12.7	35.2	2.91	121.0	43.6	36.0
2	12.5	34.7	2.86	121.5	43.6	35.9

Treatment Code	Red Cell Distribution Width (RDW)	White Blood Cells (WBC)	Heterophils (HET)	Lymphocytes (LYMPH)	Activated Lymphocytes (ACTLYM)	Monocytes (MONO)
	%	x10^3/uL	%	%	%	%
8	9.1	14.0	32	59	0	4
2	9.4	13.9	34	53	0	4

Treatment Code	Eosinophils (EOS)	Basophils (BASO)	Absolute Band Heterophils (ABBHET)	Absolute Heterophils (ABHET)	Absolute Lymphocytes (ABLYMP)	Absolute Activiate Lymphocytes (ABACTL)
	%	%	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL
8	3	3	0	4.06	7.54	0
2	5	3	0	4.18	7.25	0

Treatment Code	Absolute Monocytes (ABMONO)	Absolute Eosinophils (ABEOS)	Absolute Basophils (ABBASO)	Total Protein (TP)	Globulin (GLOBU)	Albumin/Globulin (A/G)
	x10^3/uL	x10^3/uL	x10^3/uL	g/dL	g/dL	
8	0.44	0.42	0.45	2.9	1.9	0.5
2	0.48	0.64	0.34	2.8	1.8	0.6

Treatment Code	Phosphorus (PHOS)	Glucose (GLU)
	mg/dL	mg/dL
8	6.4	256
2	6.8	256

Appendix 11

GraINzyme Phytase Phy02 Dose Response in Poultry

Project No. AGV-15-5

Conducted by Colorado Quality Research, Ft. Collins, CO

Final Study Report Pages 1 - 108

COLORADO QUALITY RESEARCH FINAL REPORT

GraINzyme Phytase Phy02 Dose Response in Poultry

Project No. AGV-15-5

SPONSOR

Agrivida Inc.
200 Boston Ave, Suite 2975
Medford, MA 02155

TEST FACILITY

COLORADO QUALITY RESEARCH, INC.
400 East County Road 72
Wellington, Colorado 80549

March 2016

CQR FINAL REPORT
Project No. AGV-15-5

I. GraINzyme Phytase Phy02 Dose Response in Poultry

SPONSOR MONITORS:
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Email: dan@coloradoqualityresearch.com

STUDY EVENT SCHEDULE:

Event	Study Day	Calendar Date
Received, weighed birds by pen, vaccinated for NCB, and placed 17 chicks/pen. Administered Starter 1 diets	0	17NOV15 TUE
Weighed birds by pen; Weighed back Starter 1 diets; Administered Starter 2 diets	14	01DEC15 TUE
Weighed birds by pen; Weighed back Starter 2 diets and changed to Grower/Finisher diets; Removed 3 birds/pen; collected ileal and tibia samples	21	08DEC15 TUE
Weighed birds by pen; Weighed back Grower/Finisher diets; Collected tibia and ileal samples from 3 birds/pen; Collected blood from 3 birds/pen in treatments 1, 2, and 8; Necropsied 3 birds/pen in treatments 2 and 8. Ended live phase	42	29DEC15 TUE

OBJECTIVE

The objective of this study was to demonstrate the effectiveness over a range of doses of Phy02, a phytase enzyme product that is being developed by Agrivida, Inc. as a feed additive for poultry diets.

III. MATERIALS AND METHODS

A. TESTING/SUPPORT FACILITIES

Study Investigator	
Dan Moore, PhD (CV: on file, available upon request)	Colorado Quality Research, Inc. 400 E. County Road 72 Wellington, CO 80549 W: 970-568-7738 F: 970-568-7719 dan@coloradoqualityresearch.com
Sponsor Representative	
Jim Ligon, PhD (CV: on file, available upon request)	Agrivida, Inc. VP Business Development 200 Boston Ave, Suite 2975 Medford, MA 02155 M: (b) (6) (b) (6)@gmail.com
Enzyme Analysis	
Phillip A. Lessard, Ph.D. (CV: on file, available upon request)	Agrivida, Inc. 200 Boston Ave., Suite 2975 Medford, MA 02155 Philip.lessard@agrivida.com
Contributing Scientist – Tibia Ash Parameters	
Linda Kirby (CV: on file, available upon request)	University of Arkansas Central Analytical Lab 1260 W. Maple Street Fayetteville, AR 72701 lkirby@uark.edu
Contributing Scientist – Ileal Phosphorus Digestibility, Feed Analysis	
Thomas P. Mawhinney (CV: on file, available upon request)	Experimental Station Chemical Laboratories Room 4, Agricultural Building University of Missouri Columbia, MO 65211-7170 mawhinneyt@missouri.edu
Contributing Scientist – Proximate Analysis of Basal Feeds	
Bryan Brock (CV: on file, available upon request)	MVTL Laboratories 2 N. German Street New Ulm, MN 56072 W: (800) 782-3557 bbrock@mvtl.com

B. TEST ARTICLES, CONTROL ARTICLES, AND FEED ADDITIVES

Test Articles

GraINzyme Phytase Phy02	Lot No. AV_Phy02_0038-0041 Expiration 04/22/2016
Concentration	(b) (4) FTU/kg
Dosage Form	Via complete feed
Level	250 Units Phytase (Treatment Group 3) 500 Units Phytase (Treatment Group 4) 1000 Units Phytase (Treatment Group 5) 3000 Units Phytase (Treatment Group 6) 6000 Units Phytase (Treatment Group 7) 60000 Units Phytase (Treatment Group 8)
Duration	*Ad libitum* Day 0 – Study End
Source	Agrivida, Inc.

Feed Additives

Sacox 60	Lot No. JSB443
(Salinomycin)	Expiration August 2017
Concentration	60 g/lb
Dosage Form	Via Complete Feed
Level	50 g/ton
Duration	*Ad libitum* in Starter 1 and Starter 2 diets
Source	Huvepharma

Titanium Dioxide (Titanium dioxide USP FCC – Hombitan AFDC)	Lot No. TIOKFP40050PBGN
Dosage Form	Via Complete Feed
Level	0.3% in Complete Feed
Duration	*Ad libitum* in Starter 2 and Grower/Finisher diets
Source	Included in Study Records

Storage:	Secured, temperature monitored, dry area
Method of administration:	Oral via complete feed
Accounting:	All quantities of the test articles, control articles, and feed additives received and used in this study were documented

C. BASAL AND EXPERIMENTAL DIETS

Diets were formulated by CQR. Diets met and conformed with the commercial standards for feed used based on breed and age range of broilers. Copies of the diet formulations were included in the study records and as Appendix 1 of this Final Report.

There were two different basal diet formulations. Low Phosphate (LP) diets contained 0.3% AvP in the Starter 1 and Starter 2 diets and 0.25% AvP in the Grower/Finisher diets. The High Phosphate (HP) diets contained 0.45% AvP in the Starter 1 and Starter 2 diets and 0.4% AvP in the Grower/Finisher diets.

Basal diets were manufactured at CQR and stored in bulk mash form. The treatment diets were mixed at the CQR feed mill. A 500 pound capacity vertical mixer, a 4000 pound capacity vertical mixer, or a 14,000 lb horizontal mixer and a California Pellet Mill system were used to prepare the starter and grower diets. Feed was pelleted using a ~5-mm die and the Starter 1 diet was further processed into crumbles. The pelleting temperature was ~65 ºC. Mixed feed was stored in bulk storage bins labeled with study number, treatment letter code, and diet type. Complete records of diet mixing are included in the study records.

Approximate Feeding Program:

Diet	Form	Period	~Lbs Feed Mixed per Trt
Starter 1	Crumbled	0 – 14 Days	300
Starter 2	Pelleted	14 – 21 Days	390
Grower/Finisher	Pelleted	21 – 42 Days	1680

Test article and control article were added to the basal feed in the following approximate quantities in order to achieve the targeted levels of phytase in the treatment feeds:

Trt Group	Product	Starter 1	Starter 2	Grower/Finisher
1	NA	NA	NA	NA
2	NA	NA	NA	NA
3	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted] (b) (4)
4	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
5	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
6	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
7	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]
8	GraINzyme Phytase Phy02[1]	[redacted]	[redacted]	[redacted]

[1] Concentration of GraINzyme Phytase Phy02 as determined analytically by Agrivida was [redacted] (b) (4) FTU/kg.

D. SAMPLES AND ASSAYS

Prior to the pelleting process, an ~500g sample was taken of all treatment diets.

Following pelleting, treatment feeds were sampled (~500 g sample size) in duplicate according to CQR standard operating procedures (SOP FM-4 rev04). Five to ten samples of approximately equal size were collected from evenly distributed points as the feed was exiting the mixer/pelleter. These samples were combined into a representative composite sample which was then split into two duplicate samples in a manner appropriate to ensure minimal risk of cross-contamination. One sample was submitted to Agrivida for enzyme (phytase) analysis. The second sample of the treatment feeds was retained by CQR until notification from the Sponsor was received that the back-up samples were no longer needed. All samples were labeled with the CQR project number, sample description, and date of collection.

Basal feeds were sampled (~500 g sample size) in quadruplicate according to CQR standard operating procedures. One sample was submitted to MVTL for proximate analysis with the addition of Ca [See the following: AOAC 942.05; AOAC 930.15; AOAC (18) 2005 985.01; AOAC 968.08 (D.(a)); AOAC 990.03; AOAC 2003.06; AOAC 2003.05; ISO 11085-2008; AN 3414 (2005-03-02) Revision 4.1; AOAC (18) 2005 Method 994.12; and AOCS B1 6a-05], one sample was submitted to Agrivida for enzyme (phytase) analysis, one sample was submitted to the University of Missouri for titanium, percent moisture, and phosphorus analysis, and the fourth sample was retained by CQR until notification from the Sponsor is received that the back-up sample was no longer needed. All samples were labeled with the CQR project number, sample description, and date of collection.

E. TEST SYSTEM

Species	Commercial Broiler Chickens
Strain	Cobb 500
Supplier	Simmons Foods Hatchery Siloam Springs, AR
Sex	Males
Age	~1 day of age upon receipt (Day 0) ~42 days at final weights
Identification	Pen cards
Number of birds/pen	17
Number of treatments	8
Number of pens/treatment	12
Number of birds/treatment	204
Total number of pens	96
Total number of birds	1632

IV. EXPERIMENTAL DESIGN

A. TEST GROUPS

The test facility (Building #7) was divided into 12 blocks of 8 pens each block. Treatments were assigned to the pens using a complete randomized block design. Birds were assigned to the pens randomly according to CQR SOP B-10. Specific treatment groups were as follows:

Low Phosphate diets contained:
Starter: 0.3% AvP
Grower/Finisher: 0.25% AvP

High Phosphate diets contained:
Starter: 0.45% AvP
Grower/Finisher: 0.4% AvP

Trt Group	Description	No. Pens	No. Birds/Pen	No. Birds/Trt
1	Low Phosphate (LP)	12	17	204
2	High Phosphate (HP)	12	17	204
3	250 Units Phytase (LP)	12	17	204
4	500 Units Phytase (LP)	12	17	204
5	1000 Units Phytase (LP)	12	17	204
6	3000 Units Phytase (LP)	12	17	204
7	6000 Units Phytase (LP)	12	17	204
8	60000 Units Phytase (LP)	12	17	204
Totals		**96**	**NA**	**1632**

B. HOUSING AND MANAGEMENT

Housing

Assignment of treatments to pens was conducted using Microsoft Excel. The computer-generated assignment was as follows:

	T1	T2	T3	T4	T5	T6	T7	T8
Block 1	97	133	135	98	99	134	100	136
Block 2	103	102	101	105	108	106	107	104
Block 3	110	113	115	116	112	109	114	111
Block 4	122	123	120	119	118	117	121	124
Block 5	132	126	128	127	130	131	125	129
Block 6	177	140	137	179	138	139	180	178
Block 7	141	144	142	148	143	147	146	145
Block 8	152	151	154	153	149	150	156	155
Block 9	160	166	161	162	163	164	159	165
Block 10	170	169	171	174	173	175	168	167
Block 11	186	188	185	182	183	184	181	187
Block 12	190	195	191	189	192	196	194	193

Birds were housed in concrete floor pens (~ 3' x 5') within an environmentally controlled facility (Facility #7). All birds were placed in clean pens containing clean pine shavings as bedding. Additional shavings were added to pens if they became too damp for comfortable conditions for the test birds during the study. Lighting was via incandescent lights and a commercial lighting program was used. Hours of light for every 24-hour period were as follows:

Approximate Bird Age (days)	Approximate Hours of Continuous Light per 24 hr period	~Light Intensity (foot candles)
0 – 4	24	1.0 – 1.3
5 – 10	10	1.0 – 1.3
11 – 18	12	0.2 – 0.3
19 – Study End	16	0.2 – 0.3

Environmental conditions for the birds (floor space & bird density [~0.88 ft^2/bird], temperature, lighting, feeder and water space) were similar for all treatment groups at placement. In order to prevent bird migration, each pen was checked to ensure that no openings greater than 1 inch existed for approximately 12 inches in height between pens. To achieve this, a wood or plastic solid partition was in place for approximately the first 12 inches from the floor between each pen.

Vaccinations:

Birds were vaccinated for Mareks at the hatchery. Newcastle, Infectious Bronchitis (NCB) vaccine was administered using a spray cabinet upon receipt of chicks (Newcastle-Bronchitis Vaccine; B1 Type, B1 Strain, Mass. & Conn. Types, Live Virus; Zoetis Inc, Kalamazoo, MI; Serial No. 1502029; Expiration 15NOV16). No other vaccinations or treatments (except as indicated above), were administered during the study.

Water:

Water was provided *ad libitum* throughout the study via one automatic nipple drinker (4 nipples per drinker) per pen. Drinkers were checked twice daily and cleaned as needed to ensure a clean and constant water supply to the birds.

Feed:

Feed was provided *ad libitum* throughout the study via one hanging, ~17 inch diameter tube feeder per pen. One chick feeder tray was placed in each pen for approximately the first four days. Birds were placed on their respective treatment diets on Day 0 and as per the experimental design. Feed added and removed from pens from Day 0 to study end was weighed and recorded.

Daily observations:

The test facility, pens, and birds were observed at least twice daily for general flock condition, lighting, water, feed, ventilation and unanticipated events. No abnormal conditions were documented. The minimum-maximum temperature and humidity of the test facility was recorded once daily.

Mortality and Culls:

Starting on study day 0, any bird that was found dead or was removed and sacrificed was weighed and necropsied. Cull birds that are unable to reach feed or water were sacrificed, weighed and documented. The weight and probable cause of death and necropsy findings were recorded on the pen mortality record.

Veterinary Care, Intervention and Euthanasia:

Birds that developed clinically significant concurrent disease unrelated to the test procedures were, at the discretion of the Study Investigator or a designee, removed from the study and euthanized in accordance with site SOPs. In addition, moribund or injured birds whose condition may have affected the outcome of the study were euthanized upon the authority of a Site Veterinarian or a qualified technician. The reason for withdrawal was documented. If an animal died, or was removed and euthanized for humane reasons, it was recorded on the mortality sheet for the pen and a necropsy performed and filed to document the reason for removal.

If euthanasia was deemed necessary by the Study Investigator or a qualified technician, animals were euthanized by cervical dislocation.

Body Weights and Feed Intake:

Birds were weighed by pen on Study Days 0, 14, 21, and 42. The weights of all mortalities and culls over the course of the study were recorded on the Mortality & Necropsy Records for the appropriate pens. Average bird weight on a pen basis, on each weigh day, was summarized.

The feed remaining in each pen's feeder was weighed and the amount of feed consumed per pen was calculated by subtracting the feed weighed out of the pen from the total amount of feed weighed into the pen. Feeders were weighed on or before Study Day 0 and on Study Days 14, 21, and 42.

Weight Gains and Feed Conversion:

Average feed conversion were calculated for Days 0 – 14, 14 – 21, 0 – 21, 21 – 42, and 0 – 42 by dividing the total feed intake for that pen by the weight of the surviving birds in that pen.

Adjusted feed conversion were calculated for Days 0 – 14, 14 – 21, 0 – 21, 21 – 42, and 0 – 42 by dividing the total feed intake for that pen by the weight of the surviving birds in that pen and the weight of the birds that died or were removed from that pen.

Scales:

Scales used in the weighing of feed, feed additives, and birds were licensed by the State of Colorado. At each use the scales were checked using standard weights according to CQR Standard Operating Procedures.

C. BONE PARMETERS AND ILEAL PHOSPHORUS DIGESTIBILITY:

TiO2 was placed in all feeds from study day 14.

At Days 21 and 42, three birds were randomly collected from each pen, sacrificed and ileal and left tibia samples were collected. The tibia samples were pooled in one bag per pen (3 tibias per pen in a bag). Adhering muscle was carefully removed from each tibia to get them mostly clean and then they were frozen and retained until shipment to the laboratory for the determination of % ash (AOAC 923.03).

The ileal samples were also be pooled in one plastic vial per pen (3 ileal samples per pen in a vial) and were frozen retained until Sponsor either instructed disposal or shipment to the laboratory for the determination of ileal phosphorus digestibility (% Moisture: AOAC Official Method 934.01, 2006, vacuum oven; Titanium: Journal of Animal Science, 2004, 82: 179 – 183; Phosphorus: AOAC Official method 966.01). From each bird starting at the Meckel's Diverticulum, the contents of the ileum were squeezed into the plastic bags.

D. HEMATOLOGICAL ENDPOINTS

Hematological endpoints were measured for only treatment groups 1 (Low Phosphate control), 2 (High Phosphate control) and 8 (60,000 Units Phytase). At Day 42, prior to euthanasia for tibia and ileal content collection, blood was collected from the same three birds indicated in the above section for hematological analyses.

From each bird a minimum of 1.0 mL of whole blood was collected into a lavender top EDTA containing tube via the brachial vein. Tubes were labeled with study number, animal number, pen number, and date of collection. It was mixed by gently inverting the tube 5 to 6 times. A barcode label was attached vertically to the lavender top tube at the performing laboratory. Two peripheral blood smears were prepared from each lavender top tube. The animal identification number was written on the frosted edge of the slides with a lead pencil. The corresponding small barcode label for each slide was placed on the outside of the plastic slide holder at the performing laboratory. The lavender top tubes were shipped on ice packs to the performing laboratory.

From each bird a mimimum of 2.0 mL of whole blood was collected into a no additive red top tube via the brachial vein. Tubes were labeled with study number, animal number, pen number, and date of collection. Blood was allowed to clot for ~30 minutes. The tubes were centrifuged for 10 – 15 minutes. For each sample, the serum was transferred from the no additive red top tube into the tall plastic tube labeled "Serum Tube." (A minimum of 0.56 mL of serum was required. The preferred volume was 1.0 mL). One large barcode label was affixed vertically on the serum tube at the performing laboratory. The no additive red top tubes were discarded after removing the serum.

All samples were identified with numbered and barcoded labels at the performing laboratory. Corresponding animal identification was provided on a data capture form.

Samples were shipped on ice packs to Marshfield Labs at the following address:

Marshfield Labs
Study Specimen Processing
701 Kalsched St.
Marshfield, WI 54449
1-800-222-5835

The following hematological endpoints were assayed:

Haematocrit (HCT)	Red Blood Cells (RBC)	Glucose (GLU)	Basophil (BASO)
Phosphorus (PHOS)	Lymphocytes (LYMPH)	Mean Corpuscular Volume (MCV)	Alanine aminotransaminase (ALT)
Monocytes (MONO)	Thrombocyte check	Creatine Phosphokinase (CPK)	Mean Corpuscular Hemoglobin (MCH)
White Blood Cells (WBC)	Haemoglobin (HGB)	Mean Corpuscular Hemoglobin Concentration (MCHC)	Albumin (ALB)
Eosinophil (EOS)	Red Cell Distribution Width (RDW)	Heterophils (HET)	Absolute Band Heterophils (ABBHET)
Absolute Heterophils (ABHET)	Absolute Lymphocytes (ABLYMP)	Absolute Activated Lymphocytes (ABACTL)	Absolute Monocytes (ABMONO)
Absolute Eosinophils (ABEOS)	Absolute Basophils (ABBASO)	Total Protein (TP)	Globulin (GLOBU)
Albumin/Globulin (A/G)			

E. HISTOLOGICAL SAMPLING

For only treatment groups 2 (High Phosphate control) and 8 (60,000 Units Phytase). At Day 42, after euthanasia for tibia and ileal content collection, birds were necropsied and examined by a veterinarian. Only if pathological or toxicological symptoms were noted in tissues of birds in group 8, the tissues displaying abnormal characteristics were to be collected from the affected bird and the corresponding normal tissue from a bird in group 2 and placed into 10% buffered formalin. There were no pathological or toxicological symptoms noted in the tissues of the group 8 birds and thus no samples were collected.

F. STATISTICAL DESIGN

Data generated from the study was statistically analyzed by the Sponsor. The experimental design was a randomized complete block design. Pen location within the barn was used as the blocking criteria. Each of the 12 blocks had 8 pens to which the treatments were randomly distributed. Pen was used as experimental unit for each analyzed variable. Data was analyzed using fit least squares of the JMP software (version 12, SAS Institute Inc., Cary, NC). The ANOVA model included treatment and block. Mean values were separated using Tukey's honesty significant difference procedure. P-values < 0.05 were considered significant in all comparisons.

V. DATA COLLECTED

- Bird weights by pen, on approximately Days 0, 14, 21, and 42.
- Feed amounts added and removed from each pen from day 0 to study end (day 42).
- Mortality: sex, weight and probable cause of death day 0 to study end.
- Removed birds: reason for culling, sex and weight day 0 to study end.
- Daily observation of facility and birds, daily facility temperature, daily facility humidity.
- Feed conversion by pen and treatment group for days 0 – 14, 14 – 21, 0 – 21, 21 – 42, and 0 – 42.
- Bone parameters
- Ileal phosphorus digestibility
- Hematological endpoints

VI. DISPOSITIONS

Excess Test Articles

An accounting was maintained of the test articles received and used for this study. Excess test articles were retained in the CQR general inventory until instruction from the Sponsor was received regarding the disposal or shipment of them. Documentation was provided with the study records.

Feed

An accounting was maintained of all treatment diets. The amount mixed, used and discarded was documented. Unused feed was discarded to the landfill at study end. Retention feed samples were discarded to the landfill upon receipt of permission from the Sponsor. Disposition was documented in the study records.

Test Animals

An accounting was maintained of all birds received for the study. All mortalities, birds culled or sacrificed were disposed of by dumpster and commercial landfill. Disposal of mortalities, birds culled or birds sacrificed during the study and at study end was by dumpster and commercial landfill. Surviving birds were euthanized and disposed of by dumpster and commercial landfill as they were not suitable for human consumption. Documentation of disposition was provided with the study records.

VII. RECORDS AND REPORT

A final report and the original study records were provided to the Sponsor following study completion. The Sponsor was provided with an electronic copy of the data in excel CQR spreadsheet format, with individual replicates represented in rows, and measurements made and identifying criteria (such as treatment, pen, block) in columns. No statistics were included in the final report unless provided by the Sponsor. A copy of the report, data and study records will be kept in CQR archives for a period of 3 years.

VIII. PERSONNEL

Key personnel involved in this study were as follows:

Agrivida, Inc.	
Sponsor Representative	Jon Broomhead
CQR	
Investigator	Dan Moore, PhD.
Test Facility Management	Stephen W. Davis, DVM, Dip. ACPV
Data Manager	Shoshana Gray, B.A.
Feed Mill Manager	Ken Johlke, B.S.
Farm Manager	Kyle Kline, B.S.
Research Technician	Jamie Meneuy, B.S.

IX. INVESTIGATOR'S STATEMENT

There were no known circumstances that may have affected the data quality or integrity during this study.

Summary tables and graphs of bird performance have been prepared and are attached to this report (See Tables 1 – 12 and Graphs 1 – 5).

Overall mortality and moribund removal was as expected for study conditions and ranged from 1.961% (Treatment Group 7) to 6.373% (Treatment Group 8). See Tables 13 and 14 for mortality and removal information.

Performance during the trial was as expected for study conditions with body weight ranging from 2.268 Kg for the low phosphate group (Treatment Group 1) to 3.029 Kg for the highest phytase dose (Treatment Group 8), and feed conversion ranging from 1.545(Treatment group 8) to 1.615 (Treatment Group 1) at 42D. The high phosphate control group had higher body weight gain and feed conversion compared to the low phosphate control group for all time. All phytase treatments outperformed the low phosphate control for all time periods for both body weight gain and feed conversion. Overall, increasing levels of phytase resulted in increased body weight gain and lower feed conversions. However, treatment groups 5-8 were similar in performance. See Tables 3 – 12 and Graphs 1– 5 for performance information.

The high phosphate control and all phytase supplemented treatment groups had increased tibia ash at both 21D and 42D when compared to the low phosphate control group. On day 21, P digestibility was higher than the LP (treatment group 1) control for treatment groups 2, 3, 6, 7 and 8. However, at 42D P digestibility was higher for all treatment groups compared to the LP group with the exception of treatment group 4. See Tables 19 – 26 and Graphs 6 – 9 for tibia and phosphorus digestibility information.

Treatment groups 1 (LP), 2 (HP) and 8 (LP + highest level of phytase) had blood drawn on 42D for hematological analysis. All blood parameters appeared to be similar between groups with the exception of treatment group 1having lower creatine kinase and phosphorus levels compared to the other two groups. See Tables16-18 for hematology information.

The report and data herein submitted to the Sponsor for CQR Project No. AGV-15-5 are accurate in that they represent the actual results of the study, were collected in a manner which did not misrepresent the true effects of the test articles and were complete in that all data obtained in this study was submitted to the Sponsor.

30 MAR 16

Dan Moore, Ph.D.
Investigator

Date

Tables

Table 1. Day 0 Pen Weights (17NOV15) of Male Cobb 500 Broilers
Table 2. Day 0 Pen Weights (17NOV15) of Male Cobb 500 Broilers Summarized by Treatment Group
Table 3. Bird Weights and Feed Conversion Days 0 - 14 (01DEC15)
Table 4. Bird Weights and Feed Conversion Days 0 - 14 (01DEC15) Summarized by Treatment Group
Table 5. Bird Weights and Feed Conversion Days 0 - 21 (08DEC15)
Table 6. Bird Weights and Feed Conversion Days 0 - 21 (08DEC15) Summarized by Treatment Group
Table 7. Bird Weights and Feed Conversion Days 14 - 21 (08DEC15)
Table 8. Bird Weights and Feed Conversion Days 14 - 21 (08DEC15) Summarized by Treatment Group
Table 9. Bird Weights and Feed Conversion Days 0 - 42 (29DEC15)
Table 10. Bird Weights and Feed Conversion Days 0 - 42 (29DEC15) Summarized by Treatment Group
Table 11. Bird Weights and Feed Conversion Days 21 - 42 (29DEC15)
Table 12. Bird Weights and Feed Conversion Days 21 - 42 (29DEC15) Summarized by Treatment Group
Table 13. Mortality and Removal Weights (Day 0 - Study End)
Table 14. Summary of Mortalities and Removals (Day 0 - Study End)
Table 15. Feed Added and Removed by Pen Days 0 - Study End
Table 16. Hematalogical Results as Received from Marshfield Labs
Table 17. Hematalogical Results Summarized by Treatment Group
Table 18. Hematalogical Results Summarized by Treatment Group (Condensed Table)
Table 19. Day 21 Tibia Ash Results (08DEC15)
Table 20. Day 21 Tibia Ash Results (08DEC15) Summarized by Treatment Group
Table 21. Day 42 Tibia Ash Results (29DEC15)
Table 22. Day 42 Tibia Ash Results (29DEC15) Summarized by Treatment Group
Table 23. Day 21 % Phosphorus Digestibility
Table 24. Day 21 % Phosphorus Digestibility Summarized by Treatment Group
Table 25. Day 42 % Phosphorus Digestibility
Table 26. Day 42 % Phosphorus Digestibility Summarized by Treatment Group

Graphs

Graph 1. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 14) Summarized by Treatment Group
Graph 2. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 21) Summarized by Treatment Group
Graph 3. Average Bird Weight Gain and Adjusted Feed Conversion (Days 14 - 21) Summarized by Treatment Group
Graph 4. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 42) Summarized by Treatment Group
Graph 5. Average Bird Weight Gain and Adjusted Feed Conversion (Days 21 - 42) Summarized by Treatment Group
Graph 6. Day 21 Average Tibia Ash % Summarized by Treatment Group
Graph 7. Day 42 Average Tibia Ash % Summarized by Treatment Group
Graph 8. Day 21 %P Digestibility Summarized by Treatment Group
Graph 9. Day 42 %P Digestibility Summarized by Treatment Group

APPENDIX 1 – DIET FORMULATIONS

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151SP AGV-15-1 BS PC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1135.89	56.795	164.64	113.20	295.20			
1914	SBM , CQR	716.19	35.810	508.00	261.40	843.60			
1542	Soy Oil	38.93	1.947	600.00	224.40	2008.40			
1554	DICALCIUM PHOS	36.42	1.821	255.24		25253.0			
1553	Sand	28.02	1.401	15.00		29.40		1.6000	
1552	Limestone, CQR	19.87	0.994	30.00	15.00	29505.6			
1544	SALT, PLAIN (N	8.81	0.440	29.34	15.00	145444.			
1549	DL-METHIONINE,	5.98	0.299	2637.89	15.00	23294.8			
1548	CQR Choline	3.92	0.196	2534.00	15.00	48090.4			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1545	Salinomycin (6	0.820	0.041	0.00			0.0410	0.0410	
1551	Threonine, CQR	0.169	0.008	1849.00	15.00	15136.0			
1550	L-LYSINE, CQR	0.166	0.008	1725.00	15.00	8300.60			

Total Batch: 2000.00 Lbs at 309.15 $/Ton 15.458 $/100Lb 0.1546 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.5661	0.10 PCT
5	FAT, CRUDE	PCT	0.4283	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4130	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
35	THREONINE	PCT	0.1853	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.74	
3	MOISTURE		10.26	
4	PROTEIN, CRUDE	22.00	22.00	
5	FAT, CRUDE	4.50	4.50	
6	FIBER, CRUDE		2.23	
7	CALCIUM	0.93	0.9300	
8	PHOS. TOTAL	0.71	0.7205	
9	ASH		5.50	
10	PHOS., AVAILAB	0.45	0.4500	0.45
18	ADF		0.0000	
19	M.E. POULTRY	1378.00	1378.00	
21	M.E. SWINE		1485.49	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.55	0.6413	
32	CYSTINE		0.3487	
33	LYSINE	1.31	1.31	
34	TRYPTOPHAN		0.2980	
35	THREONINE	0.92	0.9200	
36	ISOLEUCINE		1.13	
37	HISTIDINE		0.6218	
38	VALINE		1.24	
39	LEUCINE		1.98	
40	ARGININE		1.52	
41	PHENYLALANINE		1.24	
42	TSAA	0.99	0.9900	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5274	
47	VITAMIN A		1265.17	
48	VITAMIN E		12.30	
49	THIAMIN		1.95	
50	RIBOFLAVIN		2.68	
51	PANTOTHENIC AC		8.67	
52	BIOTIN		156.14	
53	FOLIC ACID		446.81	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.21	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.9437	
63	MAGNESIUM		0.1613	
64	SULPHUR		0.2044	
65	MANGANESE		107.18	
66	IRON		371.60	
67	COPPER		19.98	
68	ZINC		89.49	
69	SELENIUM		0.3028	
70	COBALT		0.0000	
71	FLOURINE		0.0033	
72	CHLORIDE	0.28	0.2979	
73	SALT		0.4405	
74	IODINE		0.5957	
76	Dig Methionine		0.6129	
77	Dig Cystine		0.2885	
78	Dig Lysine		1.18	
79	Dig Tryptophan		0.2168	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Formulated By: Single Product Formulation
Trial Version: 17
Product: AGV151SP AGV-15-1 BS PC
Using Costs: Plant 1 Owning Costs
Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.8039	
81	Dig Isoleucine		1.04	
82	Dig Histidine		0.5584	
83	Dig Valine		1.12	
84	Dig Leucine		1.83	
85	Dig Arginine		1.39	
86	Dig Phenylalan		1.43	
87	Dig TSAA		0.9018	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		0.8943	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER

Plant: 1 Silver Springs
Product: AGV151SN AGV-15-1 BS NC

Formulated By: Single Product Formulation
Using Costs: Plant 1 Owning Costs

Trial Version: 16
Prod'n Version: 0
Page: 1

------------------------------ Used Ingredients ------------------------------

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1135.89	56.795	164.64		295.20			
1914	SBM , CQR	716.19	35.810	508.00	261.40	*******			
1542	Soy Oil	38.93	1.947	600.00	224.40				
1553	Sand	33.48	1.674	15.00		29.40		1.6800	-0.14
1552	Limestone, CQR	30.68	1.534	30.00	15.00	29505.6			
1554	DICALCIUM PHOS	20.11	1.006	255.24		29394.8			
1544	SALT, PLAIN (N	8.84	0.442	29.34	15.00	404093.			
1549	DL-METHIONINE,	5.98	0.299	2637.89	15.00	23294.8			
1548	CQR Choline	3.92	0.196	2534.00	15.00	74427.2			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1545	Salinomycin (6	0.820	0.041	0.00			0.0410	0.0410	
1551	Threonine, CQR	0.169	0.008	1849.00	15.00	15136.0			
1550	L-LYSINE, CQR	0.166	0.008	1725.00	15.00	8300.60			

Total Batch: 2000.00 Lbs at 307.27 $/Ton 15.364 $/100Lb 0.1536 $/Lb

------------------------ Binding Nutrients ------------------------

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.5661	0.10 PCT
5	FAT, CRUDE	PCT	0.4283	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4130	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
35	THREONINE	PCT	0.1853	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

------------- Nutrient Solution -------------

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.74	
3	MOISTURE		10.26	
4	PROTEIN, CRUDE	22.00	22.00	
5	FAT, CRUDE	4.50	4.50	
6	FIBER, CRUDE		2.23	
7	CALCIUM	0.93	0.9290	0.93
8	PHOS. TOTAL	0.56	0.5705	
9	ASH		5.32	
10	PHOS., AVAILAB	0.30	0.3000	0.30
18	ADF		0.0000	
19	M.E. POULTRY	1378.00	1378.00	1378.00
21	M.E. SWINE		1485.49	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.55	0.6413	
32	CYSTINE		0.3487	
33	LYSINE	1.31	1.31	
34	TRYPTOPHAN		0.2980	
35	THREONINE	0.92	0.9200	
36	ISOLEUCINE		1.13	
37	HISTIDINE		0.6218	
38	VALINE		1.24	
39	LEUCINE		1.98	
40	ARGININE		1.52	
41	PHENYLALANINE		1.24	
42	TSAA	0.99	0.9900	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5274	
47	VITAMIN A		1265.17	
48	VITAMIN E		12.30	
49	THIAMIN		1.95	
50	RIBOFLAVIN		2.68	
51	PANTOTHENIC AC		8.67	
52	BIOTIN		156.14	
53	FOLIC ACID		446.81	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.21	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	0.20
62	POTASSIUM		0.9431	
63	MAGNESIUM		0.1564	
64	SULPHUR		0.2044	
65	MANGANESE		104.73	
66	IRON		290.08	
67	COPPER		19.33	
68	ZINC		87.70	
69	SELENIUM		0.2979	
70	COBALT		0.0000	
71	FLOURINE		0.0018	
72	CHLORIDE	0.28	0.2990	
73	SALT		0.4421	
74	IODINE		0.5957	
76	Dig Methionine		0.6129	
77	Dig Cystine		0.2885	
78	Dig Lysine		1.18	
79	Dig Tryptophan		0.2168	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Product: AGV151SN AGV-15-1 BS NC
Formulated By: Single Product Formulation
Using Costs: Plant 1 Owning Costs
Trial Version: 16
Prod'n Version: 0
Page: 2

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.8039	
81	Dig Isoleucine		1.04	
82	Dig Histidine		0.5584	
83	Dig Valine		1.12	
84	Dig Leucine		1.83	
85	Dig Arginine		1.39	
86	Dig Phenylalan		1.43	
87	Dig TSAA		0.9018	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		1.38	

CFC/Concept5 — Least Cost Formula

Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER
Trial Version: 16
Prod'n Version: 0
Page: 1

Plant: 1 Silver Springs
Product: AGV151GP AGV-15-1 BG PC

Formulated By: Single Product Formulation
Using Costs: Plant 1 Owning Costs

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1252.29	62.615	164.64	113.60	295.60			
1914	SBM , CQR	629.58	31.479	508.00	227.40	841.60			
1542	Soy Oil	41.69	2.084	600.00	223.40	1999.80			
1554	DICALCIUM PHOS	31.53	1.576	255.24		25099.8			
1552	Limestone, CQR	18.88	0.944	30.00	15.00	33574.0			
1544	SALT, PLAIN (N	8.85	0.442	29.34	15.00	144552.			
1549	DL-METHIONINE,	4.23	0.212	2637.89	15.00	26146.0			
1548	CQR Choline	4.13	0.206	2534.00	15.00	47811.2			
1553	Sand	3.58	0.179	15.00		29.40		1.5000	
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1550	L-LYSINE, CQR	0.441	0.022	1725.00	15.00	9208.20			

Total Batch: 2000.00 Lbs at 294.77 $/Ton 14.738 $/100Lb 0.1474 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.6442	0.10 PCT
5	FAT, CRUDE	PCT	0.4294	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4106	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Unused Ingredients

Ingr Code	Ingredient Name	Current $/Ton	At $/Ton	Would Use	Minimum Pct	Maximum Pct	Rcost
1551	Threonine, CQR	1849.00	15.00				18.34

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.47	
3	MOISTURE		10.53	
4	PROTEIN, CRUDE	20.30	20.30	
5	FAT, CRUDE	4.80	4.80	
6	FIBER, CRUDE		2.20	
7	CALCIUM	0.84	0.8400	
8	PHOS. TOTAL	0.66	0.6607	
9	ASH		5.03	
10	PHOS., AVAILAB	0.40	0.4000	0.40
18	ADF		0.0000	
19	M.E. POULTRY	1425.00	1425.00	
21	M.E. SWINE		1518.02	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.51	0.5332	
32	CYSTINE		0.3268	
33	LYSINE	1.20	1.20	
34	TRYPTOPHAN		0.2709	
35	THREONINE	0.83	0.8395	
36	ISOLEUCINE		1.03	
37	HISTIDINE		0.5784	
38	VALINE		1.14	
39	LEUCINE		1.87	
40	ARGININE		1.39	
41	PHENYLALANINE		1.14	
42	TSAA	0.86	0.8600	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5815	
47	VITAMIN A		1311.15	
48	VITAMIN E		12.86	
49	THIAMIN		1.99	
50	RIBOFLAVIN		2.66	
51	PANTOTHENIC AC		8.50	
52	BIOTIN		151.84	
53	FOLIC ACID		435.80	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.37	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.8718	
63	MAGNESIUM		0.1519	
64	SULPHUR		0.1900	
65	MANGANESE		104.89	
66	IRON		341.03	
67	COPPER		19.27	
68	ZINC		87.99	
69	SELENIUM		0.3017	
70	COBALT		0.0000	
71	FLOURINE		0.0028	
72	CHLORIDE	0.26	0.3006	
73	SALT		0.4424	
74	IODINE		0.5944	
76	Dig Methionine		0.5065	
77	Dig Cystine		0.2709	
78	Dig Lysine		1.08	
79	Dig Tryptophan		0.1987	

Continued... See Page 2

Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs
Product: AGV151GP AGV-15-1 BG PC
Formulated By: Single Product Formulation
Using Costs: Plant 1 Owning Costs
Trial Version: 16
Prod'n Version: 0
Page: 2

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.7313	
81	Dig Isoleucine		0.9463	
82	Dig Histidine		0.5214	
83	Dig Valine		1.03	
84	Dig Leucine		1.73	
85	Dig Arginine		1.27	
86	Dig Phenylalan		1.37	
87	Dig TSAA		0.7777	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		0.8494	

CFC/Concept5 Least Cost Formula Date Printed: 05/11/15
Date Optimized: 05/11/2015
Optimized By: PRO5USER
Plant: 1 Silver Springs Formulated By: Single Product Formulation Trial Version: 17
Product: AGV151GN AGV-15-1 BG NC Using Costs: Plant 1 Owning Costs Prod'n Version: 0
Page: 1

Used Ingredients

Ingr Code	Ingredient Name	Unrounded Lbs	Pct	Owning $/Ton	Range Low	Range High	Restriction Min Pct	Restriction Max Pct	Rcost
1913	Corn, CQR	1252.29	62.615	164.64	113.60	295.60			
1914	SBM , CQR	629.58	31.479	508.00	227.40	841.60			
1542	Soy Oil	41.69	2.084	600.00	223.40	1999.80			
1552	Limestone, CQR	29.75	1.487	30.00	15.00	33574.0			
1554	DICALCIUM PHOS	15.22	0.761	255.24		25099.8			
1553	Sand	8.98	0.449	15.00		29.40		1.5000	
1544	SALT, PLAIN (N	8.88	0.444	29.34	15.00	144552.			
1549	DL-METHIONINE,	4.23	0.212	2637.89	15.00	26146.0			
1548	CQR Choline	4.13	0.206	2534.00	15.00	47811.2			
1916	Pou NRC TM	2.80	0.140	908.00			0.1400	0.1400	
1956	Pou VIT 1.2 D3	2.00	0.100	2332.00			0.1000	0.1000	
1550	L-LYSINE, CQR	0.441	0.022	1725.00	15.00	9208.20			

Total Batch: 2000.00 Lbs at 292.89 $/Ton 14.645 $/100Lb 0.1464 $/Lb

Binding Nutrients

Nutr No	Nutrient Name	Unit of Measure	Nutr Cost	Increment Change
4	PROTEIN, CRUDE	PCT	0.6442	0.10 PCT
5	FAT, CRUDE	PCT	0.4294	0.10 PCT
7	CALCIUM	PCT	0.0045	0.01 PCT
10	PHOS., AVAILABLE	PCT	0.1251	0.01 PCT
19	M.E. POULTRY	KCAL/LB	0.4106	10.00 KCAL/LB
33	LYSINE	PCT	0.2170	0.01 PCT
42	TSAA	PCT	0.2649	0.01 PCT
54	CHOLINE	MG/LB	0.0093	1.00 MG/LB
61	SODIUM	PCT	0.0366	0.10 PCT

Unused Ingredients

Ingr Code	Ingredient Name	Current $/Ton	At $/Ton	Would Use	Minimum Pct	Maximum Pct	Rcost
1551	Threonine, CQR	1849.00	15.00				18.34

Nutrient Solution

Nutr No	Nutrient	Minimum	Actual	Maximum
2	DRY MATTER		89.47	
3	MOISTURE		10.53	
4	PROTEIN, CRUDE	20.30	20.30	
5	FAT, CRUDE	4.80	4.80	
6	FIBER, CRUDE		2.20	
7	CALCIUM	0.84	0.8400	
8	PHOS. TOTAL	0.51	0.5107	
9	ASH		4.85	
10	PHOS., AVAILAB	0.25	0.2500	0.25
18	ADF		0.0000	
19	M.E. POULTRY	1425.00	1425.00	
21	M.E. SWINE		1518.02	
23	N.E.L.		0.0000	
24	N.E.M.		0.0000	
25	N.E.G.		0.0000	
31	METHIONINE	0.51	0.5332	
32	CYSTINE		0.3268	
33	LYSINE	1.20	1.20	
34	TRYPTOPHAN		0.2709	
35	THREONINE	0.83	0.8395	
36	ISOLEUCINE		1.03	
37	HISTIDINE		0.5784	
38	VALINE		1.14	
39	LEUCINE		1.87	
40	ARGININE		1.39	
41	PHENYLALANINE		1.14	
42	TSAA	0.86	0.8600	
43	[** No Name **		0.0000	
45	PYRIDOXINE		4.31	
46	CAROTENE		0.5815	
47	VITAMIN A		1311.15	
48	VITAMIN E		12.86	
49	THIAMIN		1.99	
50	RIBOFLAVIN		2.66	
51	PANTOTHENIC AC		8.50	
52	BIOTIN		151.84	
53	FOLIC ACID		435.80	
54	CHOLINE	1300.00	1300.00	
55	VITAMIN B12		5.40	
56	NIACIN		28.37	
57	VITAMIN D3 IU		1375.00	
58	MENADIONE		0.8749	
59	VITAMIN C		0.0000	
60	Vitamin D		0.0000	
61	SODIUM	0.20	0.2000	
62	POTASSIUM		0.8713	
63	MAGNESIUM		0.1470	
64	SULPHUR		0.1900	
65	MANGANESE		102.44	
66	IRON		259.51	
67	COPPER		18.62	
68	ZINC		86.19	
69	SELENIUM		0.2968	
70	COBALT		0.0000	
71	FLOURINE		0.0014	
72	CHLORIDE	0.26	0.3016	
73	SALT		0.4441	
74	IODINE		0.5944	
76	Dig Methionine		0.5065	
77	Dig Cystine		0.2709	
78	Dig Lysine		1.08	
79	Dig Tryptophan		0.1987	

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                                                                                                   Date Optimized: 05/11/2015
                                                                                                     Optimized By: PRO5USER
  Plant: 1       Silver Springs                          Formulated By: Single Product Formulation    Trial Version: 17
Product: AGV151GN AGV-15-1 BG NC                          Using Costs: Plant 1 Owning Costs          Prod'n Version: 0
                                                                                                             Page: 2
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Nutr No	Nutrient	Minimum	Actual	Maximum
80	Dig Threonine		0.7313	
81	Dig Isoleucine		0.9463	
82	Dig Histidine		0.5214	
83	Dig Valine		1.03	
84	Dig Leucine		1.73	
85	Dig Arginine		1.27	
86	Dig Phenylalan		1.37	
87	Dig TSAA		0.7777	
89	Oxytetracyclin		0.0000	
90	Non Protein Ni		0.0000	
100	Total Nitrogen		0.0000	
101	Bulk Density		1.34	

Tables

Table 2. Day 0 Pen Weights (17NOV15) of Male Cobb 500 Broilers Summarized by Treatment Group
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Graph 9. Day 42 %P Digestibility Summarized by Treatment Group

Table 2. Day 0 Pen Weights (17NOV15) of Male Cobb 500 Broilers Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen No.	No. Birds	Pen Wt (kg)	Avg Bird Wt (kg)
1	1	97	17	0.699	0.041
2	1	103	17	0.677	0.040
3	1	110	17	0.703	0.041
4	1	122	17	0.682	0.040
5	1	132	17	0.687	0.040
6	1	177	17	0.683	0.040
7	1	141	17	0.711	0.042
8	1	152	17	0.699	0.041
9	1	160	17	0.701	0.041
10	1	170	17	0.684	0.040
11	1	186	17	0.695	0.041
12	1	190	17	0.679	0.040
Total & Averages			**204**	**0.692**	**0.041**
Std Deviations				**0.011**	**0.001**
CVs				**1.591%**	**1.591%**
1	2	133	17	0.669	0.039
2	2	102	17	0.689	0.041
3	2	113	17	0.702	0.041
4	2	123	17	0.684	0.040
5	2	126	17	0.710	0.042
6	2	140	17	0.704	0.041
7	2	144	17	0.716	0.042
8	2	151	17	0.719	0.042
9	2	166	17	0.700	0.041
10	2	169	17	0.684	0.040
11	2	188	17	0.684	0.040
12	2	195	17	0.692	0.041
Total & Averages			**204**	**0.696**	**0.041**
Std Deviations				**0.015**	**0.001**
CVs				**2.151%**	**2.151%**
1	3	135	17	0.692	0.041
2	3	101	17	0.691	0.041
3	3	115	17	0.707	0.042
4	3	120	17	0.688	0.040
5	3	128	17	0.688	0.040
6	3	137	17	0.704	0.041
7	3	142	17	0.718	0.042
8	3	154	17	0.699	0.041
9	3	161	17	0.700	0.041
10	3	171	17	0.701	0.041
11	3	185	17	0.692	0.041
12	3	191	17	0.687	0.040
Total & Averages			**204**	**0.697**	**0.041**
Std Deviations				**0.009**	**0.001**
CVs				**1.344%**	**1.344%**

Table 2. Day 0 Pen Weights (17NOV15) of Male Cobb 500 Broilers Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen No.	No. Birds	Pen Wt (kg)	Avg Bird Wt (kg)
1	4	98	17	0.696	0.041
2	4	105	17	0.696	0.041
3	4	116	17	0.698	0.041
4	4	119	17	0.697	0.041
5	4	127	17	0.683	0.040
6	4	179	17	0.704	0.041
7	4	148	17	0.693	0.041
8	4	153	17	0.693	0.041
9	4	162	17	0.686	0.040
10	4	174	17	0.688	0.040
11	4	182	17	0.715	0.042
12	4	189	17	0.695	0.041
Total & Averages			**204**	**0.695**	**0.041**
Std Deviations				**0.008**	**0.000**
CVs				**1.208%**	**1.208%**

1	5	99	17	0.697	0.041
2	5	108	17	0.700	0.041
3	5	112	17	0.692	0.041
4	5	118	17	0.674	0.040
5	5	130	17	0.686	0.040
6	5	138	17	0.697	0.041
7	5	143	17	0.703	0.041
8	5	149	17	0.707	0.042
9	5	163	17	0.714	0.042
10	5	173	17	0.710	0.042
11	5	183	17	0.687	0.040
12	5	192	17	0.701	0.041
Total & Averages			**204**	**0.697**	**0.041**
Std Deviations				**0.011**	**0.001**
CVs				**1.614%**	**1.614%**

1	6	134	17	0.670	0.039
2	6	106	17	0.670	0.039
3	6	109	17	0.694	0.041
4	6	117	17	0.677	0.040
5	6	131	17	0.702	0.041
6	6	139	17	0.711	0.042
7	6	147	17	0.715	0.042
8	6	150	17	0.705	0.041
9	6	164	17	0.705	0.041
10	6	172	17	0.703	0.041
11	6	184	17	0.688	0.040
12	6	196	17	0.707	0.042
Total & Averages			**204**	**0.696**	**0.041**
Std Deviations				**0.016**	**0.001**
CVs				**2.266%**	**2.266%**

Table 2. Day 0 Pen Weights (17NOV15) of Male Cobb 500 Broilers Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen No.	No. Birds	Pen Wt (kg)	Avg Bird Wt (kg)
1	7	100	17	0.694	0.041
2	7	107	17	0.696	0.041
3	7	114	17	0.706	0.042
4	7	121	17	0.699	0.041
5	7	125	17	0.705	0.041
6	7	180	17	0.708	0.042
7	7	146	17	0.719	0.042
8	7	156	17	0.716	0.042
9	7	159	17	0.708	0.042
10	7	168	17	0.698	0.041
11	7	181	17	0.683	0.040
12	7	194	17	0.682	0.040
Total & Averages			**204**	**0.701**	**0.041**
Std Deviations				**0.012**	**0.001**
CVs				**1.643%**	**1.643%**

1	8	136	17	0.679	0.040
2	8	104	17	0.694	0.041
3	8	111	17	0.695	0.041
4	8	124	17	0.687	0.040
5	8	129	17	0.712	0.042
6	8	178	17	0.707	0.042
7	8	145	17	0.679	0.040
8	8	155	17	0.702	0.041
9	8	165	17	0.688	0.040
10	8	167	17	0.694	0.041
11	8	187	17	0.691	0.041
12	8	193	17	0.687	0.040
Total & Averages			**204**	**0.693**	**0.041**
Std Deviations				**0.010**	**0.001**
CVs				**1.467%**	**1.467%**

Table 4. Bird Weights and Feed Conversion Days 0 - 14 (01DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D14	D14 Pen Wt (kg)	D14 Avg Bird Wt (kg)	D0-14 Avg Bird Gain (kg)	Feed Conversion D0-14	Adj. Feed Conversion D0-14
1	1	97	17	0	0	0	17	5.220	0.307	0.266	1 332	1.332
2	1	103	17	0	0	0	17	5.140	0.302	0.263	1 394	1.394
3	1	110	17	0	0	0	17	5.100	0.300	0.259	1 360	1.360
4	1	122	17	0	0	0	17	5.400	0.318	0.278	1 361	1.361
5	1	132	17	0	0	0	17	5.020	0.295	0.255	1 375	1.375
6	1	177	17	0	0	0	17	5.140	0.302	0.262	1 346	1.346
7	1	141	17	0	0	0	17	5.280	0.311	0.269	1 379	1.379
8	1	152	17	0	0	0	17	5.140	0.302	0.261	1 392	1.392
9	1	160	17	0	0	0	17	5.400	0.318	0.276	1 332	1.332
10	1	170	17	0	0	0	17	5.180	0.305	0.264	1 348	1.348
11	1	186	17	0	0	0	17	5.220	0.307	0.266	1 335	1.335
12	1	190	17	0	0	0	17	5.100	0.300	0.260	1 366	1.366
Totals & Avgs			**204**	**0**	**0**	**0**	**204**	**5.195**	**0.306**	**0.265**	**1.360**	**1.360**
Std. Deviations								**0.117**	**0.007**	**0.007**	**0.022**	**0.022**
CVs								**2.252%**	**2.252%**	**2.543%**	**1.617%**	**1.617%**
1	2	133	17	0	0	0	17	5.660	0.333	0.294	1 370	1.370
2	2	102	17	0	0	0	17	5.780	0.340	0.299	1 320	1.320
3	2	113	17	0	0	0	17	5.820	0.342	0.301	1 301	1.301
4	2	123	17	0	0	0	17	5.860	0.345	0.304	1 321	1.321
5	2	126	17	1	0	0	16	5.700	0.356	0.314	1 399	1.366
6	2	140	17	0	0	0	17	6.100	0.359	0.317	1 319	1.319
7	2	144	17	0	0	0	17	6.120	0.360	0.318	1 355	1.355
8	2	151	17	0	0	0	17	6.220	0.366	0.324	1 342	1.342
9	2	166	17	0	0	0	17	5.880	0.346	0.305	1 332	1.332
10	2	169	17	0	0	0	17	5.840	0.344	0.303	1 311	1.311
11	2	188	17	0	0	0	17	5.860	0.345	0.304	1 321	1.321
12	2	195	17	0	0	0	17	5.800	0.341	0.300	1 366	1.366
Totals & Avgs			**204**	**1**	**0**	**0**	**203**	**5.887**	**0.348**	**0.307**	**1.338**	**1.335**
Std. Deviations								**0.172**	**0.010**	**0.009**	**0.029**	**0.024**
CVs								**2.917%**	**2.826%**	**2.953%**	**2.157%**	**1.772%**
1	3	135	17	0	1	0	16	5.220	0.326	0.286	1.449	1.367
2	3	101	17	0	0	0	17	5.680	0.334	0.293	1 311	1.311
3	3	115	17	0	0	0	17	5.660	0.333	0.291	1 312	1.312
4	3	120	17	0	0	0	17	5.800	0.341	0.301	1 315	1.315
5	3	128	17	0	0	0	17	5.560	0.327	0.287	1 326	1.326
6	3	137	17	0	0	0	17	5.980	0.352	0.310	1 277	1.277
7	3	142	17	0	0	0	17	5.880	0.346	0.304	1 329	1.329
8	3	154	17	2	0	0	15	5.340	0.356	0.315	1 349	1.329
9	3	161	17	0	0	0	17	5.780	0.340	0.299	1 303	1.303
10	3	171	17	1	1	0	15	5.060	0.337	0.296	1 386	1.345
11	3	185	17	0	0	0	17	5.840	0.344	0.303	1 309	1.309
12	3	191	17	0	0	0	17	5.780	0.340	0.300	1 316	1.316
Totals & Avgs			**204**	**3**	**2**	**0**	**199**	**5.632**	**0.340**	**0.299**	**1.332**	**1.320**
Std. Deviations								**0.284**	**0.009**	**0.009**	**0.045**	**0.022**
CVs								**5.046%**	**2.648%**	**2.946%**	**3.401%**	**1.681%**
1	4	98	17	0	0	0	17	5.900	0.347	0.306	1 291	1.291
2	4	105	17	0	0	0	17	5.840	0.344	0.303	1 256	1.256
3	4	116	17	0	0	0	17	5.860	0.345	0.304	1 282	1.282
4	4	119	17	0	0	0	17	5.980	0.352	0.311	1 314	1.314
5	4	127	17	0	0	0	17	5.880	0.346	0.306	1 274	1.274
6	4	179	17	0	0	0	17	5.740	0.338	0.296	1 307	1.307
7	4	148	17	0	0	0	17	6.160	0.362	0.322	1 354	1.354
8	4	153	17	0	0	0	17	6.040	0.355	0.315	1 309	1.309
9	4	162	17	0	0	0	17	6.060	0.356	0.316	1 254	1.254
10	4	174	17	0	0	0	17	5.780	0.340	0.300	1 280	1.280
11	4	182	17	0	1	0	16	5.660	0.354	0.312	1 294	1.264
12	4	189	17	0	0	0	17	5.760	0.339	0.298	1 283	1.283
Totals & Avgs			**204**	**0**	**1**	**0**	**203**	**5.888**	**0.348**	**0.307**	**1.292**	**1.289**
Std. Deviations								**0.148**	**0.008**	**0.008**	**0.027**	**0.028**
CVs								**2.510%**	**2.241%**	**2.550%**	**2.106%**	**2.196%**

Table 4. Bird Weights and Feed Conversion Days 0 - 14 (01DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D14	D14 Pen Wt (kg)	D14 Avg Bird Wt (kg)	D0-14 Avg Bird Gain (kg)	Feed Conversion D0-14	Adj. Feed Conversion D0-14
1	5	99	17	0	0	0	17	6.140	0.361	0.320	1 246	1.246
2	5	108	17	0	0	0	17	6.000	0.353	0.312	1 234	1.234
3	5	112	17	0	0	0	17	6.140	0.361	0.320	1 270	1.270
4	5	118	17	0	0	0	17	6.260	0.368	0.329	1 246	1.246
5	5	130	17	0	0	0	17	6.060	0.356	0.316	1 303	1.303
6	5	138	17	0	0	0	17	6.120	0.360	0.319	1 265	1.265
7	5	143	17	0	0	0	17	6.380	0.375	0.334	1 261	1.261
8	5	149	17	0	0	0	17	6.220	0.366	0.324	1 291	1.291
9	5	163	17	0	0	0	17	6.420	0.378	0.336	1 262	1.262
10	5	173	17	0	0	0	17	6.440	0.379	0.337	1 271	1.271
11	5	183	17	0	0	0	17	6.300	0.371	0.330	1 244	1.244
12	5	192	17	0	0	0	17	6.280	0.369	0.328	1 269	1.269
Totals & Avgs			**204**	**0**	**0**	**0**	**204**	**6.230**	**0.366**	**0.325**	**1.263**	**1.263**
Std. Deviations								**0.142**	**0.008**	**0.008**	**0.020**	**0.020**
CVs								**2.276%**	**2.276%**	**2.487%**	**1.572%**	**1.572%**
1	6	134	17	0	0	0	17	6.400	0.376	0.337	1 302	1.302
2	6	106	17	0	0	0	17	6.200	0.365	0.325	1 251	1.251
3	6	109	17	0	0	0	17	6.440	0.379	0.338	1 257	1.257
4	6	117	17	0	0	0	17	6.120	0.360	0.320	1 238	1.238
5	6	131	17	0	0	0	17	6.300	0.371	0.329	1 261	1.261
6	6	139	17	0	0	0	17	6.360	0.374	0.332	1 232	1.232
7	6	147	17	0	0	0	17	6.720	0.395	0.353	1 302	1.302
8	6	150	17	0	0	0	17	6.400	0.376	0.335	1 324	1.324
9	6	164	17	0	0	0	17	6.760	0.398	0.356	1 252	1.252
10	6	172	17	0	0	0	17	6.420	0.378	0.336	1 231	1.231
11	6	184	17	0	0	0	17	6.500	0.382	0.342	1 215	1.215
12	6	196	17	0	0	0	17	6.400	0.376	0.335	1 226	1.226
Totals & Avgs			**204**	**0**	**0**	**0**	**204**	**6.418**	**0.378**	**0.337**	**1.258**	**1.258**
Std. Deviations								**0.183**	**0.011**	**0.010**	**0.034**	**0.034**
CVs								**2.857%**	**2.857%**	**3.057%**	**2.733%**	**2.733%**
1	7	100	17	0	0	0	17	6.480	0.381	0.340	1 258	1.258
2	7	107	17	0	0	0	17	6.280	0.369	0.328	1 239	1.239
3	7	114	17	0	0	0	17	6.520	0.384	0.342	1 245	1.245
4	7	121	17	0	0	0	17	6.300	0.371	0.329	1 278	1.278
5	7	125	17	0	1	0	16	5.700	0.356	0.315	1 309	1.300
6	7	180	17	1	0	0	16	6.000	0.375	0.333	1 266	1.252
7	7	146	17	0	0	0	17	6.540	0.385	0.342	1 261	1.261
8	7	156	17	0	0	0	17	6.580	0.387	0.345	1 262	1.262
9	7	159	17	0	0	0	17	6.500	0.382	0.341	1 264	1.264
10	7	168	17	0	0	0	17	5.320	0.313	0.272	1 225	1.225
11	7	181	17	0	0	0	17	6.400	0.376	0.336	1 231	1.231
12	7	194	17	0	0	0	17	6.340	0.373	0.333	1 251	1.251
Totals & Avgs			**204**	**1**	**1**	**0**	**202**	**6.247**	**0.371**	**0.330**	**1.258**	**1.256**
Std. Deviations								**0.387**	**0.020**	**0.020**	**0.022**	**0.020**
CVs								**6.191%**	**5.437%**	**6.074%**	**1.786%**	**1.621%**
1	8	136	17	0	0	0	17	6.280	0.369	0.329	1 303	1.303
2	8	104	17	0	0	0	17	6.280	0.369	0.329	1 260	1.260
3	8	111	17	2	0	0	15	5.880	0.392	0.351	1 308	1.285
4	8	124	17	1	0	0	16	6.060	0.379	0.338	1 269	1.256
5	8	129	17	1	0	0	16	6.280	0.393	0.351	1 243	1.231
6	8	178	17	0	1	0	16	5.880	0.368	0.326	1 311	1.280
7	8	145	17	0	0	0	17	6.560	0.386	0.346	1 251	1.251
8	8	155	17	0	0	0	17	6.600	0.388	0.347	1 234	1.234
9	8	165	17	0	0	0	17	6.720	0.395	0.355	1 240	1.240
10	8	167	17	0	0	0	17	6.760	0.398	0.357	1 220	1.220
11	8	187	17	0	0	0	17	6.540	0.385	0.344	1 241	1.241
12	8	193	17	0	0	0	17	6.580	0.387	0.347	1 246	1.246
Totals & Avgs			**204**	**4**	**1**	**0**	**199**	**6.368**	**0.384**	**0.343**	**1.261**	**1.254**
Std. Deviations								**0.307**	**0.010**	**0.010**	**0.031**	**0.025**
CVs								**4.822%**	**2.727%**	**3.039%**	**2.438%**	**1.960%**

Graph 1. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 14) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.265	1.360	Low Phosphate (LP)
2	0.307	1.335	High Phosphate (HP)
3	0.299	1.320	250 Units Phytase (LP)
4	0.307	1.289	500 Units Phytase (LP)
5	0.325	1.263	1000 Units Phytase (LP)
6	0.337	1.258	3000 Units Phytase (LP)
7	0.330	1.256	6000 Units Phytase (LP)
8	0.343	1.254	60000 Units Phytase (LP)

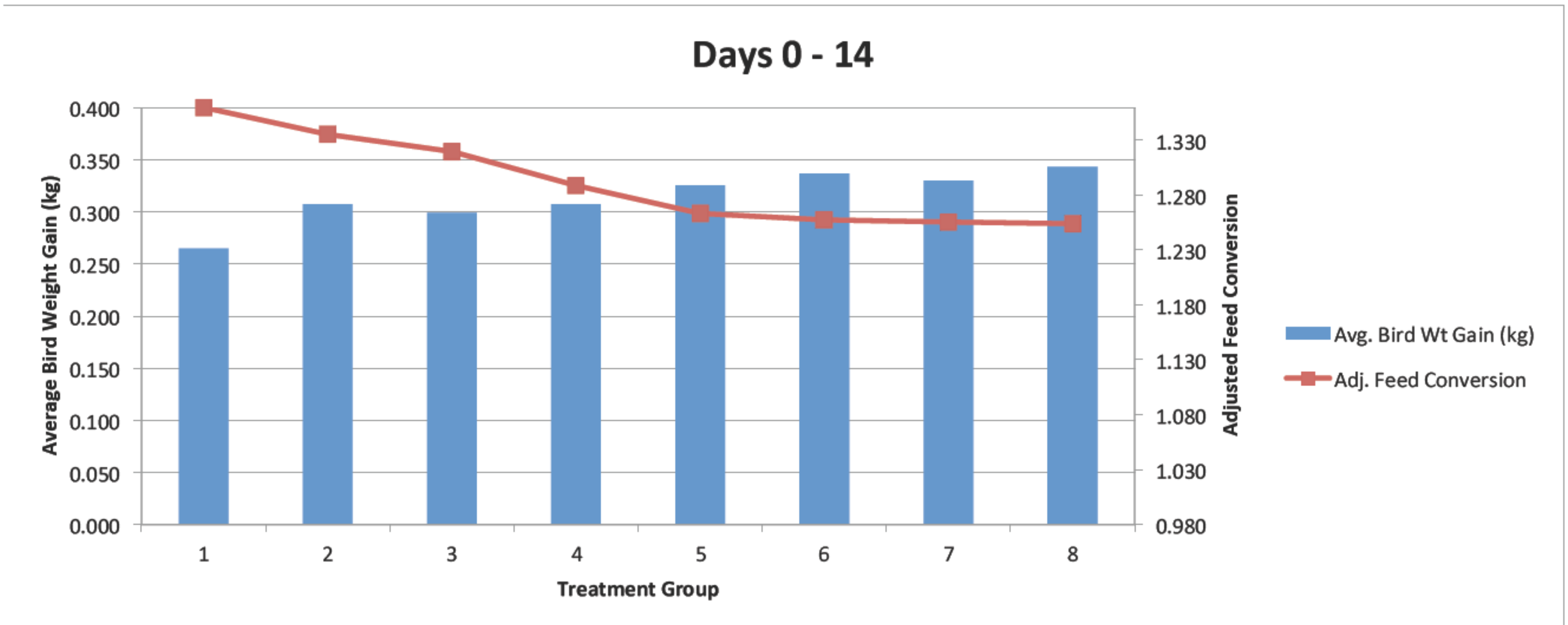


Table 6. Bird Weights and Feed Conversion Days 0 - 21 (08DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	1	97	17	0	0	0	17	10.620	0.625	0.584	1.389	1.389
2	1	103	17	0	0	0	17	10.660	0.627	0.587	1.402	1.402
3	1	110	17	0	0	0	17	10.680	0.628	0.587	1.419	1.419
4	1	122	17	0	0	0	17	11.100	0.653	0.613	1.378	1.378
5	1	132	17	0	0	0	17	10.340	0.608	0.568	1.403	1.403
6	1	177	17	0	0	0	17	10.600	0.624	0.583	1.355	1.355
7	1	141	17	0	0	0	17	10.720	0.631	0.589	1.391	1.391
8	1	152	17	0	0	0	17	10.640	0.626	0.585	1.424	1.424
9	1	160	17	0	0	0	17	11.160	0.656	0.615	1.405	1.405
10	1	170	17	0	0	0	17	10.840	0.638	0.597	1.380	1.380
11	1	186	17	0	0	0	17	10.380	0.611	0.570	1.361	1.361
12	1	190	17	0	0	0	17	10.500	0.618	0.578	1.375	1.375
Totals & Avgs			**204**	**0**	**0**	**0**	**204**	**10.687**	**0.629**	**0.588**	**1.390**	**1.390**
Std. Deviations								**0.249**	**0.015**	**0.015**	**0.022**	**0.022**
CVs								**2.332%**	**2.332%**	**2.485%**	**1.551%**	**1.551%**
1	2	133	17	0	0	0	17	12.500	0.735	0.696	1.357	1.357
2	2	102	17	0	0	0	17	12.760	0.751	0.710	1.347	1.347
3	2	113	17	0	0	0	17	12.720	0.748	0.707	1.333	1.333
4	2	123	17	0	0	0	17	12.780	0.752	0.712	1.334	1.334
5	2	126	17	1	0	0	16	12.220	0.764	0.722	1.380	1.365
6	2	140	17	0	0	0	17	13.060	0.768	0.727	1.339	1.339
7	2	144	17	0	0	0	17	13.140	0.773	0.731	1.352	1.352
8	2	151	17	0	0	0	17	13.640	0.802	0.760	1.357	1.357
9	2	166	17	0	0	0	17	12.860	0.756	0.715	1.359	1.359
10	2	169	17	0	0	0	17	12.920	0.760	0.720	1.342	1.342
11	2	188	17	0	0	0	17	12.760	0.751	0.710	1.360	1.360
12	2	195	17	0	0	0	17	12.860	0.756	0.716	1.368	1.368
Totals & Avgs			**204**	**1**	**0**	**0**	**203**	**12.852**	**0.760**	**0.719**	**1.352**	**1.351**
Std. Deviations								**0.346**	**0.017**	**0.016**	**0.014**	**0.012**
CVs								**2.690%**	**2.196%**	**2.223%**	**1.033%**	**0.878%**
1	3	135	17	0	1	0	16	11.280	0.705	0.664	1.398	1.363
2	3	101	17	0	0	0	17	12.260	0.721	0.681	1.350	1.350
3	3	115	17	0	0	0	17	12.240	0.720	0.678	1.334	1.334
4	3	120	17	0	0	0	17	12.440	0.732	0.691	1.339	1.339
5	3	128	17	0	0	0	17	12.120	0.713	0.672	1.345	1.345
6	3	137	17	0	0	0	17	12.980	0.764	0.722	1.338	1.338
7	3	142	17	0	0	0	17	12.780	0.752	0.710	1.351	1.351
8	3	154	17	2	0	0	15	11.460	0.764	0.723	1.377	1.368
9	3	161	17	0	0	0	17	12.160	0.715	0.674	1.365	1.365
10	3	171	17	1	1	0	15	11.160	0.744	0.703	1.379	1.362
11	3	185	17	0	0	0	17	12.320	0.725	0.684	1.355	1.355
12	3	191	17	0	0	0	17	12.660	0.745	0.704	1.328	1.328
Totals & Avgs			**204**	**3**	**2**	**0**	**199**	**12.155**	**0.733**	**0.692**	**1.355**	**1.350**
Std. Deviations								**0.579**	**0.020**	**0.020**	**0.021**	**0.013**
CVs								**4.767%**	**2.722%**	**2.851%**	**1.550%**	**0.980%**

Table 6. Bird Weights and Feed Conversion Days 0 - 21 (08DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	4	98	17	0	0	0	17	12.760	0.751	0.710	1.333	1.333
2	4	105	17	0	0	0	17	12.620	0.742	0.701	1.315	1.315
3	4	116	17	0	0	0	17	12.940	0.761	0.720	1.318	1.318
4	4	119	17	0	0	0	17	12.800	0.753	0.712	1.330	1.330
5	4	127	17	0	0	0	17	12.020	0.707	0.667	1.332	1.332
6	4	179	17	0	0	0	17	12.380	0.728	0.687	1.329	1.329
7	4	148	17	0	0	0	17	13.320	0.784	0.743	1.383	1.383
8	4	153	17	0	0	0	17	12.660	0.745	0.704	1.349	1.349
9	4	162	17	0	0	0	17	13.080	0.769	0.729	1.305	1.305
10	4	174	17	0	0	0	17	12.840	0.755	0.715	1.294	1.294
11	4	182	17	0	1	0	16	11.840	0.740	0.698	1.332	1.318
12	4	189	17	0	0	0	17	12.440	0.732	0.691	1.323	1.323
Totals & Avgs			**204**	**0**	**1**	**0**	**203**	**12.642**	**0.747**	**0.706**	**1.329**	**1.327**
Std. Deviations								**0.422**	**0.020**	**0.020**	**0.022**	**0.022**
CVs								**3.338%**	**2.679%**	**2.839%**	**1.677%**	**1.691%**
1	5	99	17	0	0	0	17	13.720	0.807	0.766	1.299	1.299
2	5	108	17	0	0	0	17	13.120	0.772	0.731	1.306	1.306
3	5	112	17	0	0	0	17	13.420	0.789	0.749	1.315	1.315
4	5	118	17	0	0	0	17	13.500	0.794	0.754	1.304	1.304
5	5	130	17	0	0	0	17	12.980	0.764	0.723	1.339	1.339
6	5	138	17	1	0	0	16	12.620	0.789	0.748	1.330	1.299
7	5	143	17	0	0	0	17	13.720	0.807	0.766	1.298	1.298
8	5	149	17	0	0	0	17	13.760	0.809	0.768	1.324	1.324
9	5	163	17	0	0	0	17	13.920	0.819	0.777	1.319	1.319
10	5	173	17	0	0	0	17	14.200	0.835	0.794	1.311	1.311
11	5	183	17	0	0	0	17	12.880	0.758	0.717	1.317	1.317
12	5	192	17	0	0	0	17	13.680	0.805	0.763	1.313	1.313
Totals & Avgs			**204**	**1**	**0**	**0**	**203**	**13.460**	**0.796**	**0.755**	**1.315**	**1.312**
Std. Deviations								**0.469**	**0.023**	**0.022**	**0.012**	**0.012**
CVs								**3.488%**	**2.880%**	**2.979%**	**0.935%**	**0.914%**
1	6	134	17	1	0	0	16	13.360	0.835	0.796	1.376	1.330
2	6	106	17	0	0	0	17	13.540	0.796	0.757	1.313	1.313
3	6	109	17	0	0	0	17	13.960	0.821	0.780	1.315	1.315
4	6	117	17	0	0	0	17	13.340	0.785	0.745	1.295	1.295
5	6	131	17	0	0	0	17	13.640	0.802	0.761	1.316	1.316
6	6	139	17	0	0	0	17	13.760	0.809	0.768	1.292	1.292
7	6	147	17	0	0	0	17	14.520	0.854	0.812	1.362	1.362
8	6	150	17	0	0	0	17	14.000	0.824	0.782	1.337	1.337
9	6	164	17	0	0	0	17	14.760	0.868	0.827	1.319	1.319
10	6	172	17	0	0	0	17	14.100	0.829	0.788	1.281	1.281
11	6	184	17	0	0	0	17	13.500	0.794	0.754	1.299	1.299
12	6	196	17	0	0	0	17	13.820	0.813	0.771	1.315	1.315
Totals & Avgs			**204**	**1**	**0**	**0**	**203**	**13.858**	**0.819**	**0.778**	**1.318**	**1.314**
Std. Deviations								**0.442**	**0.025**	**0.024**	**0.028**	**0.022**
CVs								**3.187%**	**3.025%**	**3.132%**	**2.126%**	**1.665%**

Table 6. Bird Weights and Feed Conversion Days 0 - 21 (08DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D0-21 Avg Bird Gain (kg)	Feed Conversion D0-21	Adj. Feed Conversion D0-21
1	7	100	17	0	0	0	17	14.140	0.832	0.791	1.318	1.318
2	7	107	17	0	0	0	17	13.660	0.804	0.763	1.316	1.316
3	7	114	17	0	0	0	17	14.120	0.831	0.789	1.318	1.318
4	7	121	17	0	0	0	17	13.620	0.801	0.760	1.314	1.314
5	7	125	17	0	1	0	16	12.180	0.761	0.720	1.344	1.339
6	7	180	17	1	0	0	16	12.900	0.806	0.765	1.307	1.301
7	7	146	17	0	0	0	17	13.980	0.822	0.780	1.317	1.317
8	7	156	17	0	0	0	17	13.920	0.819	0.777	1.324	1.324
9	7	159	17	0	0	0	17	14.400	0.847	0.805	1.313	1.313
10	7	168	17	0	0	0	17	12.800	0.753	0.712	1.190	1.190
11	7	181	17	0	0	0	17	13.700	0.806	0.766	1.292	1.292
12	7	194	17	0	0	0	17	13.760	0.809	0.769	1.311	1.311
Totals & Avgs			**204**	**1**	**1**	**0**	**202**	**13.598**	**0.808**	**0.766**	**1.305**	**1.304**
Std. Deviations								**0.649**	**0.027**	**0.027**	**0.038**	**0.038**
CVs								**4.773%**	**3.384%**	**3.550%**	**2.927%**	**2.900%**
1	8	136	17	1	0	0	16	13.180	0.824	0.784	1.403	1.342
2	8	104	17	0	0	0	17	14.000	0.824	0.783	1.309	1.309
3	8	111	17	2	0	0	15	12.900	0.860	0.819	1.334	1.324
4	8	124	17	1	0	0	16	13.100	0.819	0.778	1.326	1.320
5	8	129	17	1	0	0	16	13.600	0.850	0.808	1.316	1.310
6	8	178	17	0	1	0	16	12.840	0.803	0.761	1.337	1.323
7	8	145	17	0	0	0	17	14.360	0.845	0.805	1.313	1.313
8	8	155	17	0	0	0	17	14.200	0.835	0.794	1.314	1.314
9	8	165	17	0	0	0	17	14.440	0.849	0.809	1.337	1.337
10	8	167	17	0	0	0	17	14.900	0.876	0.836	1.280	1.280
11	8	187	17	0	0	0	17	14.300	0.841	0.801	1.292	1.292
12	8	193	17	0	0	0	17	14.420	0.848	0.808	1.306	1.306
Totals & Avgs			**204**	**5**	**1**	**0**	**198**	**13.853**	**0.839**	**0.799**	**1.322**	**1.314**
Std. Deviations								**0.699**	**0.020**	**0.020**	**0.031**	**0.017**
CVs								**5.048%**	**2.388%**	**2.516%**	**2.331%**	**1.310%**

Table 8. Bird Weights and Feed Conversion Days 14 - 21 (08DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	1	97	17	0	0	0	17	10.620	0.625	0.318	1.437	1.437
2	1	103	17	0	0	0	17	10.660	0.627	0.325	1.409	1.409
3	1	110	17	0	0	0	17	10.680	0.628	0.328	1.466	1.466
4	1	122	17	0	0	0	17	11.100	0.653	0.335	1.393	1.393
5	1	132	17	0	0	0	17	10.340	0.608	0.313	1.425	1.425
6	1	177	17	0	0	0	17	10.600	0.624	0.321	1.363	1.363
7	1	141	17	0	0	0	17	10.720	0.631	0.320	1.401	1.401
8	1	152	17	0	0	0	17	10.640	0.626	0.324	1.451	1.451
9	1	160	17	0	0	0	17	11.160	0.656	0.339	1.465	1.465
10	1	170	17	0	0	0	17	10.840	0.638	0.333	1.406	1.406
11	1	186	17	0	0	0	17	10.380	0.611	0.304	1.384	1.384
12	1	190	17	0	0	0	17	10.500	0.618	0.318	1.381	1.381
Totals & Avgs			**204**	**0**	**0**	**0**	**204**	**10.687**	**0.629**	**0.323**	**1.415**	**1.415**
Std. Deviations								**0.249**	**0.015**	**0.010**	**0.034**	**0.034**
CVs								**2.332%**	**2.332%**	**3.069%**	**2.395%**	**2.395%**
1	2	133	17	0	0	0	17	12.500	0.735	0.402	1.348	1.348
2	2	102	17	0	0	0	17	12.760	0.751	0.411	1.367	1.367
3	2	113	17	0	0	0	17	12.720	0.748	0.406	1.357	1.357
4	2	123	17	0	0	0	17	12.780	0.752	0.407	1.344	1.344
5	2	126	16	0	0	0	16	12.220	0.764	0.408	1.365	1.365
6	2	140	17	0	0	0	17	13.060	0.768	0.409	1.353	1.353
7	2	144	17	0	0	0	17	13.140	0.773	0.413	1.350	1.350
8	2	151	17	0	0	0	17	13.640	0.802	0.436	1.369	1.369
9	2	166	17	0	0	0	17	12.860	0.756	0.411	1.378	1.378
10	2	169	17	0	0	0	17	12.920	0.760	0.416	1.364	1.364
11	2	188	17	0	0	0	17	12.760	0.751	0.406	1.388	1.388
12	2	195	17	0	0	0	17	12.860	0.756	0.415	1.368	1.368
Totals & Avgs			**203**	**0**	**0**	**0**	**203**	**12.852**	**0.760**	**0.412**	**1.363**	**1.363**
Std. Deviations								**0.346**	**0.017**	**0.009**	**0.013**	**0.013**
CVs								**2.690%**	**2.196%**	**2.139%**	**0.950%**	**0.950%**
1	3	135	16	0	0	0	16	11.280	0.705	0.379	1.360	1.360
2	3	101	17	0	0	0	17	12.260	0.721	0.387	1.380	1.380
3	3	115	17	0	0	0	17	12.240	0.720	0.387	1.350	1.350
4	3	120	17	0	0	0	17	12.440	0.732	0.391	1.358	1.358
5	3	128	17	0	0	0	17	12.120	0.713	0.386	1.360	1.360
6	3	137	17	0	0	0	17	12.980	0.764	0.412	1.383	1.383
7	3	142	17	0	0	0	17	12.780	0.752	0.406	1.368	1.368
8	3	154	15	0	0	0	15	11.460	0.764	0.408	1.399	1.399
9	3	161	17	0	0	0	17	12.160	0.715	0.375	1.414	1.414
10	3	171	15	0	0	0	15	11.160	0.744	0.407	1.374	1.374
11	3	185	17	0	0	0	17	12.320	0.725	0.381	1.392	1.392
12	3	191	17	0	0	0	17	12.660	0.745	0.405	1.337	1.337
Totals & Avgs			**199**	**0**	**0**	**0**	**199**	**12.155**	**0.733**	**0.394**	**1.373**	**1.373**
Std. Deviations								**0.579**	**0.020**	**0.013**	**0.022**	**0.022**
CVs								**4.767%**	**2.722%**	**3.292%**	**1.591%**	**1.591%**

Graph 2. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 21) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.588	1.390	Low Phosphate (LP)
2	0.719	1.351	High Phosphate (HP)
3	0.692	1.350	250 Units Phytase (LP)
4	0.706	1.327	500 Units Phytase (LP)
5	0.755	1.312	1000 Units Phytase (LP)
6	0.778	1.314	3000 Units Phytase (LP)
7	0.766	1.304	6000 Units Phytase (LP)
8	0.799	1.314	60000 Units Phytase (LP)

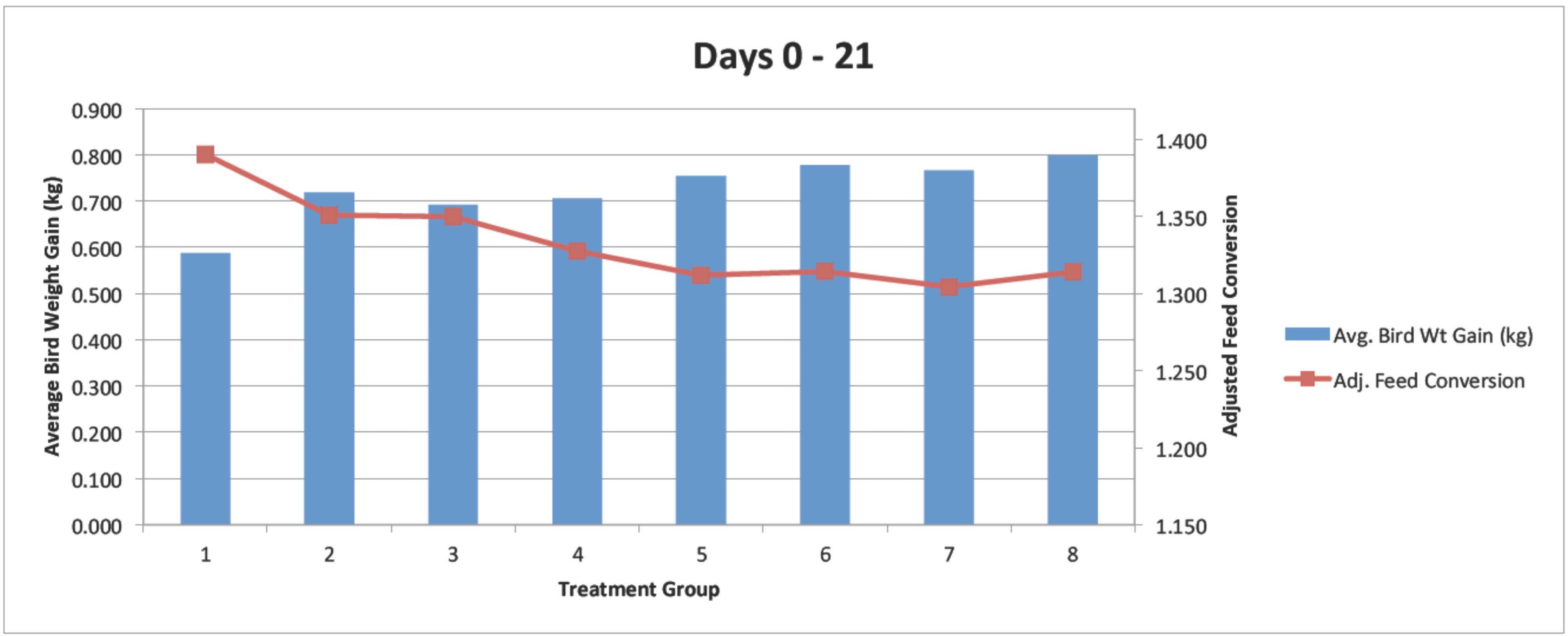


Table 8. Bird Weights and Feed Conversion Days 14 - 21 (08DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	1	97	17	0	0	0	17	10.620	0.625	0.318	1.437	1.437
2	1	103	17	0	0	0	17	10.660	0.627	0.325	1.409	1.409
3	1	110	17	0	0	0	17	10.680	0.628	0.328	1.466	1.466
4	1	122	17	0	0	0	17	11.100	0.653	0.335	1.393	1.393
5	1	132	17	0	0	0	17	10.340	0.608	0.313	1.425	1.425
6	1	177	17	0	0	0	17	10.600	0.624	0.321	1.363	1.363
7	1	141	17	0	0	0	17	10.720	0.631	0.320	1.401	1.401
8	1	152	17	0	0	0	17	10.640	0.626	0.324	1.451	1.451
9	1	160	17	0	0	0	17	11.160	0.656	0.339	1.465	1.465
10	1	170	17	0	0	0	17	10.840	0.638	0.333	1.406	1.406
11	1	186	17	0	0	0	17	10.380	0.611	0.304	1.384	1.384
12	1	190	17	0	0	0	17	10.500	0.618	0.318	1.381	1.381
Totals & Avgs			**204**	**0**	**0**	**0**	**204**	**10.687**	**0.629**	**0.323**	**1.415**	**1.415**
Std. Deviations								**0.249**	**0.015**	**0.010**	**0.034**	**0.034**
CVs								**2.332%**	**2.332%**	**3.069%**	**2.395%**	**2.395%**
1	2	133	17	0	0	0	17	12.500	0.735	0.402	1.348	1.348
2	2	102	17	0	0	0	17	12.760	0.751	0.411	1.367	1.367
3	2	113	17	0	0	0	17	12.720	0.748	0.406	1.357	1.357
4	2	123	17	0	0	0	17	12.780	0.752	0.407	1.344	1.344
5	2	126	16	0	0	0	16	12.220	0.764	0.408	1.365	1.365
6	2	140	17	0	0	0	17	13.060	0.768	0.409	1.353	1.353
7	2	144	17	0	0	0	17	13.140	0.773	0.413	1.350	1.350
8	2	151	17	0	0	0	17	13.640	0.802	0.436	1.369	1.369
9	2	166	17	0	0	0	17	12.860	0.756	0.411	1.378	1.378
10	2	169	17	0	0	0	17	12.920	0.760	0.416	1.364	1.364
11	2	188	17	0	0	0	17	12.760	0.751	0.406	1.388	1.388
12	2	195	17	0	0	0	17	12.860	0.756	0.415	1.368	1.368
Totals & Avgs			**203**	**0**	**0**	**0**	**203**	**12.852**	**0.760**	**0.412**	**1.363**	**1.363**
Std. Deviations								**0.346**	**0.017**	**0.009**	**0.013**	**0.013**
CVs								**2.690%**	**2.196%**	**2.139%**	**0.950%**	**0.950%**
1	3	135	16	0	0	0	16	11.280	0.705	0.379	1.360	1.360
2	3	101	17	0	0	0	17	12.260	0.721	0.387	1.380	1.380
3	3	115	17	0	0	0	17	12.240	0.720	0.387	1.350	1.350
4	3	120	17	0	0	0	17	12.440	0.732	0.391	1.358	1.358
5	3	128	17	0	0	0	17	12.120	0.713	0.386	1.360	1.360
6	3	137	17	0	0	0	17	12.980	0.764	0.412	1.383	1.383
7	3	142	17	0	0	0	17	12.780	0.752	0.406	1.368	1.368
8	3	154	15	0	0	0	15	11.460	0.764	0.408	1.399	1.399
9	3	161	17	0	0	0	17	12.160	0.715	0.375	1.414	1.414
10	3	171	15	0	0	0	15	11.160	0.744	0.407	1.374	1.374
11	3	185	17	0	0	0	17	12.320	0.725	0.381	1.392	1.392
12	3	191	17	0	0	0	17	12.660	0.745	0.405	1.337	1.337
Totals & Avgs			**199**	**0**	**0**	**0**	**199**	**12.155**	**0.733**	**0.394**	**1.373**	**1.373**
Std. Deviations								**0.579**	**0.020**	**0.013**	**0.022**	**0.022**
CVs								**4.767%**	**2.722%**	**3.292%**	**1.591%**	**1.591%**

Table 8. Bird Weights and Feed Conversion Days 14 - 21 (08DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	4	98	17	0	0	0	17	12.760	0.751	0.404	1.364	1.364
2	4	105	17	0	0	0	17	12.620	0.742	0.399	1.360	1.360
3	4	116	17	0	0	0	17	12.940	0.761	0.416	1.345	1.345
4	4	119	17	0	0	0	17	12.800	0.753	0.401	1.343	1.343
5	4	127	17	0	0	0	17	12.020	0.707	0.361	1.381	1.381
6	4	179	17	0	0	0	17	12.380	0.728	0.391	1.346	1.346
7	4	148	17	0	0	0	17	13.320	0.784	0.421	1.405	1.405
8	4	153	17	0	0	0	17	12.660	0.745	0.389	1.381	1.381
9	4	162	17	0	0	0	17	13.080	0.769	0.413	1.345	1.345
10	4	174	17	0	0	0	17	12.840	0.755	0.415	1.303	1.303
11	4	182	16	0	0	0	16	11.840	0.740	0.386	1.362	1.362
12	4	189	17	0	0	0	17	12.440	0.732	0.393	1.353	1.353
Totals & Avgs			**203**	**0**	**0**	**0**	**203**	**12.642**	**0.747**	**0.399**	**1.357**	**1.357**
Std. Deviations								**0.422**	**0.020**	**0.017**	**0.025**	**0.025**
CVs								**3.338%**	**2.679%**	**4.188%**	**1.867%**	**1.867%**
1	5	99	17	0	0	0	17	13.720	0.807	0.446	1.338	1.338
2	5	108	17	0	0	0	17	13.120	0.772	0.419	1.360	1.360
3	5	112	17	0	0	0	17	13.420	0.789	0.428	1.349	1.349
4	5	118	17	0	0	0	17	13.500	0.794	0.426	1.348	1.348
5	5	130	17	0	0	0	17	12.980	0.764	0.407	1.367	1.367
6	5	138	17	1	0	0	16	12.620	0.789	0.429	1.385	1.326
7	5	143	17	0	0	0	17	13.720	0.807	0.432	1.327	1.327
8	5	149	17	0	0	0	17	13.760	0.809	0.444	1.347	1.347
9	5	163	17	0	0	0	17	13.920	0.819	0.441	1.363	1.363
10	5	173	17	0	0	0	17	14.200	0.835	0.456	1.340	1.340
11	5	183	17	0	0	0	17	12.880	0.758	0.387	1.380	1.380
12	5	192	17	0	0	0	17	13.680	0.805	0.435	1.346	1.346
Totals & Avgs			**204**	**1**	**0**	**0**	**203**	**13.460**	**0.796**	**0.429**	**1.354**	**1.349**
Std. Deviations								**0.469**	**0.023**	**0.019**	**0.017**	**0.016**
CVs								**3.488%**	**2.880%**	**4.331%**	**1.267%**	**1.186%**
1	6	134	17	1	0	0	16	13.360	0.835	0.459	1.437	1.351
2	6	106	17	0	0	0	17	13.540	0.796	0.432	1.360	1.360
3	6	109	17	0	0	0	17	13.960	0.821	0.442	1.359	1.359
4	6	117	17	0	0	0	17	13.340	0.785	0.425	1.338	1.338
5	6	131	17	0	0	0	17	13.640	0.802	0.432	1.357	1.357
6	6	139	17	0	0	0	17	13.760	0.809	0.435	1.338	1.338
7	6	147	17	0	0	0	17	14.520	0.854	0.459	1.408	1.408
8	6	150	17	0	0	0	17	14.000	0.824	0.447	1.347	1.347
9	6	164	17	0	0	0	17	14.760	0.868	0.471	1.370	1.370
10	6	172	17	0	0	0	17	14.100	0.829	0.452	1.318	1.318
11	6	184	17	0	0	0	17	13.500	0.794	0.412	1.369	1.369
12	6	196	17	0	0	0	17	13.820	0.813	0.436	1.383	1.383
Totals & Avgs			**204**	**1**	**0**	**0**	**203**	**13.858**	**0.819**	**0.442**	**1.365**	**1.358**
Std. Deviations								**0.442**	**0.025**	**0.016**	**0.032**	**0.023**
CVs								**3.187%**	**3.025%**	**3.734%**	**2.366%**	**1.711%**

Table 8. Bird Weights and Feed Conversion Days 14 - 21 (08DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	7	100	17	0	0	0	17	14.140	0.832	0.451	1.363	1.363
2	7	107	17	0	0	0	17	13.660	0.804	0.434	1.374	1.374
3	7	114	17	0	0	0	17	14.120	0.831	0.447	1.374	1.374
4	7	121	17	0	0	0	17	13.620	0.801	0.431	1.342	1.342
5	7	125	16	0	0	0	16	12.180	0.761	0.405	1.370	1.370
6	7	180	16	0	0	0	16	12.900	0.806	0.431	1.339	1.339
7	7	146	17	0	0	0	17	13.980	0.822	0.438	1.360	1.360
8	7	156	17	0	0	0	17	13.920	0.819	0.432	1.373	1.373
9	7	159	17	0	0	0	17	14.400	0.847	0.465	1.349	1.349
10	7	168	17	0	0	0	17	12.800	0.753	0.440	1.168	1.168
11	7	181	17	0	0	0	17	13.700	0.806	0.429	1.340	1.340
12	7	194	17	0	0	0	17	13.760	0.809	0.436	1.356	1.356
Totals & Avgs			**202**	**0**	**0**	**0**	**202**	**13.598**	**0.808**	**0.437**	**1.342**	**1.342**
Std. Deviations								**0.649**	**0.027**	**0.014**	**0.056**	**0.056**
CVs								**4.773%**	**3.384%**	**3.278%**	**4.200%**	**4.200%**

Block	Trt	Pen No.	No. Birds Started Day 14	Mortality	Removal-1	Removal-2	No. Birds Weighed D21	D21 Pen Wt (kg)	D21 Avg Bird Wt (kg)	D14-21 Avg Bird Gain (kg)	Feed Conversion D14-21	Adj. Feed Conversion D14-21
1	8	136	17	1	0	0	16	13.180	0.824	0.454	1.484	1.370
2	8	104	17	0	0	0	17	14.000	0.824	0.454	1.345	1.345
3	8	111	15	0	0	0	15	12.900	0.860	0.468	1.353	1.353
4	8	124	16	0	0	0	16	13.100	0.819	0.440	1.369	1.369
5	8	129	16	0	0	0	16	13.600	0.850	0.458	1.372	1.372
6	8	178	16	0	0	0	16	12.840	0.803	0.435	1.356	1.356
7	8	145	17	0	0	0	17	14.360	0.845	0.459	1.359	1.359
8	8	155	17	0	0	0	17	14.200	0.835	0.447	1.376	1.376
9	8	165	17	0	0	0	17	14.440	0.849	0.454	1.412	1.412
10	8	167	17	0	0	0	17	14.900	0.876	0.479	1.324	1.324
11	8	187	17	0	0	0	17	14.300	0.841	0.456	1.330	1.330
12	8	193	17	0	0	0	17	14.420	0.848	0.461	1.352	1.352
Totals & Avgs			**199**	**1**	**0**	**0**	**198**	**13.853**	**0.839**	**0.455**	**1.369**	**1.360**
Std. Deviations								**0.699**	**0.020**	**0.012**	**0.043**	**0.023**
CVs								**5.048%**	**2.388%**	**2.551%**	**3.118%**	**1.693%**

Graph 3. Average Bird Weight Gain and Adjusted Feed Conversion (Days 14 - 21) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	0.323	1.415	Low Phosphate (LP)
2	0.412	1.363	High Phosphate (HP)
3	0.394	1.373	250 Units Phytase (LP)
4	0.399	1.357	500 Units Phytase (LP)
5	0.429	1.349	1000 Units Phytase (LP)
6	0.442	1.358	3000 Units Phytase (LP)
7	0.437	1.342	6000 Units Phytase (LP)
8	0.455	1.360	60000 Units Phytase (LP)

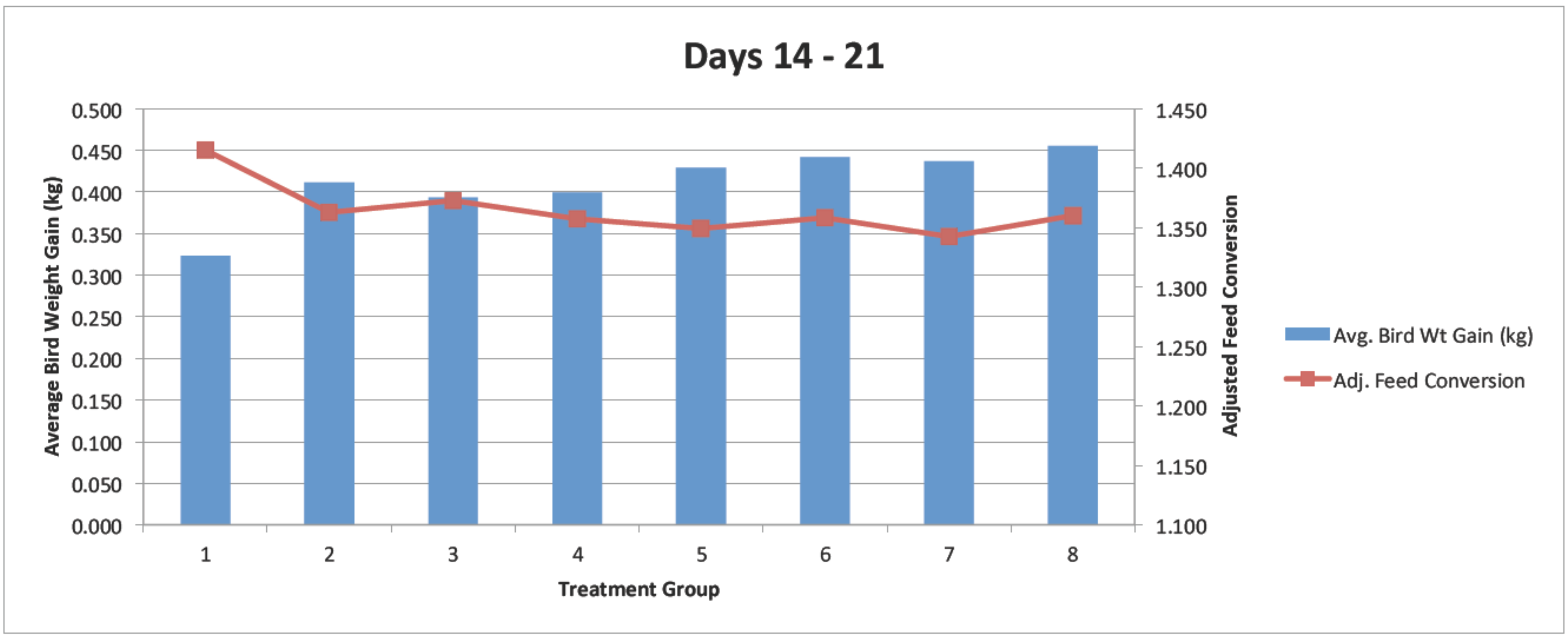


Table 10. Bird Weights and Feed Conversion Days 0 - 42 (29DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	1	97	17	0	0	3	14	31.160	2.226	2.185	1.697	1.608
2	1	103	17	0	1	3	13	29.400	2.262	2.222	1.842	1.615
3	1	110	17	0	0	3	14	31.500	2.250	2.209	1.731	1.626
4	1	122	17	0	0	3	14	33.080	2.363	2.323	1.705	1.606
5	1	132	17	3	0	3	11	25.260	2.296	2.256	2.059	1.616
6	1	177	17	0	0	3	14	30.220	2.159	2.118	1.760	1.653
7	1	141	17	1	1	3	12	26.580	2.215	2.173	1.924	1.623
8	1	152	17	2	0	3	12	28.140	2.345	2.304	1.851	1.624
9	1	160	17	1	1	3	12	28.020	2.335	2.294	1.933	1.646
10	1	170	17	1	1	3	12	28.440	2.370	2.330	1.899	1.593
11	1	186	17	0	0	3	14	29.440	2.103	2.062	1.691	1.579
12	1	190	17	0	0	3	14	32.160	2.297	2.257	1.680	1.588
Totals & Avgs			**204**	**8**	**4**	**36**	**156**	**29.450**	**2.268**	**2.228**	**1.814**	**1.615**
Std. Deviations								**2.312**	**0.083**	**0.083**	**0.122**	**0.022**
CVs								**7.852%**	**3.657%**	**3.730%**	**6.736%**	**1.359%**
1	2	133	17	1	0	3	13	35.820	2.755	2.716	1.717	1.576
2	2	102	17	1	0	3	13	38.520	2.963	2.923	1.705	1.547
3	2	113	17	1	1	3	12	34.780	2.898	2.857	1.825	1.575
4	2	123	17	1	0	3	13	38.920	2.994	2.954	1.657	1.517
5	2	126	17	1	1	3	12	35.140	2.928	2.887	1.786	1.575
6	2	140	17	0	0	3	14	40.880	2.920	2.879	1.657	1.563
7	2	144	17	0	0	3	14	42.300	3.021	2.979	1.635	1.548
8	2	151	17	0	0	3	14	42.520	3.037	2.995	1.649	1.551
9	2	166	17	0	0	3	14	41.620	2.973	2.932	1.622	1.534
10	2	169	17	0	0	3	14	41.920	2.994	2.954	1.638	1.552
11	2	188	17	0	1	3	13	37.480	2.883	2.843	1.711	1.575
12	2	195	17	0	0	3	14	39.100	2.793	2.752	1.679	1.586
Totals & Avgs			**204**	**5**	**3**	**36**	**160**	**39.083**	**2.930**	**2.889**	**1.690**	**1.558**
Std. Deviations								**2.820**	**0.087**	**0.087**	**0.063**	**0.020**
CVs								**7.216%**	**2.975%**	**3.000%**	**3.709%**	**1.305%**
1	3	135	17	0	1	3	13	35.980	2.768	2.727	1.686	1.571
2	3	101	17	0	2	3	12	33.420	2.785	2.744	1.885	1.609
3	3	115	17	0	0	3	14	38.140	2.724	2.683	1.657	1.562
4	3	120	17	0	0	3	14	37.660	2.690	2.650	1.670	1.570
5	3	128	17	0	0	3	14	39.840	2.846	2.805	1.647	1.563
6	3	137	17	1	1	3	12	33.740	2.812	2.770	1.786	1.570
7	3	142	17	0	0	3	14	40.180	2.870	2.828	1.665	1.573
8	3	154	17	2	0	3	12	34.200	2.850	2.809	1.687	1.572
9	3	161	17	1	1	3	12	33.860	2.822	2.780	1.742	1.554
10	3	171	17	2	1	3	11	32.180	2.925	2.884	1.792	1.579
11	3	185	17	0	0	3	14	38.040	2.717	2.676	1.672	1.571
12	3	191	17	0	0	3	14	38.780	2.770	2.730	1.666	1.569
Totals & Avgs			**204**	**6**	**6**	**36**	**156**	**36.335**	**2.798**	**2.757**	**1.713**	**1.572**
Std. Deviations								**2.768**	**0.069**	**0.069**	**0.073**	**0.013**
CVs								**7.618%**	**2.473%**	**2.501%**	**4.276%**	**0.839%**

Table 10. Bird Weights and Feed Conversion Days 0 - 42 (29DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	4	98	17	0	0	3	14	40.220	2.873	2.832	1.653	1.559
2	4	105	17	1	0	3	13	37.900	2.915	2.874	1.671	1.547
3	4	116	17	0	0	3	14	38.200	2.729	2.688	1.689	1.587
4	4	119	17	0	0	3	14	38.780	2.770	2.729	1.654	1.555
5	4	127	17	0	0	3	14	40.860	2.919	2.878	1.619	1.536
6	4	179	17	0	1	3	13	35.820	2.755	2.714	1.703	1.566
7	4	148	17	0	0	3	14	41.340	2.953	2.912	1.666	1.568
8	4	153	17	1	0	3	13	36.080	2.775	2.735	1.686	1.537
9	4	162	17	0	0	3	14	41.360	2.954	2.914	1.632	1.548
10	4	174	17	0	0	3	14	40.180	2.870	2.830	1.639	1.550
11	4	182	17	2	1	3	11	32.140	2.922	2.880	1.750	1.529
12	4	189	17	0	0	3	14	39.700	2.836	2.795	1.650	1.557
Totals & Avgs			**204**	**4**	**2**	**36**	**162**	**38.548**	**2.856**	**2.815**	**1.668**	**1.553**
Std. Deviations								**2.747**	**0.081**	**0.081**	**0.036**	**0.016**
CVs								**7.127%**	**2.832%**	**2.878%**	**2.153%**	**1.024%**
1	5	99	17	0	0	3	14	41.440	2.960	2.919	1.653	1.560
2	5	108	17	0	0	3	14	42.460	3.033	2.992	1.622	1.536
3	5	112	17	0	0	3	14	41.300	2.950	2.909	1.648	1.555
4	5	118	17	0	0	3	14	39.120	2.794	2.755	1.642	1.539
5	5	130	17	0	2	3	12	35.060	2.922	2.881	1.854	1.602
6	5	138	17	1	0	3	13	38.340	2.949	2.908	1.654	1.537
7	5	143	17	0	0	3	14	41.440	2.960	2.919	1.631	1.535
8	5	149	17	0	0	3	14	43.280	3.091	3.050	1.611	1.523
9	5	163	17	0	1	3	13	38.880	2.991	2.949	1.733	1.566
10	5	173	17	0	0	3	14	42.320	3.023	2.981	1.655	1.559
11	5	183	17	0	1	3	13	39.040	3.003	2.963	1.641	1.523
12	5	192	17	0	0	3	14	40.180	2.870	2.829	1.644	1.542
Totals & Avgs			**204**	**1**	**4**	**36**	**163**	**40.238**	**2.962**	**2.921**	**1.666**	**1.548**
Std. Deviations								**2.286**	**0.078**	**0.077**	**0.066**	**0.022**
CVs								**5.681%**	**2.625%**	**2.647%**	**3.980%**	**1.425%**
1	6	134	17	2	0	3	12	36.060	3.005	2.966	1.741	1.568
2	6	106	17	0	1	3	13	39.840	3.065	3.025	1.637	1.521
3	6	109	17	0	0	3	14	44.100	3.150	3.109	1.630	1.543
4	6	117	17	0	0	3	14	40.880	2.920	2.880	1.615	1.520
5	6	131	17	0	0	3	14	40.600	2.900	2.859	1.642	1.535
6	6	139	17	0	1	3	13	38.960	2.997	2.955	1.730	1.553
7	6	147	17	0	0	3	14	43.240	3.089	3.047	1.663	1.563
8	6	150	17	0	0	3	14	42.900	3.064	3.023	1.633	1.535
9	6	164	17	1	1	3	12	37.280	3.107	3.065	1.782	1.565
10	6	172	17	0	0	3	14	41.280	2.949	2.907	1.645	1.543
11	6	184	17	0	0	3	14	42.480	3.034	2.994	1.620	1.536
12	6	196	17	0	0	3	14	39.420	2.816	2.774	1.679	1.573
Totals & Avgs			**204**	**3**	**3**	**36**	**162**	**40.587**	**3.008**	**2.967**	**1.668**	**1.546**
Std. Deviations								**2.429**	**0.097**	**0.097**	**0.054**	**0.018**
CVs								**5.984%**	**3.225%**	**3.271%**	**3.238%**	**1.164%**

Table 10. Bird Weights and Feed Conversion Days 0 - 42 (29DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D0-42 Avg Bird Gain (kg)	Feed Conversion D0-42	Adj. Feed Conversion D0-42
1	7	100	17	0	1	3	13	38.260	2.943	2.902	1.795	1.594
2	7	107	17	0	0	3	14	42.540	3.039	2.998	1.639	1.548
3	7	114	17	0	0	3	14	43.020	3.073	3.031	1.641	1.540
4	7	121	17	0	0	3	14	40.740	2.910	2.869	1.648	1.548
5	7	125	17	0	1	3	13	38.880	2.991	2.949	1.632	1.536
6	7	180	17	1	0	3	13	39.220	3.017	2.975	1.620	1.521
7	7	146	17	0	0	3	14	43.240	3.089	3.046	1.629	1.541
8	7	156	17	0	0	3	14	41.920	2.994	2.952	1.638	1.540
9	7	159	17	0	0	3	14	42.000	3.000	2.958	1.674	1.568
10	7	168	17	0	0	3	14	39.960	2.854	2.813	1.614	1.523
11	7	181	17	1	0	3	13	39.680	3.052	3.012	1.661	1.535
12	7	194	17	0	0	3	14	39.680	2.834	2.794	1.660	1.554
Totals & Avgs			**204**	**2**	**2**	**36**	**164**	**40.762**	**2.983**	**2.942**	**1.654**	**1.546**
Std. Deviations								**1.717**	**0.082**	**0.082**	**0.048**	**0.020**
CVs								**4.213%**	**2.756%**	**2.784%**	**2.877%**	**1.282%**
1	8	136	17	2	0	3	12	34.960	2.913	2.873	1.768	1.570
2	8	104	17	0	0	3	14	41.600	2.971	2.931	1.660	1.561
3	8	111	17	2	0	3	12	37.320	3.110	3.069	1.668	1.555
4	8	124	17	2	1	3	11	34.300	3.118	3.078	1.765	1.539
5	8	129	17	1	0	3	13	40.840	3.142	3.100	1.641	1.535
6	8	178	17	1	1	3	12	34.800	2.900	2.858	1.752	1.568
7	8	145	17	1	0	3	13	39.800	3.062	3.022	1.697	1.519
8	8	155	17	0	0	3	14	42.480	3.034	2.993	1.636	1.534
9	8	165	17	0	0	3	14	43.500	3.107	3.067	1.634	1.533
10	8	167	17	1	0	3	13	39.600	3.046	3.005	1.698	1.551
11	8	187	17	0	0	3	14	42.140	3.010	2.969	1.619	1.522
12	8	193	17	1	0	3	13	38.180	2.937	2.897	1.700	1.555
Totals & Avgs			**204**	**11**	**2**	**36**	**155**	**39.127**	**3.029**	**2.988**	**1.687**	**1.545**
Std. Deviations								**3.201**	**0.084**	**0.083**	**0.053**	**0.017**
CVs								**8.181%**	**2.759%**	**2.794%**	**3.128%**	**1.113%**

Graph 4. Average Bird Weight Gain and Adjusted Feed Conversion (Days 0 - 42) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	2.228	1.615	Low Phosphate (LP)
2	2.889	1.558	High Phosphate (HP)
3	2.757	1.572	250 Units Phytase (LP)
4	2.815	1.553	500 Units Phytase (LP)
5	2.921	1.548	1000 Units Phytase (LP)
6	2.967	1.546	3000 Units Phytase (LP)
7	2.942	1.546	6000 Units Phytase (LP)
8	2.988	1.545	60000 Units Phytase (LP)

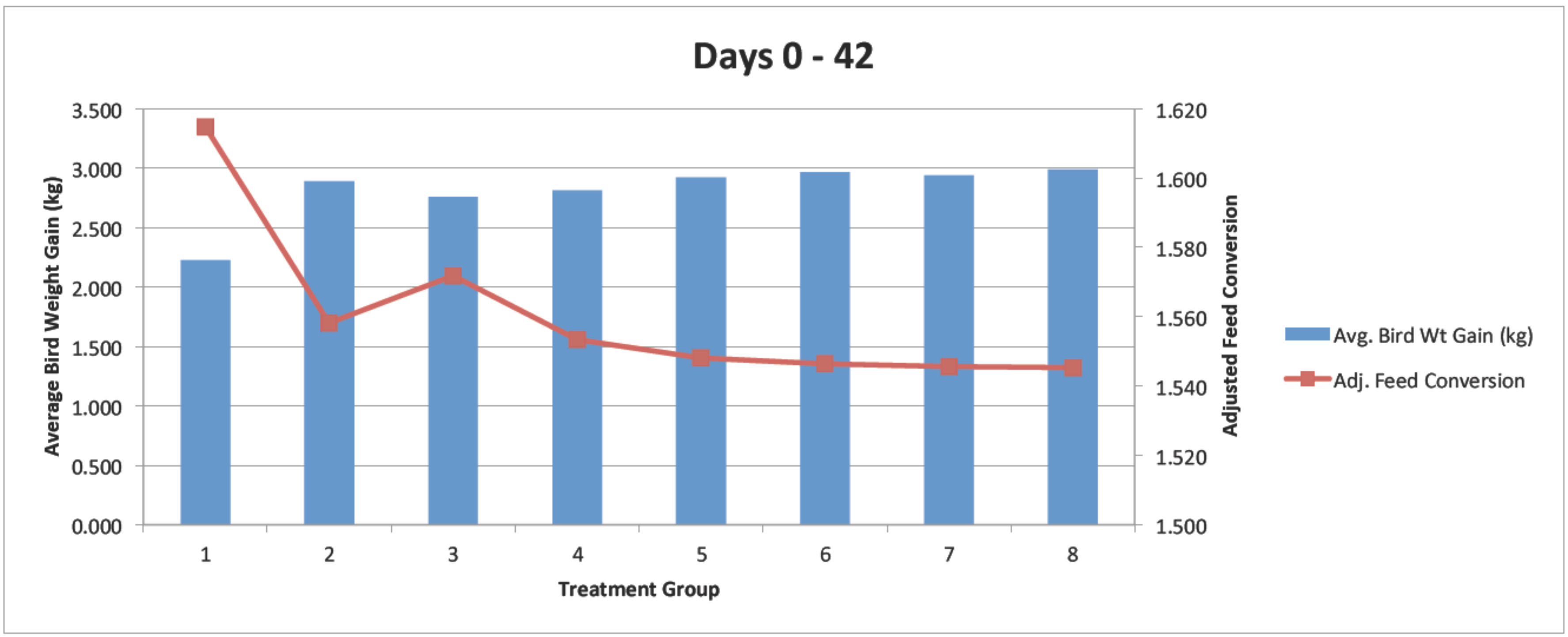


Table 12. Bird Weights and Feed Conversion Days 21 - 42 (29DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D21-42	Adj. Feed Conversion D21-42
1	1	97	17	0	0	3	14	31.160	2.226	1.601	1.846	1.706
2	1	103	17	0	1	3	13	29.400	2.262	1.634	2.077	1.708
3	1	110	17	0	0	3	14	31.500	2.250	1.622	1.880	1.717
4	1	122	17	0	0	3	14	33.080	2.363	1.710	1.860	1.704
5	1	132	17	3	0	3	11	25.260	2.296	1.688	2.484	1.710
6	1	177	17	0	0	3	14	30.220	2.159	1.535	1.964	1.790
7	1	141	17	1	1	3	12	26.580	2.215	1.584	2.260	1.736
8	1	152	17	2	0	3	12	28.140	2.345	1.719	2.093	1.717
9	1	160	17	1	1	3	12	28.020	2.335	1.679	2.261	1.762
10	1	170	17	1	1	3	12	28.440	2.370	1.732	2.198	1.688
11	1	186	17	0	0	3	14	29.440	2.103	1.492	1.858	1.679
12	1	190	17	0	0	3	14	32.160	2.297	1.679	1.818	1.677
Totals & Avgs			**204**	**8**	**4**	**36**	**156**	**29.450**	**2.268**	**1.640**	**2.050**	**1.716**
Std. Deviations								**2.312**	**0.083**	**0.076**	**0.214**	**0.033**
CVs								**7.852%**	**3.657%**	**4.610%**	**10.459%**	**1.923%**
1	2	133	17	1	0	3	13	35.820	2.755	2.020	1.899	1.673
2	2	102	17	1	0	3	13	38.520	2.963	2.212	1.873	1.629
3	2	113	17	1	1	3	12	34.780	2.898	2.150	2.093	1.680
4	2	123	17	1	0	3	13	38.920	2.994	2.242	1.806	1.592
5	2	126	16	0	1	3	12	35.140	2.928	2.165	1.990	1.664
6	2	140	17	0	0	3	14	40.880	2.920	2.152	1.799	1.655
7	2	144	17	0	0	3	14	42.300	3.021	2.248	1.756	1.626
8	2	151	17	0	0	3	14	42.520	3.037	2.235	1.779	1.631
9	2	166	17	0	0	3	14	41.620	2.973	2.216	1.733	1.602
10	2	169	17	0	0	3	14	41.920	2.994	2.234	1.763	1.634
11	2	188	17	0	1	3	13	37.480	2.883	2.132	1.883	1.668
12	2	195	17	0	0	3	14	39.100	2.793	2.036	1.824	1.679
Totals & Avgs			**203**	**4**	**3**	**36**	**160**	**39.083**	**2.930**	**2.170**	**1.850**	**1.644**
Std. Deviations								**2.820**	**0.087**	**0.078**	**0.106**	**0.030**
CVs								**7.216%**	**2.975%**	**3.573%**	**5.721%**	**1.823%**
1	3	135	16	0	0	3	13	35.980	2.768	2.063	1.810	1.655
2	3	101	17	0	2	3	12	33.420	2.785	2.064	2.178	1.720
3	3	115	17	0	0	3	14	38.140	2.724	2.004	1.801	1.655
4	3	120	17	0	0	3	14	37.660	2.690	1.958	1.825	1.668
5	3	128	17	0	0	3	14	39.840	2.846	2.133	1.771	1.647
6	3	137	17	1	1	3	12	33.740	2.812	2.048	2.051	1.683
7	3	142	17	0	0	3	14	40.180	2.870	2.118	1.804	1.664
8	3	154	15	0	0	3	12	34.200	2.850	2.086	1.834	1.660
9	3	161	17	1	1	3	12	33.860	2.822	2.106	1.942	1.639
10	3	171	15	1	0	3	11	32.180	2.925	2.181	1.998	1.670
11	3	185	17	0	0	3	14	38.040	2.717	1.992	1.815	1.660
12	3	191	17	0	0	3	14	38.780	2.770	2.025	1.821	1.670
Totals & Avgs			**199**	**3**	**4**	**36**	**156**	**36.335**	**2.798**	**2.065**	**1.887**	**1.666**
Std. Deviations								**2.768**	**0.069**	**0.064**	**0.127**	**0.021**
CVs								**7.618%**	**2.473%**	**3.110%**	**6.717%**	**1.241%**

Table 12. Bird Weights and Feed Conversion Days 21 - 42 (29DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

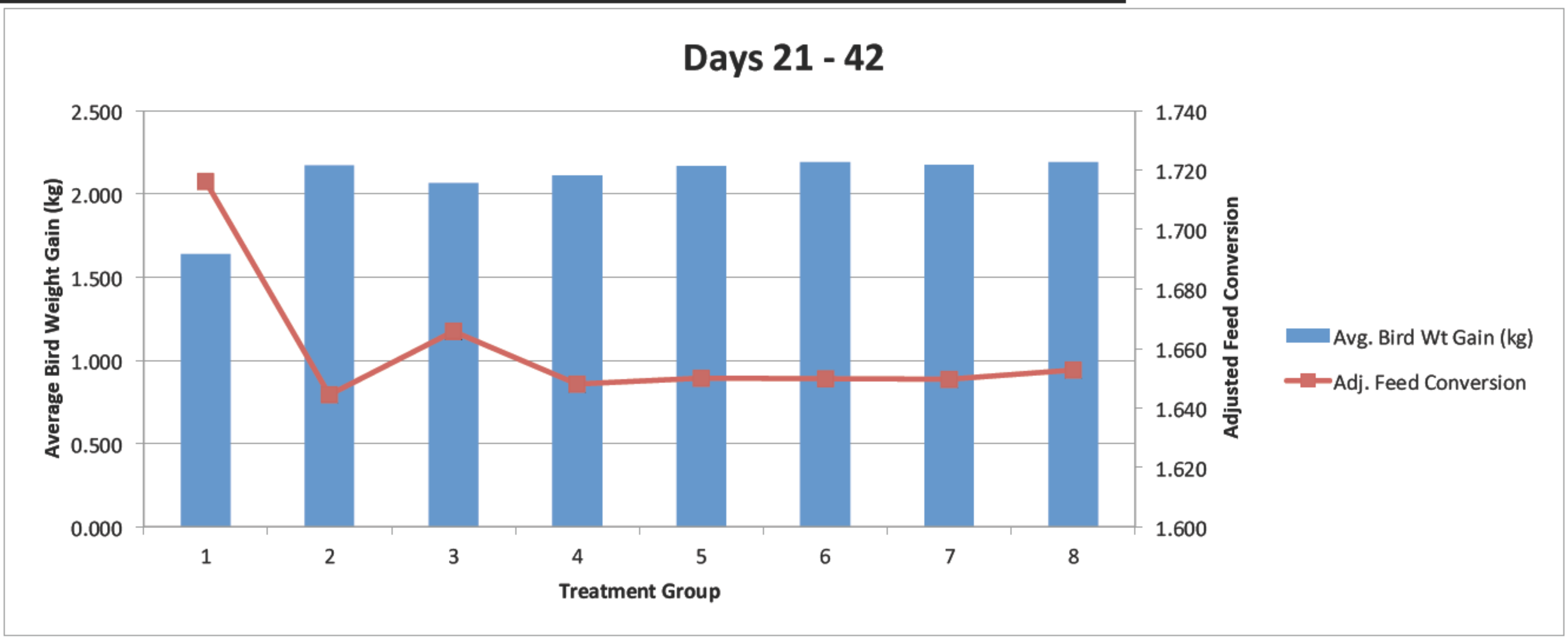
Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D21-42	Adj. Feed Conversion D21-42
1	4	98	17	0	0	3	14	40.220	2.873	2.122	1.794	1.651
2	4	105	17	1	0	3	13	37.900	2.915	2.173	1.839	1.645
3	4	116	17	0	0	3	14	38.200	2.729	1.967	1.869	1.705
4	4	119	17	0	0	3	14	38.780	2.770	2.017	1.804	1.652
5	4	127	17	0	0	3	14	40.860	2.919	2.212	1.732	1.610
6	4	179	17	0	1	3	13	35.820	2.755	2.027	1.890	1.670
7	4	148	17	0	0	3	14	41.340	2.953	2.169	1.794	1.645
8	4	153	17	1	0	3	13	36.080	2.775	2.031	1.859	1.621
9	4	162	17	0	0	3	14	41.360	2.954	2.185	1.774	1.647
10	4	174	17	0	0	3	14	40.180	2.870	2.115	1.792	1.655
11	4	182	16	2	0	3	11	32.140	2.922	2.182	1.979	1.625
12	4	189	17	0	0	3	14	39.700	2.836	2.104	1.790	1.650
Totals & Avgs			**203**	**4**	**1**	**36**	**162**	**38.548**	**2.856**	**2.109**	**1.826**	**1.648**
Std. Deviations								**2.747**	**0.081**	**0.080**	**0.066**	**0.024**
CVs								**7.127%**	**2.832%**	**3.807%**	**3.587%**	**1.481%**
1	5	99	17	0	0	3	14	41.440	2.960	2.153	1.820	1.673
2	5	108	17	0	0	3	14	42.460	3.033	2.261	1.756	1.626
3	5	112	17	0	0	3	14	41.300	2.950	2.161	1.800	1.655
4	5	118	17	0	0	3	14	39.120	2.794	2.000	1.812	1.646
5	5	130	17	0	2	3	12	35.060	2.922	2.158	2.140	1.720
6	5	138	16	0	0	3	13	38.340	2.949	2.160	1.804	1.639
7	5	143	17	0	0	3	14	41.440	2.960	2.153	1.787	1.637
8	5	149	17	0	0	3	14	43.280	3.091	2.282	1.738	1.604
9	5	163	17	0	1	3	13	38.880	2.991	2.172	1.953	1.678
10	5	173	17	0	0	3	14	42.320	3.023	2.188	1.821	1.668
11	5	183	17	0	1	3	13	39.040	3.003	2.245	1.791	1.610
12	5	192	17	0	0	3	14	40.180	2.870	2.065	1.807	1.645
Totals & Avgs			**203**	**0**	**4**	**36**	**163**	**40.238**	**2.962**	**2.167**	**1.836**	**1.650**
Std. Deviations								**2.286**	**0.078**	**0.078**	**0.109**	**0.032**
CVs								**5.681%**	**2.625%**	**3.613%**	**5.941%**	**1.934%**
1	6	134	16	1	0	3	12	36.060	3.005	2.170	1.944	1.688
2	6	106	17	0	1	3	13	39.840	3.065	2.268	1.796	1.613
3	6	109	17	0	0	3	14	44.100	3.150	2.329	1.769	1.636
4	6	117	17	0	0	3	14	40.880	2.920	2.135	1.762	1.615
5	6	131	17	0	0	3	14	40.600	2.900	2.098	1.798	1.630
6	6	139	17	0	1	3	13	38.960	2.997	2.188	1.957	1.668
7	6	147	17	0	0	3	14	43.240	3.089	2.234	1.807	1.652
8	6	150	17	0	0	3	14	42.900	3.064	2.241	1.770	1.618
9	6	164	17	1	1	3	12	37.280	3.107	2.238	2.070	1.690
10	6	172	17	0	0	3	14	41.280	2.949	2.119	1.825	1.660
11	6	184	17	0	0	3	14	42.480	3.034	2.240	1.762	1.633
12	6	196	17	0	0	3	14	39.420	2.816	2.003	1.866	1.693
Totals & Avgs			**203**	**2**	**3**	**36**	**162**	**40.587**	**3.008**	**2.189**	**1.844**	**1.650**
Std. Deviations								**2.429**	**0.097**	**0.089**	**0.098**	**0.030**
CVs								**5.984%**	**3.225%**	**4.058%**	**5.306%**	**1.810%**

Table 12. Bird Weights and Feed Conversion Days 21 - 42 (29DEC15) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Block	Trt	Pen No.	No. Birds Started Day 21	Mortality	Removal-1	Removal-2	No. Birds Weighed D42	D42 Pen Wt (kg)	D42 Avg Bird Wt (kg)	D21-42 Avg Bird Gain (kg)	Feed Conversion D21-42	Adj. Feed Conversion D21-42
1	7	100	17	0	1	3	13	38.260	2.943	2.111	2.061	1.722
2	7	107	17	0	0	3	14	42.540	3.039	2.235	1.785	1.645
3	7	114	17	0	0	3	14	43.020	3.073	2.242	1.791	1.633
4	7	121	17	0	0	3	14	40.740	2.910	2.109	1.807	1.649
5	7	125	16	0	0	3	13	38.880	2.991	2.230	1.756	1.614
6	7	180	16	0	0	3	13	39.220	3.017	2.211	1.765	1.614
7	7	146	17	0	0	3	14	43.240	3.089	2.266	1.771	1.634
8	7	156	17	0	0	3	14	41.920	2.994	2.175	1.786	1.633
9	7	159	17	0	0	3	14	42.000	3.000	2.153	1.853	1.683
10	7	168	17	0	0	3	14	39.960	2.854	2.101	1.803	1.660
11	7	181	17	1	0	3	13	39.680	3.052	2.246	1.845	1.643
12	7	194	17	0	0	3	14	39.680	2.834	2.025	1.836	1.665
Totals & Avgs			**202**	**1**	**1**	**36**	**164**	**40.762**	**2.983**	**2.175**	**1.822**	**1.650**
Std. Deviations								**1.717**	**0.082**	**0.075**	**0.082**	**0.030**
CVs								**4.213%**	**2.756%**	**3.470%**	**4.486%**	**1.832%**
1	8	136	16	1	0	3	12	34.960	2.913	2.090	1.977	1.686
2	8	104	17	0	0	3	14	41.600	2.971	2.148	1.829	1.672
3	8	111	15	0	0	3	12	37.320	3.110	2.250	1.835	1.661
4	8	124	16	1	1	3	11	34.300	3.118	2.299	2.023	1.645
5	8	129	16	0	0	3	13	40.840	3.142	2.292	1.794	1.632
6	8	178	16	1	0	3	12	34.800	2.900	2.098	1.982	1.685
7	8	145	17	1	0	3	13	39.800	3.062	2.217	1.904	1.613
8	8	155	17	0	0	3	14	42.480	3.034	2.199	1.789	1.630
9	8	165	17	0	0	3	14	43.500	3.107	2.258	1.775	1.618
10	8	167	17	1	0	3	13	39.600	3.046	2.170	1.938	1.686
11	8	187	17	0	0	3	14	42.140	3.010	2.169	1.779	1.625
12	8	193	17	1	0	3	13	38.180	2.937	2.089	1.928	1.681
Totals & Avgs			**198**	**6**	**1**	**36**	**155**	**39.127**	**3.029**	**2.190**	**1.879**	**1.653**
Std. Deviations								**3.201**	**0.084**	**0.076**	**0.089**	**0.029**
CVs								**8.181%**	**2.759%**	**3.451%**	**4.754%**	**1.741%**

Graph 5. Average Bird Weight Gain and Adjusted Feed Conversion (Days 21 - 42) Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Trt Group	Avg. Bird Wt Gain (kg)	Adj. Feed Conversion	Treatment Description
1	1.640	1.716	Low Phosphate (LP)
2	2.170	1.644	High Phosphate (HP)
3	2.065	1.666	250 Units Phytase (LP)
4	2.109	1.648	500 Units Phytase (LP)
5	2.167	1.650	1000 Units Phytase (LP)
6	2.189	1.650	3000 Units Phytase (LP)
7	2.175	1.650	6000 Units Phytase (LP)
8	2.190	1.653	60000 Units Phytase (LP)



Abbreviations for Causes of Mortality in Poultry Feeding Studies*

Abbrev.	Cause of Death	Abbrev.	Cause of Death
ACT	Ascites	IE	Intestinal enteritis
ACT-S	Ascites + SDS	INJ	Injury
AS	Airsacculitis	NE	Necrotic enteritis
BAC	Bacterial	PRO	Prolapsed
CAN	Cannibalism	RH	Round heart (ascites)
CC	Coccidiosis	SDS	Sudden death syndrome
CD	Cervical dislocation	SM	Smothered
DH	Dehydrated	SO	Starve-out
EC	*E. coli*	UNK	Unknown cause of death
M	Mortality; R1 = removed, bird moribund bound R2 = removed; bird not moribund bound		
Comments/Findings Codes			
Code	**Comment/Finding**	**Code**	**Comment/Finding**
BL	Bad leg	LS	Lesion score
C	Cull	NGL	No gross lesions
C-SB	Cull, small bird	RCT	Recount bird
DC	Decomposed	SMPL	Sample bird
FHN	Femoral head necrosis	SS	Sex slip

*This table was added to the Final Study Report after the report was finalized in order to define the abbreviations for causes of mortality in birds that were removed from the study. The data on bird mortality is contained in Tables 13 and 14 that follow.

Table 13. Mortality and Removal Weights (Day 0 - Study End)
CQR Study Number AGV-15-5
Facility Number 7

				Days 0 - 14 (17NOV15 - 01DEC15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
1	1	97	17							0.000	17
1	4	98	17							0.000	17
1	5	99	17							0.000	17
1	7	100	17							0.000	17
2	3	101	17							0.000	17
2	2	102	17							0.000	17
2	1	103	17							0.000	17
2	8	104	17							0.000	17
2	4	105	17							0.000	17
2	6	106	17							0.000	17
2	7	107	17							0.000	17
2	5	108	17							0.000	17
3	6	109	17							0.000	17
3	1	110	17							0.000	17
3	8	111	17	2			2 BAC	0.092		0.092	15
3	5	112	17							0.000	17
3	2	113	17							0.000	17
3	7	114	17							0.000	17
3	3	115	17							0.000	17
3	4	116	17							0.000	17
4	6	117	17							0.000	17
4	5	118	17							0.000	17
4	4	119	17							0.000	17
4	3	120	17							0.000	17
4	7	121	17							0.000	17
4	1	122	17							0.000	17
4	2	123	17							0.000	17
4	8	124	17	1			BAC	0.058		0.058	16
5	7	125	17		1		CD-C/SB/BL		0.037	0.037	16
5	2	126	17	1			SDS	0.121		0.121	16
5	4	127	17							0.000	17
5	3	128	17							0.000	17
5	8	129	17	1			BAC	0.055		0.055	16
5	5	130	17							0.000	17
5	6	131	17							0.000	17
5	1	132	17							0.000	17
1	2	133	17							0.000	17
1	6	134	17							0.000	17
1	3	135	17		1		CD-BL		0.271	0.271	16
1	8	136	17							0.000	17
6	3	137	17							0.000	17
6	5	138	17							0.000	17
6	6	139	17							0.000	17
6	2	140	17							0.000	17
7	1	141	17							0.000	17
7	3	142	17							0.000	17
7	5	143	17							0.000	17
7	2	144	17							0.000	17
7	8	145	17							0.000	17
7	7	146	17							0.000	17
7	6	147	17							0.000	17
7	4	148	17							0.000	17
8	5	149	17							0.000	17
8	6	150	17							0.000	17
8	2	151	17							0.000	17
8	1	152	17							0.000	17
8	4	153	17							0.000	17
8	3	154	17	2			BAC; BAC-DH	0.070		0.070	15
8	8	155	17							0.000	17
8	7	156	17							0.000	17

				Days 0 - 14 (17NOV15 - 01DEC15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 0 - 14	No. Birds Remaining Day 14
9	7	159	17							0.000	17
9	1	160	17							0.000	17
9	3	161	17							0.000	17
9	4	162	17							0.000	17
9	5	163	17							0.000	17
9	6	164	17							0.000	17
9	8	165	17							0.000	17
9	2	166	17							0.000	17
10	8	167	17							0.000	17
10	7	168	17							0.000	17
10	2	169	17							0.000	17
10	1	170	17							0.000	17
10	3	171	17	1	1		CD-DH/SO; DH	0.101	0.031	0.132	15
10	6	172	17							0.000	17
10	5	173	17							0.000	17
10	4	174	17							0.000	17
6	1	177	17							0.000	17
6	8	178	17		1		CD-BAC		0.123	0.123	16
6	4	179	17							0.000	17
6	7	180	17	1			SDS	0.060		0.060	16
11	7	181	17							0.000	17
11	4	182	17		1		CD-BL/BAC		0.118	0.118	16
11	5	183	17							0.000	17
11	6	184	17							0.000	17
11	3	185	17							0.000	17
11	1	186	17							0.000	17
11	8	187	17							0.000	17
11	2	188	17							0.000	17
12	4	189	17							0.000	17
12	1	190	17							0.000	17
12	3	191	17							0.000	17
12	5	192	17							0.000	17
12	8	193	17							0.000	17
12	7	194	17							0.000	17
12	2	195	17							0.000	17
12	6	196	17							0.000	17

Table 13. Mortality
CQR Study Number
Facility Number 7

			Days 14 - 21 (01DEC15 - 08DEC15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
1	1	97							0 000	17
1	4	98							0 000	17
1	5	99							0 000	17
1	7	100							0 000	17
2	3	101							0 000	17
2	2	102							0 000	17
2	1	103							0 000	17
2	8	104							0 000	17
2	4	105							0 000	17
2	6	106							0 000	17
2	7	107							0 000	17
2	5	108							0 000	17
3	6	109							0 000	17
3	1	110							0 000	17
3	8	111							0 000	15
3	5	112							0 000	17
3	2	113							0 000	17
3	7	114							0 000	17
3	3	115							0 000	17
3	4	116							0 000	17
4	6	117							0 000	17
4	5	118							0 000	17
4	4	119							0 000	17
4	3	120							0 000	17
4	7	121							0 000	17
4	1	122							0 000	17
4	2	123							0 000	17
4	8	124							0 000	16
5	7	125							0 000	16
5	2	126							0 000	16
5	4	127							0 000	17
5	3	128							0 000	17
5	8	129							0 000	16
5	5	130							0 000	17
5	6	131							0 000	17
5	1	132							0 000	17
1	2	133							0 000	17
1	6	134	1			SDS	0.442		0.442	16
1	3	135							0 000	16
1	8	136	1			SDS	0 572		0 572	16
6	3	137							0 000	17
6	5	138	1			SDS	0 288		0 288	16
6	6	139							0 000	17
6	2	140							0 000	17
7	1	141							0 000	17
7	3	142							0 000	17
7	5	143							0 000	17
7	2	144							0 000	17
7	8	145							0 000	17
7	7	146							0 000	17
7	6	147							0 000	17
7	4	148							0 000	17
8	5	149							0 000	17
8	6	150							0 000	17
8	2	151							0 000	17
8	1	152							0 000	17
8	4	153							0 000	17
8	3	154							0 000	15
8	8	155							0 000	17
8	7	156							0 000	17

			Days 14 - 21 (01DEC15 - 08DEC15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 14 - 21	No. Birds Remaining Day 21
9	7	159							0 000	17
9	1	160							0 000	17
9	3	161							0 000	17
9	4	162							0 000	17
9	5	163							0 000	17
9	6	164							0 000	17
9	8	165							0 000	17
9	2	166							0 000	17
10	8	167							0 000	17
10	7	168							0 000	17
10	2	169							0 000	17
10	1	170							0 000	17
10	3	171							0 000	15
10	6	172							0 000	17
10	5	173							0 000	17
10	4	174							0 000	17
6	1	177							0 000	17
6	8	178							0 000	16
6	4	179							0 000	17
6	7	180							0 000	16
11	7	181							0 000	17
11	4	182							0 000	16
11	5	183							0 000	17
11	6	184							0 000	17
11	3	185							0 000	17
11	1	186							0 000	17
11	8	187							0 000	17
11	2	188							0 000	17
12	4	189							0 000	17
12	1	190							0 000	17
12	3	191							0 000	17
12	5	192							0 000	17
12	8	193							0 000	17
12	7	194							0 000	17
12	2	195							0 000	17
12	6	196							0 000	17

Table 13. Mortality
CQR Study Number
Facility Number 7

			Days 21 - 42 (08DEC15 - 29DEC15)							
Block	**Trt**	**Pen No.**	**Mortality**	**Removal-1**	**Removal-2**	**Cause of Death**	**Mortality Wt (kg)**	**Removed Wt (kg)**	**Total M & R Wt (kg) Days 21 - 42**	**No. Birds Remaining Day 42**
1	1	97			3	3 CD-SMPL		1.686	1.686	14
1	4	98			3	3 CD-SMPL		2.380	2 380	14
1	5	99			3	3 CD-SMPL		2.434	2.434	14
1	7	100		1	3	CD-C/BL; 3 CD-SMPL		4.753	4.753	13
2	3	101		2	3	CD-C/BAC; CD-C/BL/FHN; 3 CD-SMPL		5.623	5.623	12
2	2	102	1		3	3 CD-SMPL; SDS	1.711	2.162	3 873	13
2	1	103		1	3	CD-C/ACT/FHN/BL; 3 CD-SMPL		4.051	4 051	13
2	8	104			3	3 CD-SMPL		2.596	2 596	14
2	4	105	1		3	3 CD-SMPL; SDS	0.730	2.258	2 988	13
2	6	106		1	3	CD-BL/DH; 3 CD-SMPL		2.994	2 994	13
2	7	107			3	3 CD-SMPL		2.458	2.458	14
2	5	108			3	3 CD-SMPL		2.346	2 346	14
3	6	109			3	3 CD-SMPL		2.444	2.444	14
3	1	110			3	3 CD-SMPL		1.976	1 976	14
3	8	111			3	3 CD-SMPL		2.564	2 564	12
3	5	112			3	3 CD-SMPL		2.434	2.434	14
3	2	113	1	1	3	BAC; CD-C/BAC; 3 CD-SMPL	1 821	3.603	5.424	12
3	7	114			3	3 CD-SMPL		2.790	2.790	14
3	3	115			3	3 CD-SMPL		2.284	2 284	14
3	4	116			3	3 CD-SMPL		2.416	2.416	14
4	6	117			3	3 CD-SMPL		2.500	2 500	14
4	5	118			3	3 CD-SMPL		2.580	2 580	14
4	4	119			3	3 CD-SMPL		2.406	2.406	14
4	3	120			3	3 CD-SMPL		2.378	2 378	14
4	7	121			3	3 CD-SMPL		2.592	2 592	14
4	1	122			3	3 CD-SMPL		2.008	2 008	14
4	2	123	1		3	3 CD-SMPL; SDS	1.129	2.388	3 517	13
4	8	124	1	1	3	ACT; CD-BL/FHN; 3 CD-SMPL	1.760	3.114	4 874	11
5	7	125			3	3 CD-SMPL		2.346	2 346	13
5	2	126		1	3	CD-C/FHN/BL; 3 CD-SMPL		4.488	4.488	12
5	4	127			3	3 CD-SMPL		2.176	2.176	14
5	3	128			3	3 CD-SMPL		2.090	2 090	14
5	8	129			3	3 CD-SMPL		2.720	2.720	13
5	5	130		2	3	2 CD-C/BL; 3 CD-SMPL		5.402	5.402	12
5	6	131			3	3 CD-SMPL		2.774	2.774	14
5	1	132	3		3	2 ACT; BAC; 3 CD-SMPL	4 844	1.904	6.748	11
1	2	133	1		3	BAC; 3 CD-SMPL	0.698	2.444	3.142	13
1	6	134	1		3	3 CD-SMPL; SDS	0 866	2.580	3.446	12
1	3	135			3	3 CD-SMPL		2.304	2 304	13
1	8	136	1		3	3 CD-SMPL; SDS	1.116	2.638	3.754	12
6	3	137	1	1	3	CD-C/ACT; 3 CD-SMPL; SDS	0.642	3.899	4 541	12
6	5	138			3	3 CD-SMPL		2.584	2 584	13
6	6	139		1	3	CD-C/ACT; 3 CD-SMPL		4.367	4 367	13
6	2	140			3	3 CD-SMPL		2.416	2.416	14
7	1	141	1	1	3	ACT; CD-C/BL/FHN; 3 CD-SMPL	1 561	3.220	4.781	12
7	3	142			3	3 CD-SMPL		2.306	2 306	14
7	5	143			3	3 CD-SMPL		2.538	2 538	14
7	2	144			3	3 CD-SMPL		2.332	2 332	14
7	8	145	1		3	3 CD-SMPL; SDS	1 870	2.726	4 596	13
7	7	146			3	3 CD-SMPL		2.448	2.448	14
7	6	147			3	3 CD-SMPL		2.698	2.698	14
7	4	148			3	3 CD-SMPL		2.540	2 540	14
8	5	149			3	3 CD-SMPL		2.484	2.484	14
8	6	150			3	3 CD-SMPL		2.700	2.700	14
8	2	151			3	3 CD-SMPL		2.626	2.626	14
8	1	152	2		3	2 ACT; 3 CD-SMPL	1 972	1.854	3 826	12
8	4	153	1		3	ACT; 3 CD-SMPL	1 013	2.424	3.437	13
8	3	154			3	3 CD-SMPL		2.384	2 384	12
8	8	155			3	3 CD-SMPL		2.772	2.772	14
8	7	156			3	3 CD-SMPL		2.612	2.612	14

			Days 21 - 42 (08DEC15 - 29DEC15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	Mortality Wt (kg)	Removed Wt (kg)	Total M & R Wt (kg) Days 21 - 42	No. Birds Remaining Day 42
9	7	159			3	3 CD-SMPL		2.786	2.786	14
9	1	160	1	1	3	ACT; CD-C/ACT; 3 CD-SMPL	1 377	3.393	4.770	12
9	3	161	1	1	3	CD-C/BL/FHN; 3 CD-SMPL; SDS	0 884	3.127	4 011	12
9	4	162			3	3 CD-SMPL		2.186	2.186	14
9	5	163		1	3	CD-C/FHN/BL; 3 CD-SMPL		4.081	4 081	13
9	6	164	1	1	3	CD-C/BL/FHN; 3 CD-SMPL; SDS	0 838	4.228	5 066	12
9	8	165			3	3 CD-SMPL		2.812	2 812	14
9	2	166			3	3 CD-SMPL		2.348	2 348	14
10	8	167	1		3	ACT; 3 CD-SMPL	0 903	2.790	3.693	13
10	7	168			3	3 CD-SMPL		2.354	2 354	14
10	2	169			3	3 CD-SMPL		2.292	2 292	14
10	1	170	1	1	3	ACT; CD-C/ACT; 3 CD-SMPL	1.650	3.668	5 318	12
10	3	171	1		3	BAC; 3 CD-SMPL	1.656	2.474	4.130	11
10	6	172			3	3 CD-SMPL		2.696	2.696	14
10	5	173			3	3 CD-SMPL		2.572	2 572	14
10	4	174			3	3 CD-SMPL		2.264	2 264	14
6	1	177			3	3 CD-SMPL		1.916	1 916	14
6	8	178	1		3	BAC-BL/FHN; 3 CD-SMPL	1 295	2.580	3 875	12
6	4	179		1	3	CD-C/BAC; 3 CD-SMPL		3.094	3 094	13
6	7	180			3	3 CD-SMPL		2.462	2.462	13
11	7	181	1		3	3 CD-SMPL; SDS	0 880	2.310	3.190	13
11	4	182	2		3	ACT; BAC; 3 CD-SMPL	2 021	2.408	4.429	11
11	5	183		1	3	CD-C/BAC; 3 CD-SMPL		2.950	2 950	13
11	6	184			3	3 CD-SMPL		2.286	2 286	14
11	3	185			3	3 CD-SMPL		2.408	2.408	14
11	1	186			3	3 CD-SMPL		2.036	2 036	14
11	8	187			3	3 CD-SMPL		2.634	2.634	14
11	2	188		1	3	CD-C/BL/FHN; 3 CD-SMPL		3.174	3.174	13
12	4	189			3	3 CD-SMPL		2.308	2 308	14
12	1	190			3	3 CD-SMPL		1.818	1 818	14
12	3	191			3	3 CD-SMPL		2.366	2 366	14
12	5	192			3	3 CD-SMPL		2.612	2.612	14
12	8	193	1		3	BAC; 3 CD-SMPL	0.771	2.714	3.485	13
12	7	194			3	3 CD-SMPL		2.664	2.664	14
12	2	195			3	3 CD-SMPL		2.258	2 258	14
12	6	196			3	3 CD-SMPL		2.610	2.610	14

Table 14. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number AGV-15-5
Facility Number 7

				Days 0 - 14 (17NOV15 - 01DEC15)							
Block	Trt	Pen No.	No. Birds Started Day 0	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality	% Removal	Total % M & R Days 0 - 14	No. Birds Remaining Day 14
1	1	97	17					0.000%	0.000%	0.000%	17
2	1	103	17					0.000%	0.000%	0.000%	17
3	1	110	17					0.000%	0.000%	0.000%	17
4	1	122	17					0.000%	0.000%	0.000%	17
5	1	132	17					0.000%	0.000%	0.000%	17
6	1	177	17					0.000%	0.000%	0.000%	17
7	1	141	17					0.000%	0.000%	0.000%	17
8	1	152	17					0.000%	0.000%	0.000%	17
9	1	160	17					0.000%	0.000%	0.000%	17
10	1	170	17					0.000%	0.000%	0.000%	17
11	1	186	17					0.000%	0.000%	0.000%	17
12	1	190	17					0.000%	0.000%	0.000%	17
Treatment 1			**204**	**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**204**
1	2	133	17					0.000%	0.000%	0.000%	17
2	2	102	17					0.000%	0.000%	0.000%	17
3	2	113	17					0.000%	0.000%	0.000%	17
4	2	123	17					0.000%	0.000%	0.000%	17
5	2	126	17	1			SDS	5.882%	0.000%	5.882%	16
6	2	140	17					0.000%	0.000%	0.000%	17
7	2	144	17					0.000%	0.000%	0.000%	17
8	2	151	17					0.000%	0.000%	0.000%	17
9	2	166	17					0.000%	0.000%	0.000%	17
10	2	169	17					0.000%	0.000%	0.000%	17
11	2	188	17					0.000%	0.000%	0.000%	17
12	2	195	17					0.000%	0.000%	0.000%	17
Treatment 2			**204**	**1**	**0**	**0**		**0.490%**	**0.000%**	**0.490%**	**203**
1	3	135	17		1		CD-BL	0.000%	5.882%	5.882%	16
2	3	101	17					0.000%	0.000%	0.000%	17
3	3	115	17					0.000%	0.000%	0.000%	17
4	3	120	17					0.000%	0.000%	0.000%	17
5	3	128	17					0.000%	0.000%	0.000%	17
6	3	137	17					0.000%	0.000%	0.000%	17
7	3	142	17					0.000%	0.000%	0.000%	17
8	3	154	17	2			BAC; BAC-DH	11.765%	0.000%	11.765%	15
9	3	161	17					0.000%	0.000%	0.000%	17
10	3	171	17	1	1		CD-DH/SO; DH	5.882%	5.882%	11.765%	15
11	3	185	17					0.000%	0.000%	0.000%	17
12	3	191	17					0.000%	0.000%	0.000%	17
Treatment 3			**204**	**3**	**2**	**0**	**BAC; BAC-DH; CD-BL; CD-DH/SO; DH**	**1.471%**	**0.980%**	**2.451%**	**199**

Block	Trt	Pen No.	No. Birds Started Day 0	Days 0 - 14 (17NOV15 - 01DEC15) Mortality	Removal-1	Removal-2	Cause of Death	% Mortality	% Removal	Total % M & R Days 0 - 14	No. Birds Remaining Day 14
1	4	98	17					0.000%	0.000%	0.000%	17
2	4	105	17					0.000%	0.000%	0.000%	17
3	4	116	17					0.000%	0.000%	0.000%	17
4	4	119	17					0.000%	0.000%	0.000%	17
5	4	127	17					0.000%	0.000%	0.000%	17
6	4	179	17					0.000%	0.000%	0.000%	17
7	4	148	17					0.000%	0.000%	0.000%	17
8	4	153	17					0.000%	0.000%	0.000%	17
9	4	162	17					0.000%	0.000%	0.000%	17
10	4	174	17					0.000%	0.000%	0.000%	17
11	4	182	17		1		CD-BL/BAC	0.000%	5.882%	5.882%	16
12	4	189	17					0.000%	0.000%	0.000%	17
Treatment 4			**204**	**0**	**1**	**0**	**CD-BL/BAC**	**0.000%**	**0.490%**	**0.490%**	**203**
1	5	99	17					0.000%	0.000%	0.000%	17
2	5	108	17					0.000%	0.000%	0.000%	17
3	5	112	17					0.000%	0.000%	0.000%	17
4	5	118	17					0.000%	0.000%	0.000%	17
5	5	130	17					0.000%	0.000%	0.000%	17
6	5	138	17					0.000%	0.000%	0.000%	17
7	5	143	17					0.000%	0.000%	0.000%	17
8	5	149	17					0.000%	0.000%	0.000%	17
9	5	163	17					0.000%	0.000%	0.000%	17
10	5	173	17					0.000%	0.000%	0.000%	17
11	5	183	17					0.000%	0.000%	0.000%	17
12	5	192	17					0.000%	0.000%	0.000%	17
Treatment 5			**204**	**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**204**
1	6	134	17					0.000%	0.000%	0.000%	17
2	6	106	17					0.000%	0.000%	0.000%	17
3	6	109	17					0.000%	0.000%	0.000%	17
4	6	117	17					0.000%	0.000%	0.000%	17
5	6	131	17					0.000%	0.000%	0.000%	17
6	6	139	17					0.000%	0.000%	0.000%	17
7	6	147	17					0.000%	0.000%	0.000%	17
8	6	150	17					0.000%	0.000%	0.000%	17
9	6	164	17					0.000%	0.000%	0.000%	17
10	6	172	17					0.000%	0.000%	0.000%	17
11	6	184	17					0.000%	0.000%	0.000%	17
12	6	196	17					0.000%	0.000%	0.000%	17
Treatment 6			**204**	**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**204**

Block	Trt	Pen No.	No. Birds Started Day 0	Days 0 - 14 (17NOV15 - 01DEC15) Mortality	Removal-1	Removal-2	Cause of Death	% Mortality	% Removal	Total % M & R Days 0 - 14	No. Birds Remaining Day 14
1	7	100	17					0.000%	0.000%	0.000%	17
2	7	107	17					0.000%	0.000%	0.000%	17
3	7	114	17					0.000%	0.000%	0.000%	17
4	7	121	17					0.000%	0.000%	0.000%	17
5	7	125	17		1		CD-C/SB/BL	0.000%	5.882%	5.882%	16
6	7	180	17	1			SDS	5.882%	0.000%	5.882%	16
7	7	146	17					0.000%	0.000%	0.000%	17
8	7	156	17					0.000%	0.000%	0.000%	17
9	7	159	17					0.000%	0.000%	0.000%	17
10	7	168	17					0.000%	0.000%	0.000%	17
11	7	181	17					0.000%	0.000%	0.000%	17
12	7	194	17					0.000%	0.000%	0.000%	17
Treatment 7			**204**	**1**	**1**	**0**	**CD-C/SB/BL; SDS**	**0.490%**	**0.490%**	**0.980%**	**202**

1	8	136	17					0.000%	0.000%	0.000%	17
2	8	104	17					0.000%	0.000%	0.000%	17
3	8	111	17	2			2 BAC	11.765%	0.000%	11.765%	15
4	8	124	17	1			BAC	5.882%	0.000%	5.882%	16
5	8	129	17	1			BAC	5.882%	0.000%	5.882%	16
6	8	178	17		1		CD-BAC	0.000%	5.882%	5.882%	16
7	8	145	17					0.000%	0.000%	0.000%	17
8	8	155	17					0.000%	0.000%	0.000%	17
9	8	165	17					0.000%	0.000%	0.000%	17
10	8	167	17					0.000%	0.000%	0.000%	17
11	8	187	17					0.000%	0.000%	0.000%	17
12	8	193	17					0.000%	0.000%	0.000%	17
Treatment 8			**204**	**4**	**1**	**0**	**4 BAC; CD-BAC**	**1.961%**	**0.490%**	**2.451%**	**199**

Table 14. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number ,AGV-15-5
Facility Number 7

			Days 14 - 21 (01DEC15 - 08DEC15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality	% Removal	Total % M & R Days 14 - 21	No. Birds Remaining Day 21
1	1	97					0.000%	0.000%	0.000%	17
2	1	103					0.000%	0.000%	0.000%	17
3	1	110					0.000%	0.000%	0.000%	17
4	1	122					0.000%	0.000%	0.000%	17
5	1	132					0.000%	0.000%	0.000%	17
6	1	177					0.000%	0.000%	0.000%	17
7	1	141					0.000%	0.000%	0.000%	17
8	1	152					0.000%	0.000%	0.000%	17
9	1	160					0.000%	0.000%	0.000%	17
10	1	170					0.000%	0.000%	0.000%	17
11	1	186					0.000%	0.000%	0.000%	17
12	1	190					0.000%	0.000%	0.000%	17
Treatment 1			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**204**
1	2	133					0.000%	0.000%	0.000%	17
2	2	102					0.000%	0.000%	0.000%	17
3	2	113					0.000%	0.000%	0.000%	17
4	2	123					0.000%	0.000%	0.000%	17
5	2	126					0.000%	0.000%	0.000%	16
6	2	140					0.000%	0.000%	0.000%	17
7	2	144					0.000%	0.000%	0.000%	17
8	2	151					0.000%	0.000%	0.000%	17
9	2	166					0.000%	0.000%	0.000%	17
10	2	169					0.000%	0.000%	0.000%	17
11	2	188					0.000%	0.000%	0.000%	17
12	2	195					0.000%	0.000%	0.000%	17
Treatment 2			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**203**
1	3	135					0.000%	0.000%	0.000%	16
2	3	101					0.000%	0.000%	0.000%	17
3	3	115					0.000%	0.000%	0.000%	17
4	3	120					0.000%	0.000%	0.000%	17
5	3	128					0.000%	0.000%	0.000%	17
6	3	137					0.000%	0.000%	0.000%	17
7	3	142					0.000%	0.000%	0.000%	17
8	3	154					0.000%	0.000%	0.000%	15
9	3	161					0.000%	0.000%	0.000%	17
10	3	171					0.000%	0.000%	0.000%	15
11	3	185					0.000%	0.000%	0.000%	17
12	3	191					0.000%	0.000%	0.000%	17
Treatment 3			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**199**

			Days 14 - 21 (01DEC15 - 08DEC15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality	% Removal	Total % M & R Days 14 - 21	No. Birds Remaining Day 21
1	4	98					0.000%	0.000%	0.000%	17
2	4	105					0.000%	0.000%	0.000%	17
3	4	116					0.000%	0.000%	0.000%	17
4	4	119					0.000%	0.000%	0.000%	17
5	4	127					0.000%	0.000%	0.000%	17
6	4	179					0.000%	0.000%	0.000%	17
7	4	148					0.000%	0.000%	0.000%	17
8	4	153					0.000%	0.000%	0.000%	17
9	4	162					0.000%	0.000%	0.000%	17
10	4	174					0.000%	0.000%	0.000%	17
11	4	182					0.000%	0.000%	0.000%	16
12	4	189					0.000%	0.000%	0.000%	17
Treatment 4			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**203**
1	5	99					0.000%	0.000%	0.000%	17
2	5	108					0.000%	0.000%	0.000%	17
3	5	112					0.000%	0.000%	0.000%	17
4	5	118					0.000%	0.000%	0.000%	17
5	5	130					0.000%	0.000%	0.000%	17
6	5	138	1			SDS	5.882%	0.000%	5.882%	16
7	5	143					0.000%	0.000%	0.000%	17
8	5	149					0.000%	0.000%	0.000%	17
9	5	163					0.000%	0.000%	0.000%	17
10	5	173					0.000%	0.000%	0.000%	17
11	5	183					0.000%	0.000%	0.000%	17
12	5	192					0.000%	0.000%	0.000%	17
Treatment 5			**1**	**0**	**0**	**SDS**	**0.490%**	**0.000%**	**0.490%**	**203**
1	6	134	1			SDS	5.882%	0.000%	5.882%	16
2	6	106					0.000%	0.000%	0.000%	17
3	6	109					0.000%	0.000%	0.000%	17
4	6	117					0.000%	0.000%	0.000%	17
5	6	131					0.000%	0.000%	0.000%	17
6	6	139					0.000%	0.000%	0.000%	17
7	6	147					0.000%	0.000%	0.000%	17
8	6	150					0.000%	0.000%	0.000%	17
9	6	164					0.000%	0.000%	0.000%	17
10	6	172					0.000%	0.000%	0.000%	17
11	6	184					0.000%	0.000%	0.000%	17
12	6	196					0.000%	0.000%	0.000%	17
Treatment 6			**1**	**0**	**0**	**SDS**	**0.490%**	**0.000%**	**0.490%**	**203**

			Days 14 - 21 (01DEC15 - 08DEC15)							
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality	% Removal	Total % M & R Days 14 - 21	No. Birds Remaining Day 21
1	7	100					0.000%	0.000%	0.000%	17
2	7	107					0.000%	0.000%	0.000%	17
3	7	114					0.000%	0.000%	0.000%	17
4	7	121					0.000%	0.000%	0.000%	17
5	7	125					0.000%	0.000%	0.000%	16
6	7	180					0.000%	0.000%	0.000%	16
7	7	146					0.000%	0.000%	0.000%	17
8	7	156					0.000%	0.000%	0.000%	17
9	7	159					0.000%	0.000%	0.000%	17
10	7	168					0.000%	0.000%	0.000%	17
11	7	181					0.000%	0.000%	0.000%	17
12	7	194					0.000%	0.000%	0.000%	17
Treatment 7			**0**	**0**	**0**		**0.000%**	**0.000%**	**0.000%**	**202**
1	8	136	1			SDS	5.882%	0.000%	5.882%	16
2	8	104					0.000%	0.000%	0.000%	17
3	8	111					0.000%	0.000%	0.000%	15
4	8	124					0.000%	0.000%	0.000%	16
5	8	129					0.000%	0.000%	0.000%	16
6	8	178					0.000%	0.000%	0.000%	16
7	8	145					0.000%	0.000%	0.000%	17
8	8	155					0.000%	0.000%	0.000%	17
9	8	165					0.000%	0.000%	0.000%	17
10	8	167					0.000%	0.000%	0.000%	17
11	8	187					0.000%	0.000%	0.000%	17
12	8	193					0.000%	0.000%	0.000%	17
Treatment 8			**1**	**0**	**0**	**SDS**	**0.503%**	**0.000%**	**0.503%**	**198**

Table 14. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number AGV-15-5
Facility Number 7

			Days 21 - 42 (08DEC15 - 29DEC15)								
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality	% Removal-1	% Removal-2	Total % M & R-1 Days 21 - 42	No. Birds Remaining Day 42
1	1	97			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
2	1	103		1	3	CD-C/ACT/FHN/BL; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13
3	1	110			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
4	1	122			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
5	1	132	3		3	2 ACT; BAC; 3 CD-SMPL	17.647%	0.000%	17.647%	17.647%	11
6	1	177			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
7	1	141	1	1	3	ACT; CD-C/BL/FHN; 3 CD-SMPL	5.882%	5.882%	17.647%	11.765%	12
8	1	152	2		3	2 ACT; 3 CD-SMPL	11.765%	0.000%	17.647%	11.765%	12
9	1	160	1	1	3	ACT; CD-C/ACT; 3 CD-SMPL	5.882%	5.882%	17.647%	11.765%	12
10	1	170	1	1	3	ACT; CD-C/ACT; 3 CD-SMPL	5.882%	5.882%	17.647%	11.765%	12
11	1	186			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
12	1	190			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
Treatment 1			**8**	**4**	**36**	**7 ACT; BAC; 2 CD-C/ACT; CD-C/ACT/FHN/BL; CD-C/BL/FHN; 36 CD-SMPL**	**3.922%**	**1.961%**	**17.647%**	**5.882%**	**156**
1	2	133	1		3	BAC; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13
2	2	102	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13
3	2	113	1	1	3	BAC; CD-C/BAC; 3 CD-SMPL	5.882%	5.882%	17.647%	11.765%	12
4	2	123	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13
5	2	126		1	3	CD-C/FHN/BL; 3 CD-SMPL	0.000%	6.250%	18.750%	6.250%	12
6	2	140			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
7	2	144			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
8	2	151			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
9	2	166			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
10	2	169			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
11	2	188		1	3	CD-C/BL/FHN; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13
12	2	195			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
Treatment 2			**4**	**3**	**36**	**2 BAC; CD-C/BAC; 2 CD-C/FHN/BL; 35 CD-SMPL; 2 SDS**	**1.970%**	**1.478%**	**17.734%**	**3.448%**	**160**
1	3	135			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13
2	3	101		2	3	CD-C/BAC; CD-C/BL/FHN; 3 CD-SMPL	0.000%	11.765%	17.647%	11.765%	12
3	3	115			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
4	3	120			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
5	3	128			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
6	3	137		1	3	CD-C/ACT; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13
7	3	142			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
8	3	154			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12
9	3	161	1	1	3	CD-C/BL/FHN; 3 CD-SMPL; SDS	5.882%	5.882%	17.647%	11.765%	12
10	3	171	1		3	BAC; 3 CD-SMPL	6.667%	0.000%	20.000%	6.667%	11
11	3	185			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
12	3	191			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
Treatment 3			**2**	**4**	**36**	**BAC; CD-C/ACT; CD-C/BAC; 2 CD-C/BL/FHN; 36 CD-SMPL; SDS**	**1.005%**	**2.010%**	**18.090%**	**3.015%**	**157**

			Days 21 - 42 (08DEC15 - 29DEC15)								
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality	% Removal-1	% Removal-2	Total % M & R-1 Days 21 - 42	No. Birds Remaining Day 42
1	4	98			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
2	4	105	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13
3	4	116			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
4	4	119			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
5	4	127			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
6	4	179		1	3	CD-C/BAC; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13
7	4	148			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
8	4	153	1		3	ACT; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13
9	4	162			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
10	4	174			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
11	4	182	2		3	ACT; BAC; 3 CD-SMPL	12.500%	0.000%	18.750%	12.500%	11
12	4	189			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
Treatment 4			**4**	**1**	**36**	**2 ACT; BAC; CD-C/BAC; 36 CD-SMPL; SDS**	**1.970%**	**0.493%**	**17.734%**	**2.463%**	**162**
1	5	99			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
2	5	108			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
3	5	112			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
4	5	118			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
5	5	130		2	3	2 CD-C/BL; 3 CD-SMPL	0.000%	11.765%	17.647%	11.765%	12
6	5	138			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13
7	5	143			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
8	5	149			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
9	5	163		1	3	CD-C/FHN/BL; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13
10	5	173			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
11	5	183		1	3	CD-C/BAC; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13
12	5	192			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
Treatment 5			**0**	**4**	**36**	**CD-C/BAC; 2 CD-C/BL; CD-C/FHN/BL; 36 CD-SMPL**	**0.000%**	**1.970%**	**17.734%**	**1.970%**	**163**
1	6	134	1		3	3 CD-SMPL; SDS	6.250%	0.000%	18.750%	6.250%	12
2	6	106		1	3	CD-BL/DH; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13
3	6	109			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
4	6	117			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
5	6	131			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
6	6	139		1	3	CD-C/ACT; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13
7	6	147			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
8	6	150			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
9	6	164	1	1	3	CD-C/BL/FHN; 3 CD-SMPL; SDS	5.882%	5.882%	17.647%	11.765%	12
10	6	172			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
11	6	184			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
12	6	196			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
Treatment 6			**2**	**3**	**36**	**CD-C/ACT; CD-BL/DH; CD-C/BL/FHN; 36 CD-SMPL; 2 SDS**	**0.985%**	**1.478%**	**17.734%**	**2.463%**	**162**

			Days 21 - 42 (08DEC15 - 29DEC15)								
Block	Trt	Pen No.	Mortality	Removal-1	Removal-2	Cause of Death	% Mortality	% Removal-1	% Removal-2	Total % M & R-1 Days 21 - 42	No. Birds Remaining Day 42
1	7	100		1	3	CD-C/BL; 3 CD-SMPL	0.000%	5.882%	17.647%	5.882%	13
2	7	107			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
3	7	114			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
4	7	121			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
5	7	125			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13
6	7	180			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13
7	7	146			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
8	7	156			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
9	7	159			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
10	7	168			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
11	7	181	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13
12	7	194			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
Treatment 7			**1**	**1**	**36**	**CD-C/BL; 36 CD-SMPL; SDS**	**0.495%**	**0.495%**	**17.822%**	**0.990%**	**164**
1	8	136	1		3	3 CD-SMPL; SDS	6.250%	0.000%	18.750%	6.250%	12
2	8	104			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
3	8	111			3	3 CD-SMPL	0.000%	0.000%	20.000%	0.000%	12
4	8	124	1	1	3	ACT; CD-BL/FHN; 3 CD-SMPL	6.250%	6.250%	18.750%	12.500%	11
5	8	129			3	3 CD-SMPL	0.000%	0.000%	18.750%	0.000%	13
6	8	178	1		3	BAC-BL/FHN; 3 CD-SMPL	6.250%	0.000%	18.750%	6.250%	12
7	8	145	1		3	3 CD-SMPL; SDS	5.882%	0.000%	17.647%	5.882%	13
8	8	155			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
9	8	165			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
10	8	167	1		3	ACT; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13
11	8	187			3	3 CD-SMPL	0.000%	0.000%	17.647%	0.000%	14
12	8	193	1		3	BAC; 3 CD-SMPL	5.882%	0.000%	17.647%	5.882%	13
Treatment 8			**6**	**1**	**36**	**2 ACT; BAC; BAC-BL/FHN; CD-BL/FHN; 36 CD-SMPL; 2 SDS**	**3.030%**	**0.505%**	**18.182%**	**3.535%**	**155**

Table 14. Summary of Mortalities and Removals (Day 0 - Study End)
CQR Study Number ,AGV-15-5
Facility Number 7

			Days 0 - 42			
Block	Trt	Pen No.	% Mortality	% Removal-1	% Removal-2	% Mortality & Removal-1
1	1	97	0.000%	0.000%	17.647%	0.000%
2	1	103	0.000%	5.882%	17.647%	5.882%
3	1	110	0.000%	0.000%	17.647%	0.000%
4	1	122	0.000%	0.000%	17.647%	0.000%
5	1	132	17.647%	0.000%	17.647%	17.647%
6	1	177	0.000%	0.000%	17.647%	0.000%
7	1	141	5.882%	5.882%	17.647%	11.765%
8	1	152	11.765%	0.000%	17.647%	11.765%
9	1	160	5.882%	5.882%	17.647%	11.765%
10	1	170	5.882%	5.882%	17.647%	11.765%
11	1	186	0.000%	0.000%	17.647%	0.000%
12	1	190	0.000%	0.000%	17.647%	0.000%
Treatment 1			3.922%	1.961%	17.647%	5.882%
1	2	133	5.882%	0.000%	17.647%	5.882%
2	2	102	5.882%	0.000%	17.647%	5.882%
3	2	113	5.882%	5.882%	17.647%	11.765%
4	2	123	5.882%	0.000%	17.647%	5.882%
5	2	126	5.882%	5.882%	17.647%	11.765%
6	2	140	0.000%	0.000%	17.647%	0.000%
7	2	144	0.000%	0.000%	17.647%	0.000%
8	2	151	0.000%	0.000%	17.647%	0.000%
9	2	166	0.000%	0.000%	17.647%	0.000%
10	2	169	0.000%	0.000%	17.647%	0.000%
11	2	188	0.000%	5.882%	17.647%	5.882%
12	2	195	0.000%	0.000%	17.647%	0.000%
Treatment 2			2.451%	1.471%	17.647%	3.922%
1	3	135	0.000%	5.882%	17.647%	5.882%
2	3	101	0.000%	11.765%	17.647%	11.765%
3	3	115	0.000%	0.000%	17.647%	0.000%
4	3	120	0.000%	0.000%	17.647%	0.000%
5	3	128	0.000%	0.000%	17.647%	0.000%
6	3	137	0.000%	5.882%	17.647%	5.882%
7	3	142	0.000%	0.000%	17.647%	0.000%
8	3	154	11.765%	0.000%	17.647%	11.765%
9	3	161	5.882%	5.882%	17.647%	11.765%
10	3	171	11.765%	5.882%	17.647%	17.647%
11	3	185	0.000%	0.000%	17.647%	0.000%
12	3	191	0.000%	0.000%	17.647%	0.000%
Treatment 3			2.451%	2.941%	17.647%	5.392%

			Days 0 - 42			
Block	Trt	Pen No.	% Mortality	% Removal-1	% Removal-2	% Mortality & Removal-1
1	4	98	0.000%	0.000%	17.647%	0.000%
2	4	105	5.882%	0.000%	17.647%	5.882%
3	4	116	0.000%	0.000%	17.647%	0.000%
4	4	119	0.000%	0.000%	17.647%	0.000%
5	4	127	0.000%	0.000%	17.647%	0.000%
6	4	179	0.000%	5.882%	17.647%	5.882%
7	4	148	0.000%	0.000%	17.647%	0.000%
8	4	153	5.882%	0.000%	17.647%	5.882%
9	4	162	0.000%	0.000%	17.647%	0.000%
10	4	174	0.000%	0.000%	17.647%	0.000%
11	4	182	11.765%	5.882%	17.647%	17.647%
12	4	189	0.000%	0.000%	17.647%	0.000%
Treatment 4			1.961%	0.980%	17.647%	2.941%
1	5	99	0.000%	0.000%	17.647%	0.000%
2	5	108	0.000%	0.000%	17.647%	0.000%
3	5	112	0.000%	0.000%	17.647%	0.000%
4	5	118	0.000%	0.000%	17.647%	0.000%
5	5	130	0.000%	11.765%	17.647%	11.765%
6	5	138	5.882%	0.000%	17.647%	5.882%
7	5	143	0.000%	0.000%	17.647%	0.000%
8	5	149	0.000%	0.000%	17.647%	0.000%
9	5	163	0.000%	5.882%	17.647%	5.882%
10	5	173	0.000%	0.000%	17.647%	0.000%
11	5	183	0.000%	5.882%	17.647%	5.882%
12	5	192	0.000%	0.000%	17.647%	0.000%
Treatment 5			0.490%	1.961%	17.647%	2.451%
1	6	134	11.765%	0.000%	17.647%	11.765%
2	6	106	0.000%	5.882%	17.647%	5.882%
3	6	109	0.000%	0.000%	17.647%	0.000%
4	6	117	0.000%	0.000%	17.647%	0.000%
5	6	131	0.000%	0.000%	17.647%	0.000%
6	6	139	0.000%	5.882%	17.647%	5.882%
7	6	147	0.000%	0.000%	17.647%	0.000%
8	6	150	0.000%	0.000%	17.647%	0.000%
9	6	164	5.882%	5.882%	17.647%	11.765%
10	6	172	0.000%	0.000%	17.647%	0.000%
11	6	184	0.000%	0.000%	17.647%	0.000%
12	6	196	0.000%	0.000%	17.647%	0.000%
Treatment 6			1.471%	1.471%	17.647%	2.941%

			Days 0 - 42			
Block	Trt	Pen No.	% Mortality	% Removal-1	% Removal-2	% Mortality & Removal-1
1	7	100	0.000%	5.882%	17.647%	5.882%
2	7	107	0.000%	0.000%	17.647%	0.000%
3	7	114	0.000%	0.000%	17.647%	0.000%
4	7	121	0.000%	0.000%	17.647%	0.000%
5	7	125	0.000%	5.882%	17.647%	5.882%
6	7	180	5.882%	0.000%	17.647%	5.882%
7	7	146	0.000%	0.000%	17.647%	0.000%
8	7	156	0.000%	0.000%	17.647%	0.000%
9	7	159	0.000%	0.000%	17.647%	0.000%
10	7	168	0.000%	0.000%	17.647%	0.000%
11	7	181	5.882%	0.000%	17.647%	5.882%
12	7	194	0.000%	0.000%	17.647%	0.000%
Treatment 7			0.980%	0.980%	17.647%	1.961%
1	8	136	11.765%	0.000%	17.647%	11.765%
2	8	104	0.000%	0.000%	17.647%	0.000%
3	8	111	11.765%	0.000%	17.647%	11.765%
4	8	124	11.765%	5.882%	17.647%	17.647%
5	8	129	5.882%	0.000%	17.647%	5.882%
6	8	178	5.882%	5.882%	17.647%	11.765%
7	8	145	5.882%	0.000%	17.647%	5.882%
8	8	155	0.000%	0.000%	17.647%	0.000%
9	8	165	0.000%	0.000%	17.647%	0.000%
10	8	167	5.882%	0.000%	17.647%	5.882%
11	8	187	0.000%	0.000%	17.647%	0.000%
12	8	193	5.882%	0.000%	17.647%	5.882%
Treatment 8			5.392%	0.980%	17.647%	6.373%

Table 15. Feed Added and Removed by Pen Days 0 - Study End
AGV-15-5
BUILDING 7

			Days 0 - 14			Days 14 - 21		
Block	Trt Group	Pen No.	Feed 1 13-Nov-15	WB 1-Dec-15	D0-14 Consumed	Feed 2 1-Dec-15	WB 8-Dec-15	D14-21 Consumed
1	1	97	10.00	*3.98*	**6.02**	13.00	*5.24*	**7.76**
1	4	98	10.00	*3.28*	**6.72**	13.00	*3.64*	**9.36**
1	5	99	10.00	*3.22*	**6.78**	13.00	*2.86*	**10.14**
1	7	100	10.00	*2.72*	**7.28**	13.00	*2.56*	**10.44**
2	3	101	10.00	*3.46*	**6.54**	13.00	*3.92*	**9.08**
2	2	102	10.00	*3.28*	**6.72**	13.00	*3.46*	**9.54**
2	1	103	10.00	*3.78*	**6.22**	13.00	*5.22*	**7.78**
2	8	104	10.00	*2.96*	**7.04**	13.00	*2.62*	**10.38**
2	4	105	10.00	*3.54*	**6.46**	13.00	*3.78*	**9.22**
2	6	106	10.00	*3.08*	**6.92**	13.00	*3.02*	**9.98**
2	7	107	10.00	*3.08*	**6.92**	13.00	*2.86*	**10.14**
2	5	108	10.00	*3.46*	**6.54**	13.00	*3.32*	**9.68**
3	6	109	10.00	*2.78*	**7.22**	13.00	*2.78*	**10.22**
3	1	110	10.00	*4.02*	**5.98**	13.00	*4.82*	**8.18**
3	8	111	10.00	*3.22*	**6.78**	13.00	*3.50*	**9.50**
3	5	112	10.00	*3.08*	**6.92**	13.00	*3.18*	**9.82**
3	2	113	10.00	*3.34*	**6.66**	13.00	*3.64*	**9.36**
3	7	114	10.00	*2.76*	**7.24**	13.00	*2.56*	**10.44**
3	3	115	10.00	*3.50*	**6.50**	13.00	*4.12*	**8.88**
3	4	116	10.00	*3.38*	**6.62**	13.00	*3.48*	**9.52**
4	6	117	10.00	*3.26*	**6.74**	13.00	*3.34*	**9.66**
4	5	118	10.00	*3.04*	**6.96**	13.00	*3.24*	**9.76**
4	4	119	10.00	*3.06*	**6.94**	13.00	*3.84*	**9.16**
4	3	120	10.00	*3.28*	**6.72**	13.00	*3.98*	**9.02**
4	7	121	10.00	*2.84*	**7.16**	13.00	*3.18*	**9.82**
4	1	122	10.00	*3.58*	**6.42**	13.00	*5.06*	**7.94**
4	2	123	10.00	*3.16*	**6.84**	13.00	*3.70*	**9.30**
4	8	124	10.00	*3.18*	**6.82**	13.00	*3.36*	**9.64**

Block	Trt Group	Pen No.	Feed 1 13-Nov-15	WB 1-Dec-15	D0-14 Consumed	Feed 2 1-Dec-15	WB 8-Dec-15	D14-21 Consumed
5	7	125	10.00	*3.46*	**6.54**	13.00	*4.12*	**8.88**
5	2	126	10.00	*3.02*	**6.98**	13.00	*4.10*	**8.90**
5	4	127	10.00	*3.38*	**6.62**	13.00	*4.52*	**8.48**
5	3	128	10.00	*3.54*	**6.46**	13.00	*4.08*	**8.92**
5	8	129	10.00	*3.08*	**6.92**	13.00	*2.96*	**10.04**
5	5	130	10.00	*3.00*	**7.00**	13.00	*3.54*	**9.46**
5	6	131	10.00	*2.94*	**7.06**	13.00	*3.04*	**9.96**
5	1	132	10.00	*4.04*	**5.96**	13.00	*5.42*	**7.58**
1	2	133	10.00	*3.16*	**6.84**	13.00	*3.78*	**9.22**
1	6	134	10.00	*2.54*	**7.46**	13.00	*3.00*	**10.00**
1	3	135	10.00	*3.44*	**6.56**	13.00	*4.76*	**8.24**
1	8	136	10.00	*2.70*	**7.30**	13.00	*2.76*	**10.24**
6	3	137	10.00	*3.26*	**6.74**	13.00	*3.32*	**9.68**
6	5	138	10.00	*3.14*	**6.86**	13.00	*4.00*	**9.00**
6	6	139	10.00	*3.04*	**6.96**	13.00	*3.10*	**9.90**
6	2	140	10.00	*2.88*	**7.12**	13.00	*3.58*	**9.42**
7	1	141	10.00	*3.70*	**6.30**	13.00	*5.38*	**7.62**
7	3	142	10.00	*3.14*	**6.86**	13.00	*3.56*	**9.44**
7	5	143	10.00	*2.84*	**7.16**	13.00	*3.26*	**9.74**
7	2	144	10.00	*2.68*	**7.32**	13.00	*3.52*	**9.48**
7	8	145	10.00	*2.64*	**7.36**	13.00	*2.40*	**10.60**
7	7	146	10.00	*2.66*	**7.34**	13.00	*2.88*	**10.12**
7	6	147	10.00	*2.18*	**7.82**	13.00	*2.02*	**10.98**
7	4	148	10.00	*2.60*	**7.40**	13.00	*2.94*	**10.06**
8	5	149	10.00	*2.88*	**7.12**	13.00	*2.84*	**10.16**
8	6	150	10.00	*2.46*	**7.54**	13.00	*2.76*	**10.24**
8	2	151	10.00	*2.62*	**7.38**	13.00	*2.84*	**10.16**
8	1	152	10.00	*3.82*	**6.18**	13.00	*5.02*	**7.98**
8	4	153	10.00	*3.00*	**7.00**	13.00	*3.86*	**9.14**
8	3	154	10.00	*3.74*	**6.26**	13.00	*4.44*	**8.56**
8	8	155	10.00	*2.72*	**7.28**	13.00	*2.54*	**10.46**
8	7	156	10.00	*2.60*	**7.40**	13.00	*2.92*	**10.08**

Block	Trt Group	Pen No.	Feed 1 13-Nov-15	WB 1-Dec-15	D0-14 Consumed	Feed 2 1-Dec-15	WB 8-Dec-15	D14-21 Consumed
9	7	159	10.00	*2.68*	**7.32**	13.00	*2.34*	**10.66**
9	1	160	10.00	*3.74*	**6.26**	13.00	*4.56*	**8.44**
9	3	161	10.00	*3.38*	**6.62**	13.00	*3.98*	**9.02**
9	4	162	10.00	*3.26*	**6.74**	13.00	*3.56*	**9.44**
9	5	163	10.00	*2.80*	**7.20**	13.00	*2.78*	**10.22**
9	6	164	10.00	*2.42*	**7.58**	13.00	*2.04*	**10.96**
9	8	165	10.00	*2.52*	**7.48**	13.00	*2.10*	**10.90**
9	2	166	10.00	*3.10*	**6.90**	13.00	*3.38*	**9.62**
10	8	167	10.00	*2.60*	**7.40**	13.00	*2.22*	**10.78**
10	7	168	10.00	*4.34*	**5.66**	13.00	*4.26*	**8.74**
10	2	169	10.00	*3.24*	**6.76**	13.00	*3.34*	**9.66**
10	1	170	10.00	*3.94*	**6.06**	13.00	*5.04*	**7.96**
10	3	171	10.00	*3.96*	**6.04**	13.00	*4.62*	**8.38**
10	6	172	10.00	*2.96*	**7.04**	13.00	*2.88*	**10.12**
10	5	173	10.00	*2.72*	**7.28**	13.00	*2.60*	**10.40**
10	4	174	10.00	*3.48*	**6.52**	13.00	*3.80*	**9.20**
6	1	177	10.00	*4.00*	**6.00**	13.00	*5.56*	**7.44**
6	8	178	10.00	*3.22*	**6.78**	13.00	*3.56*	**9.44**
6	4	179	10.00	*3.42*	**6.58**	13.00	*4.06*	**8.94**
6	7	180	10.00	*3.30*	**6.70**	13.00	*3.76*	**9.24**
11	7	181	10.00	*2.96*	**7.04**	13.00	*3.22*	**9.78**
11	4	182	10.00	*3.60*	**6.40**	13.00	*4.58*	**8.42**
11	5	183	10.00	*3.02*	**6.98**	13.00	*3.92*	**9.08**
11	6	184	10.00	*2.94*	**7.06**	13.00	*3.42*	**9.58**
11	3	185	10.00	*3.26*	**6.74**	13.00	*3.98*	**9.02**
11	1	186	10.00	*3.96*	**6.04**	13.00	*5.86*	**7.14**
11	8	187	10.00	*2.74*	**7.26**	13.00	*2.68*	**10.32**
11	2	188	10.00	*3.16*	**6.84**	13.00	*3.42*	**9.58**
12	4	189	10.00	*3.50*	**6.50**	13.00	*3.96*	**9.04**
12	1	190	10.00	*3.96*	**6.04**	13.00	*5.54*	**7.46**
12	3	191	10.00	*3.30*	**6.70**	13.00	*3.80*	**9.20**
12	5	192	10.00	*2.92*	**7.08**	13.00	*3.04*	**9.96**
12	8	193	10.00	*2.66*	**7.34**	13.00	*2.40*	**10.60**
12	7	194	10.00	*2.92*	**7.08**	13.00	*2.94*	**10.06**
12	2	195	10.00	*3.02*	**6.98**	13.00	*3.34*	**9.66**
12	6	196	10.00	*3.02*	**6.98**	13.00	*2.74*	**10.26**

Table 15. Feed Added and Removed by Pen Days 0 - Study End
AGV-15-5
BUILDING 7

			Days 21 - 42						
Block	Trt Group	Pen No.	Feed 3 8-Dec-15	Feed 4 14-Dec-15	Feed 5 21-Dec-15	Feed 6 23-Dec-15	Feed 7 28-Dec-15	WB 29-Dec-15	D21-42 Consumed
1	1	97	20.00	14.00	12.00	0.00	0.00	*8.08*	**37.92**
1	4	98	20.00	14.00	12.00	8.00	5.00	*9.74*	**49.26**
1	5	99	20.00	14.00	12.00	8.00	5.00	*8.56*	**50.44**
1	7	100	20.00	14.00	12.00	8.00	5.00	*9.28*	**49.72**
2	3	101	20.00	14.00	12.00	8.00	5.00	*12.92*	**46.08**
2	2	102	20.00	14.00	12.00	8.00	5.00	*10.74*	**48.26**
2	1	103	20.00	14.00	12.00	0.00	0.00	*7.08*	**38.92**
2	8	104	20.00	14.00	12.00	8.00	5.00	*8.52*	**50.48**
2	4	105	20.00	14.00	12.00	8.00	5.00	*12.50*	**46.50**
2	6	106	20.00	14.00	12.00	8.00	5.00	*11.76*	**47.24**
2	7	107	20.00	14.00	12.00	8.00	5.00	*7.46*	**51.54**
2	5	108	20.00	14.00	12.00	8.00	5.00	*7.48*	**51.52**
3	6	109	20.00	14.00	12.00	8.00	5.00	*5.68*	**53.32**
3	1	110	20.00	14.00	12.00	0.00	0.00	*6.86*	**39.14**
3	8	111	20.00	14.00	12.00	8.00	5.00	*14.18*	**44.82**
3	5	112	20.00	14.00	12.00	8.00	5.00	*8.82*	**50.18**
3	2	113	20.00	14.00	12.00	8.00	5.00	*12.82*	**46.18**
3	7	114	20.00	14.00	12.00	8.00	5.00	*7.24*	**51.76**
3	3	115	20.00	14.00	12.00	8.00	5.00	*12.36*	**46.64**
3	4	116	20.00	14.00	12.00	8.00	5.00	*11.80*	**47.20**
4	6	117	20.00	14.00	12.00	8.00	5.00	*10.48*	**48.52**
4	5	118	20.00	14.00	12.00	8.00	5.00	*12.58*	**46.42**
4	4	119	20.00	14.00	12.00	8.00	5.00	*12.12*	**46.88**
4	3	120	20.00	14.00	12.00	8.00	5.00	*12.98*	**46.02**
4	7	121	20.00	14.00	12.00	8.00	5.00	*10.00*	**49.00**
4	1	122	20.00	14.00	12.00	0.00	0.00	*5.12*	**40.88**
4	2	123	20.00	14.00	12.00	8.00	5.00	*11.80*	**47.20**
4	8	124	20.00	14.00	12.00	8.00	5.00	*16.12*	**42.88**

Block	Trt Group	Pen No.	Feed 3 8-Dec-15	Feed 4 14-Dec-15	Feed 5 21-Dec-15	Feed 6 23-Dec-15	Feed 7 28-Dec-15	WB 29-Dec-15	D21-42 Consumed
5	7	125	20.00	14.00	12.00	8.00	5.00	*12.12*	**46.88**
5	2	126	20.00	14.00	12.00	8.00	5.00	*13.40*	**45.60**
5	4	127	20.00	14.00	12.00	8.00	5.00	*9.06*	**49.94**
5	3	128	20.00	14.00	12.00	8.00	5.00	*9.90*	**49.10**
5	8	129	20.00	14.00	12.00	8.00	5.00	*10.12*	**48.88**
5	5	130	20.00	14.00	12.00	8.00	5.00	*11.74*	**47.26**
5	6	131	20.00	14.00	12.00	8.00	5.00	*10.52*	**48.48**
5	1	132	20.00	14.00	12.00	0.00	0.00	*8.94*	**37.06**
1	2	133	20.00	14.00	12.00	8.00	5.00	*14.72*	**44.28**
1	6	134	20.00	14.00	12.00	8.00	5.00	*14.86*	**44.14**
1	3	135	20.00	14.00	12.00	8.00	5.00	*14.30*	**44.70**
1	8	136	20.00	14.00	12.00	8.00	5.00	*15.94*	**43.06**
6	3	137	20.00	14.00	12.00	8.00	5.00	*16.42*	**42.58**
6	5	138	20.00	14.00	12.00	8.00	5.00	*12.60*	**46.40**
6	6	139	20.00	14.00	12.00	8.00	5.00	*9.68*	**49.32**
6	2	140	20.00	14.00	12.00	8.00	5.00	*8.96*	**50.04**
7	1	141	20.00	14.00	12.00	0.00	0.00	*10.16*	**35.84**
7	3	142	20.00	14.00	12.00	8.00	5.00	*9.58*	**49.42**
7	5	143	20.00	14.00	12.00	8.00	5.00	*9.46*	**49.54**
7	2	144	20.00	14.00	12.00	8.00	5.00	*7.80*	**51.20**
7	8	145	20.00	14.00	12.00	8.00	5.00	*10.56*	**48.44**
7	7	146	20.00	14.00	12.00	8.00	5.00	*7.18*	**51.82**
7	6	147	20.00	14.00	12.00	8.00	5.00	*7.10*	**51.90**
7	4	148	20.00	14.00	12.00	8.00	5.00	*8.74*	**50.26**
8	5	149	20.00	14.00	12.00	8.00	5.00	*7.68*	**51.32**
8	6	150	20.00	14.00	12.00	8.00	5.00	*7.86*	**51.14**
8	2	151	20.00	14.00	12.00	8.00	5.00	*7.62*	**51.38**
8	1	152	20.00	14.00	12.00	0.00	0.00	*9.38*	**36.62**
8	4	153	20.00	14.00	12.00	8.00	5.00	*15.46*	**43.54**
8	3	154	20.00	14.00	12.00	8.00	5.00	*17.30*	**41.70**
8	8	155	20.00	14.00	12.00	8.00	5.00	*8.40*	**50.60**
8	7	156	20.00	14.00	12.00	8.00	5.00	*9.00*	**50.00**

Block	Trt Group	Pen No.	Feed 3 8-Dec-15	Feed 4 14-Dec-15	Feed 5 21-Dec-15	Feed 6 23-Dec-15	Feed 7 28-Dec-15	WB 29-Dec-15	D21-42 Consumed
9	7	159	20.00	14.00	12.00	8.00	5.00	*7.86*	**51.14**
9	1	160	20.00	14.00	12.00	0.00	0.00	*7.88*	**38.12**
9	3	161	20.00	14.00	12.00	8.00	5.00	*16.86*	**42.14**
9	4	162	20.00	14.00	12.00	8.00	5.00	*8.82*	**50.18**
9	5	163	20.00	14.00	12.00	8.00	5.00	*10.26*	**48.74**
9	6	164	20.00	14.00	12.00	8.00	5.00	*12.38*	**46.62**
9	8	165	20.00	14.00	12.00	8.00	5.00	*7.42*	**51.58**
9	2	166	20.00	14.00	12.00	8.00	5.00	*9.16*	**49.84**
10	8	167	20.00	14.00	12.00	8.00	5.00	*11.12*	**47.88**
10	7	168	20.00	14.00	12.00	8.00	5.00	*10.02*	**48.98**
10	2	169	20.00	14.00	12.00	8.00	5.00	*7.88*	**51.12**
10	1	170	20.00	14.00	12.00	0.00	0.00	*7.32*	**38.68**
10	3	171	20.00	14.00	12.00	8.00	5.00	*17.00*	**42.00**
10	6	172	20.00	14.00	12.00	8.00	5.00	*9.40*	**49.60**
10	5	173	20.00	14.00	12.00	8.00	5.00	*7.80*	**51.20**
10	4	174	20.00	14.00	12.00	8.00	5.00	*10.00*	**49.00**
6	1	177	20.00	14.00	12.00	0.00	0.00	*7.46*	**38.54**
6	8	178	20.00	14.00	12.00	8.00	5.00	*15.48*	**43.52**
6	4	179	20.00	14.00	12.00	8.00	5.00	*14.70*	**44.30**
6	7	180	20.00	14.00	12.00	8.00	5.00	*12.54*	**46.46**
11	7	181	20.00	14.00	12.00	8.00	5.00	*11.06*	**47.94**
11	4	182	20.00	14.00	12.00	8.00	5.00	*18.82*	**40.18**
11	5	183	20.00	14.00	12.00	8.00	5.00	*12.14*	**46.86**
11	6	184	20.00	14.00	12.00	8.00	5.00	*7.94*	**51.06**
11	3	185	20.00	14.00	12.00	8.00	5.00	*12.32*	**46.68**
11	1	186	20.00	14.00	12.00	0.00	0.00	*10.58*	**35.42**
11	8	187	20.00	14.00	12.00	8.00	5.00	*9.48*	**49.52**
11	2	188	20.00	14.00	12.00	8.00	5.00	*12.46*	**46.54**
12	4	189	20.00	14.00	12.00	8.00	5.00	*10.20*	**48.80**
12	1	190	20.00	14.00	12.00	0.00	0.00	*6.62*	**39.38**
12	3	191	20.00	14.00	12.00	8.00	5.00	*11.44*	**47.56**
12	5	192	20.00	14.00	12.00	8.00	5.00	*11.12*	**47.88**
12	8	193	20.00	14.00	12.00	8.00	5.00	*13.20*	**45.80**
12	7	194	20.00	14.00	12.00	8.00	5.00	*11.40*	**47.60**
12	2	195	20.00	14.00	12.00	8.00	5.00	*11.14*	**47.86**
12	6	196	20.00	14.00	12.00	8.00	5.00	*11.24*	**47.76**

Table 17. Hematalogical Results Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen No.	Animal ID	HGB	HCT	RBC	MCV	MCH	MCHC	RDW	WBC	TE	BHET	HET	LYMPH
				g/dL	%	x10^6/uL	fL	pg	g/dL	%	x10^3/uL		%	%	%
				9.8-12.1	25.9-32.6	2.42-2.99	100.3-115.7	38.2-43.0	36.3-38.9	8.0-10.2	5.5-24.2	20-80			
1	1	97	1	12.2	33.7	2.7	124.8	45.2	36.2	10	19.8	*	NA	36	56
1	1	97	2	12.9	36.7	2.9	126.6	44.5	35.1	10	7.1	*	NA	28	66
1	1	97	3	13.1	37.2	2.97	125.3	44.1	35.2	10.4	10.6	*	NA	74	17
2	1	103	1	15.5	42.3	3.19	132.6	48.6	36.6	10.5	11.4	*	NA	26	64
2	1	103	2	12.3	34.8	2.74	127	44.9	35.3	8.8	14.5	*	NA	44	41
2	1	103	3	12.6	34.6	2.62	132.1	48.1	36.4	9.7	14.4	*	NA	44	46
3	1	110	1	12	32.9	2.52	130.6	47.6	36.5	9.7	5.3	*	NA	70	20
3	1	110	2	11.8	33.3	2.64	126.1	44.7	35.4	11.1	8.1	*	NA	55	40
3	1	110	3	12.7	38.6	3.15	122.5	40.3	32.9	11.2	12.4	*	NA	79	11
4	1	122	1	16.4	47.2	3.38	139.6	48.5	34.7	13.4	8.2	*	NA	34	52
4	1	122	2	14.9	40.7	3.22	126.4	46.3	36.6	10.5	9.4	*	NA	38	52
4	1	122	3	11.4	34.1	2.68	127.2	42.5	33.4	9.7	21.9	*	NA	26	58
5	1	132	1	11	31.5	2.48	127	44.4	34.9	11.1	10.4	*	NA	80	8
5	1	132	2	11.3	32.1	2.72	118	41.5	35.2	9.2	19.4	*	NA	79	7
5	1	132	3	11.3	33.4	2.6	128.5	43.5	33.8	10	16	*	NA	27	67
6	1	177	1	12.9	36.8	2.8	131.4	46.1	35.1	8.9	15.9	*	NA	29	59
6	1	177	2	12.2	34.2	2.81	121.7	43.4	35.7	10.4	27.6	*	NA	31	61
6	1	177	3	13.4	39.3	3.28	119.8	40.9	34.1	9.5	5.7	*	NA	56	24
7	1	141	1	11.6	33.2	2.61	127.2	44.4	34.9	9.7	16.6	*	NA	53	41
7	1	141	2	12	33.4	2.68	124.6	44.8	35.9	9.3	7.9	*	NA	65	26
7	1	141	3	10.7	31	2.49	124.5	43	34.5	10.1	7	*	NA	83	6
8	1	152	1	13.7	38.9	3.13	124.3	43.8	35.2	9.5	13.1	*	NA	49	42
8	1	152	2	11.5	33.9	2.64	128.4	43.6	33.9	9.3	13.2	*	NA	26	62
8	1	152	3	11.2	32.9	2.77	118.8	40.4	34	10.1	44	*	NA	11	82

Table 17. Hematalogical Results Summarized by Treatment Group

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BUILDING 7

Block	Trt Group	Pen No.	Animal ID	HGB	HCT	RBC	MCV	MCH	MCHC	RDW	WBC	TE	BHET	HET	LYMPH
				g/dL	%	x10^6/uL	fL	pg	g/dL	%	x10^3/uL		%	%	%
				9.8-12.1	25.9-32.6	2.42-2.99	100.3-115.7	38.2-43.0	36.3-38.9	8.0-10.2	5 5-24 2	20-80			
9	1	160	1	12 2	34.7	2.86	121 3	42.7	35.2	10.2	21.1	*	NA	22	66
9	1	160	2	10 8	30.7	2.45	125 3	44.1	35.2	9.9	4 2	*	NA	50	40
9	1	160	3	12 8	35.4	2.86	123 8	44.8	36.2	9.4	23.1	*	NA	25	64
10	1	170	1	10.7	31.5	2.59	121.6	41.3	34	10	19.2	*	NA	18	67
10	1	170	2	11.1	33	2.6	126 9	42.7	33.6	11.1	10.4	*	NA	30	65
10	1	170	3	13.1	36	2.78	129 5	47.1	36.4	10.7	11.4	*	NA	88	5
11	1	186	1	10 5	30.8	2.45	125.7	42.9	34.1	9.4	15	*	NA	34	58
11	1	186	2	13 3	41.2	3.04	135 5	43.8	32.3	13.2	18.2	*	NA	18	76
11	1	186	3	11 8	34.3	2.9	118 3	40.7	34.4	9.2	20	*	NA	20	68
12	1	190	1	13.4	37.2	3.05	122	43.9	36	9	11.4	*	NA	80	13
12	1	190	2	13.1	34.4	2.75	125.1	47.6	38.1	9.6	11.6	*	NA	87	5
12	1	190	3	12.1	33.1	2.71	122.1	44.6	36.6	9.1	20.8	*	NA	41	54
Averages				**12.4**	**35.3**	**2.80**	**125.9**	**44.2**	**35.1**	**10.1**	**14.6**	**NA**	**NA**	**46**	**44**
Standard Deviations				**1.3**	**3.6**	**0.25**	**4.7**	**2.2**	**1.2**	**1.0**	**7.6**	**NA**	**NA**	**23**	**23**
CVs				**10.7%**	**10.2%**	**8.81%**	**3.7%**	**5.1%**	**3.5%**	**10.1%**	**51.8%**	**NA**	**NA**	**51%**	**53%**

Table 17. Hematalogical Results Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen Number	Animal ID	HGB	HCT	RBC	MCV	MCH	MCHC	RDW	WBC	TE	BHET	HET	LYMPH
				g/dL	%	x10^6/uL	fL	pg	g/dL	%	x10^3/uL		%	%	%
				9.8-12.1	25.9-32.6	2.42-2.99	100.3-115.7	38.2-43.0	36.3-38.9	8.0-10.2	5.5-24.2	20-80			
1	2	133	1	11.6	32.8	2.8	117.1	41.4	35.4	10.2	18.4	*	NA	45	43
1	2	133	2	12.9	35.8	2.99	119.7	43.1	36	9.2	24.8	*	NA	19	73
1	2	133	3	10.2	29.1	2.53	115	40.3	35.1	9.4	20.4	*	NA	47	42
2	2	102	1	12.1	33.3	2.73	122	44.3	36.3	9.6	14.4	*	NA	62	27
2	2	102	2	12.4	35.4	3.04	116.4	40.8	35	9.2	22	*	NA	34	52
2	2	102	3	10.7	29.9	2.54	117.7	42.1	35.8	8.5	17	*	NA	42	51
3	2	113	1	10.8	30	2.61	114.9	41.4	36	9	7.8	*	NA	86	6
3	2	113	2	11.6	31.8	2.66	119.5	43.6	36.5	9.2	18.1	*	NA	33	56
3	2	113	3	13.2	35.7	2.96	120.6	44.6	37	9.4	10.9	*	NA	57	40
4	2	123	1	13	35.3	3.06	115.4	42.5	36.8	9.6	7.7	*	NA	61	28
4	2	123	2	10.6	29.8	2.54	117.3	41.7	35.6	9.3	26.2	*	NA	28	58
4	2	123	3	13.6	36.9	2.9	127.2	46.9	36.9	10.4	6.1	*	NA	70	17
5	2	126	1	11.1	30.6	2.54	120.5	43.7	36.3	10.1	16.2	*	NA	42	52
5	2	126	2	12.5	34.1	2.75	124	45.5	36.7	11.2	21.7	*	NA	27	66
5	2	126	3	11.4	32.6	2.77	117.7	41.2	35	9.3	9.5	*	NA	90	3
6	2	140	1	11.6	31.5	2.64	119.3	43.9	36.8	9.4	21.4	*	NA	34	60
6	2	140	2	10.8	30.3	2.58	117.4	41.9	35.6	7.9	19.9	*	NA	36	56
6	2	140	3	12.3	33.4	2.71	123.2	45.4	36.8	9.5	24.8	*	NA	33	51
7	2	144	1	12.2	35.2	2.81	125.3	43.4	34.7	10.2	11.9	*	NA	86	6
7	2	144	2	12.7	34.6	2.82	122.7	45	36.7	10.6	11.5	*	NA	41	43
7	2	144	3	12.8	34.9	2.9	120.3	44.1	36.7	9.8	21.2	*	NA	25	73
8	2	151	1	12	32.8	2.77	118.4	43.3	36.6	8.5	8.3	*	NA	81	6
8	2	151	2	11.9	32.4	2.73	118.7	43.6	36.7	10.4	10.4	*	NA	80	7
8	2	151	3	10.9	30.4	2.58	117.8	42.2	35.9	8.9	7.3	*	NA	86	4
9	2	166	1	12.4	35.1	2.93	119.8	42.3	35.3	9.3	6.8	*	NA	32	59
9	2	166	2	11.9	33.7	2.78	121.2	42.8	35.3	10.2	8.4	*	NA	86	6
9	2	166	3	12.2	33.3	2.69	123.8	45.4	36.6	8.3	16.9	*	NA	22	62
10	2	169	1	10.3	29	2.42	119.8	42.6	35.5	9.3	15.2	*	NA	47	41
10	2	169	2	13.9	38	3.13	121.4	44.4	36.6	9.1	11.2	*	NA	55	39
10	2	169	3	12.4	34.3	2.81	122.1	44.1	36.2	9.6	14	*	NA	36	60
11	2	188	1	13.7	38.2	3.21	119	42.7	35.9	9	19.7	*	NA	25	61
11	2	188	2	11.7	32.7	2.78	117.6	42.1	35.8	9.2	11.2	*	NA	41	57
11	2	188	3	14.8	39.9	3.24	123.1	45.7	37.1	8.6	13.4	*	NA	47	37
12	2	195	1	14	37.8	3.1	121.9	45.2	37	8.5	17.5	*	NA	44	53
12	2	195	2	12.1	33.8	2.93	115.4	41.3	35.8	8.9	11.1	*	NA	54	38
12	2	195	3	12.1	32.6	2.72	119.9	44.5	37.1	8.7	17.6	*	NA	31	63
Averages				**12.1**	**33.5**	**2.80**	**119.8**	**43.3**	**36.1**	**9.4**	**15.0**	**NA**	**NA**	**49**	**42**
Standard Deviations				**1.1**	**2.7**	**0.20**	**3.0**	**1.6**	**0.7**	**0.7**	**5.7**	**NA**	**NA**	**21**	**22**
CVs				**9.0%**	**8.1%**	**7.25%**	**2.5%**	**3.7%**	**1.9%**	**7.5%**	**38.1%**	**NA**	**NA**	**43%**	**52%**

Table 17. Hematalogical Results Summarized by Treatment Group
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BUILDING 7

Block	Trt Group	Pen Number	Animal ID	HGB g/dL 9.8-12.1	HCT % 25.9-32.6	RBC x10^6/uL 2.42-2.99	MCV fL 100.3-115.7	MCH pg 38.2-43.0	MCHC g/dL 36.3-38.9	RDW % 8.0-10.2	WBC x10^3/uL 5.5-24.2	TE 20-80	BHET %	HET %	LYMPH %
1	8	136	1	12	34.2	2.91	117.5	41.2	35.1	9	14.9	*	NA	36	54
1	8	136	2	12.1	33.3	2.84	117.3	42.6	36.3	8.9	18.8	*	NA	39	47
1	8	136	3	10.7	29.4	2.44	120.5	43.9	36.4	8.7	18.7	*	NA	43	44
2	8	104	1	12	32.4	2.61	124.1	46	37	8.8	17.8	*	NA	29	62
2	8	104	2	14.9	39.6	3.18	124.5	46.9	37.6	9.6	21.4	*	NA	27	70
2	8	104	3	12.1	32.9	2.86	115	42.3	36.8	8.8	8.9	*	NA	63	29
3	8	111	1	13.2	36.4	3.05	119.3	43.3	36.3	9.8	10	*	NA	52	45
3	8	111	2	12.3	32.7	2.72	120.2	45.2	37.6	9.3	10.7	*	NA	68	24
3	8	111	3	11.8	33.6	2.8	120	42.1	35.1	10.2	15.5	*	NA	50	46
4	8	124	1	11.9	34.2	2.83	120.8	42	34.8	8.5	9.5	*	NA	69	21
4	8	124	2	12.7	35.2	2.86	123.1	44.4	36.1	9.8	15.5	*	NA	44	48
4	8	124	3	13.3	36.3	2.98	121.8	44.6	36.6	8.8	11.1	*	NA	54	43
5	8	129	1	12.6	34.7	2.91	119.2	43.3	36.3	9.3	20.1	*	NA	36	55
5	8	129	2	12	33.8	2.81	120.3	42.7	35.5	8.9	10.3	*	NA	69	18
5	8	129	3	11.7	32	2.75	116.4	42.5	36.6	8.4	14.1	*	NA	60	31
6	8	178	1	10.3	27.9	2.3	121.3	44.8	36.9	9.2	26.3	*	NA	31	61
6	8	178	2	12.8	34.7	2.89	120.1	44.3	36.9	8.8	18.5	*	NA	33	54
6	8	178	3	12.7	33.8	2.79	121.1	45.5	37.6	10.2	18.1	*	NA	51	37
7	8	145	1	11.9	33.1	2.99	110.7	39.8	36	9.3	20.5	*	NA	34	65
7	8	145	2	11.8	32.2	2.58	124.8	45.7	36.6	8.3	18.2	*	NA	34	53
7	8	145	3	12.6	34.7	2.83	122.6	44.5	36.3	9.9	9.2	*	NA	81	4
8	8	155	1	13.3	37.1	3.05	121.6	43.6	35.8	9.1	8.1	*	NA	78	14
8	8	155	2	11.5	30.9	2.64	117	43.6	37.2	8.4	7	*	NA	75	8
8	8	155	3	11.4	32.8	2.76	118.8	41.3	34.8	9	30	*	NA	27	67
9	8	165	1	14	37.4	3.13	119.5	44.7	37.4	10.3	17.5	*	NA	33	58
9	8	165	2	11.2	30.8	2.51	122.7	44.6	36.4	9.2	11.1	*	NA	43	52
9	8	165	3	12.4	33.2	2.8	118.6	44.3	37.3	9.6	22.2	*	NA	34	58
10	8	167	1	11.5	32.4	2.67	121.3	43.1	35.5	9.7	18.3	*	NA	29	63
10	8	167	2	11.4	31.7	2.51	126.3	45.4	36	9.8	8.6	*	NA	73	19
10	8	167	3	12.1	34.5	2.8	123.2	43.2	35.1	8.9	13.4	*	NA	35	56
11	8	187	1	12	33.9	2.77	122.4	43.3	35.4	9.4	29.2	*	NA	28	62
11	8	187	2	13.2	36.8	3	122.7	44	35.9	8.5	22	*	NA	20	67
11	8	187	3	13.4	37.3	3.17	117.7	42.3	35.9	8.6	21.4	*	NA	36	62
12	8	193	1	11.9	33.2	2.68	123.9	44.4	35.8	9.8	9.2	*	NA	47	49
12	8	193	2	12.1	33.8	2.82	119.9	42.9	35.8	8.2	10.5	*	NA	83	8
12	8	193	3	11.7	33.2	2.78	119.4	42.1	35.2	8.9	15	*	NA	24	63
Averages				**12.2**	**33.8**	**2.81**	**120.4**	**43.6**	**36.2**	**9.2**	**15.9**	**NA**	**NA**	**46**	**45**
Standard Deviations				**0.9**	**2.3**	**0.20**	**3.0**	**1.5**	**0.8**	**0.6**	**6.0**	**NA**	**NA**	**18**	**19**
CVs				**7.3%**	**6.9%**	**7.04%**	**2.5%**	**3.4%**	**2.2%**	**6.3%**	**37.8%**	**NA**	**NA**	**39%**	**43%**

Table 17. Hematalogical Results Summarized by Treatment Group
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BUILDING 7

Block	Trt Group	Pen No.	Animal ID	ACTLYM	MONO	EOS	BASO	MORPH	ABBHET	ABHET	ABLYMP	ABACTL	ABMONO	ABEOS	ABBASO
				%	%	%	%		x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL
										2.99-10.10	0.21-14.17	0.00-0.18	0.00-2.03	0.00-1.42	0.03-1.73
1	1	97	1	NA	7	NA	1	*	0	7.13	11.09	0	1.39	0	0.2
1	1	97	2	NA	2	1	3	*	0	1.99	4.69	0	0.14	0.07	0.21
1	1	97	3	NA	4	NA	5	*	0	7.84	1.8	0	0.42	0	0.53
2	1	103	1	NA	NA	2	8	*	0	2.96	7.3	0	0	0.23	0.91
2	1	103	2	NA	6	1	8	*	0	6.38	5.95	0	0.87	0.15	1.16
2	1	103	3	NA	10	NA	NA	*	0	6.34	6.62	0	1.44	0	0
3	1	110	1	NA	4	2	4	*	0	3.71	1.06	0	0.21	0.11	0.21
3	1	110	2	NA	3	NA	2	*	0	4.46	3.24	0	0.24	0	0.16
3	1	110	3	NA	5	NA	5	*	0	9.8	1.36	0	0.62	0	0.62
4	1	122	1	NA	4	1	9	*	0	2.79	4.26	0	0.33	0.08	0.74
4	1	122	2	NA	6	4	NA	*	0	3.57	4.89	0	0.56	0.38	0
4	1	122	3	NA	6	6	4	*	0	5.69	12.7	0	1.31	1.31	0.88
5	1	132	1	NA	7	NA	5	*	0	8.32	0.83	0	0.73	0	0.52
5	1	132	2	NA	10	NA	4	*	0	15.33	1.36	0	1.94	0	0.78
5	1	132	3	NA	3	NA	3	*	0	4.32	10.72	0	0.48	0	0.48
6	1	177	1	NA	5	3	4	*	0	4.61	9.38	0	0.8	0.48	0.64
6	1	177	2	NA	7	NA	1	*	0	8.56	16.84	0	1.93	0	0.28
6	1	177	3	NA	12	NA	8	*	0	3.19	1.37	0	0.68	0	0.46
7	1	141	1	NA	NA	NA	6	*	0	8.8	6.81	0	0	0	1
7	1	141	2	NA	1	1	7	*	0	5.14	2.05	0	0.08	0.08	0.55
7	1	141	3	NA	4	NA	7	*	0	5.81	0.42	0	0.28	0	0.49
8	1	152	1	NA	5	NA	4	*	0	6.42	5.5	0	0.66	0	0.52
8	1	152	2	NA	4	NA	8	*	0	3.43	8.18	0	0.53	0	1.06
8	1	152	3	NA	3	NA	4	*	0	4.84	36.08	0	1.32	0	1.76
9	1	160	1	NA	NA	6	6	*	0	4.64	13.93	0	0	1.27	1.27
9	1	160	2	NA	4	NA	6	*	0	2.1	1.68	0	0.17	0	0.25
9	1	160	3	NA	5	3	3	*	0	5.78	14.78	0	1.16	0.69	0.69
10	1	170	1	2	4	4	5	*	0	3.46	12.86	0.38	0.77	0.77	0.96
10	1	170	2	NA	1	NA	4	*	0	3.12	6.76	0	0.1	0	0.42
10	1	170	3	NA	3	NA	4	*	0	10.03	0.57	0	0.34	0	0.46
11	1	186	1	NA	4	1	3	*	0	5.1	8.7	0	0.6	0.15	0.45
11	1	186	2	NA	2	NA	4	*	0	3.28	13.83	0	0.36	0	0.73
11	1	186	3	NA	1	3	6	*	0	4	13.6	0	0.2	0.6	1.2
12	1	190	1	NA	1	NA	6	*	0	9.12	1.48	0	0.11	0	0.68
12	1	190	2	NA	2	3	3	*	0	10.09	0.58	0	0.23	0.35	0.35
12	1	190	3	NA	1	3	1	*	0	8.53	11.23	0	0.21	0.62	0.21
Averages				**2**	**4**	**3**	**5**	**NA**	**0**	**5.85**	**7.35**	**0.01**	**0.59**	**0.20**	**0.61**
Standard Deviations				**NA**	**3**	**2**	**2**	**NA**	**0**	**2.88**	**6.97**	**0.06**	**0.53**	**0.35**	**0.38**
CVs				**NA**	**61%**	**60%**	**45%**	**NA**	**NA**	**49.13%**	**94.91%**	**600.00%**	**89.43%**	**171.33%**	**63.48%**

Table 17. Hematological Results Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen Number	Animal ID	ACTLYM	MONO	EOS	BASO	MORPH	ABBHET	ABHET	ABLYMP	ABACTL	ABMONO	ABEOS	ABBASO
				%	%	%	%		x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL
										2 99-10.10	0 21-14.17	0.00-0.18	0.00-2.03	0.00-1.42	0.03-1.73
1	2	133	1	NA	4	4	4	*	0	8.28	7.91	0	0.74	0.74	0.74
1	2	133	2	NA	3	2	3	*	0	4.71	18.1	0	0.74	0.5	0.74
1	2	133	3	NA	4	4	3	*	0	9.59	8.57	0	0.82	0 82	0.61
2	2	102	1	NA	3	NA	8	*	0	8.93	3.89	0	0.43	0	1.15
2	2	102	2	NA	2	7	5	*	0	7.48	11.44	0	0.44	1 54	1.1
2	2	102	3	NA	3	4	NA	*	0	7.14	8.67	0	0.51	0.68	0
3	2	113	1	NA	1	NA	7	*	0	6.71	0.47	0	0.08	0	0.55
3	2	113	2	NA	4	2	5	*	0	5.97	10.14	0	0.72	0 36	0.91
3	2	113	3	NA	2	NA	1	*	0	6.21	4.36	0	0.22	0	0.11
4	2	123	1	NA	7	1	3	*	0	4.7	2.16	0	0.54	0.08	0.23
4	2	123	2	NA	2	12	NA	*	0	7.34	15 2	0	0.52	3.14	0
4	2	123	3	NA	7	1	5	*	0	4.27	1.04	0	0.43	0.06	0.31
5	2	126	1	NA	3	2	1	*	0	6.8	8.42	0	0.49	0 32	0.16
5	2	126	2	NA	2	2	3	*	0	5.86	14.32	0	0.43	0.43	0.65
5	2	126	3	NA	4	2	1	*	0	8.55	0.29	0	0.38	0.19	0.1
6	2	140	1	NA	1	3	2	*	0	7.28	12.84	0	0.21	0.64	0.43
6	2	140	2	NA	2	1	5	*	0	7.16	11.14	0	0.4	0.2	1
6	2	140	3	NA	9	6	1	*	0	8.18	12.65	0	2.23	1.49	0.25
7	2	144	1	NA	4	1	3	*	0	10.23	0.71	0	0.48	0.12	0.36
7	2	144	2	NA	1	7	8	*	0	4.72	4.95	0	0.12	0 81	0.92
7	2	144	3	NA	1	NA	1	*	0	5.3	15.48	0	0.21	0	0.21
8	2	151	1	NA	4	2	7	*	0	6.72	0.5	0	0.33	0.17	0.58
8	2	151	2	NA	11	NA	2	*	0	8.32	0.73	0	1.14	0	0.21
8	2	151	3	NA	3	2	5	*	0	6.28	0.29	0	0.22	0.15	0.37
9	2	166	1	NA	4	2	3	*	0	2.18	4.01	0	0.27	0.14	0.2
9	2	166	2	NA	1	3	4	*	0	7.22	0.5	0	0.08	0 25	0.34
9	2	166	3	NA	2	6	8	*	0	3.72	10.48	0	0.34	1.01	1.35
10	2	169	1	NA	2	5	5	*	0	7.14	6.23	0	0.3	0.76	0.76
10	2	169	2	NA	NA	NA	6	*	0	6.16	4.37	0	0	0	0.67
10	2	169	3	NA	4	NA	NA	*	0	5.04	8.4	0	0.56	0	0
11	2	188	1	NA	6	3	5	*	0	4.93	12.02	0	1.18	0 59	0.99
11	2	188	2	NA	2	NA	NA	*	0	4.59	6.38	0	0.22	0	0
11	2	188	3	NA	7	5	4	*	0	6.3	4.96	0	0.94	0.67	0.54
12	2	195	1	NA	3	NA	NA	*	0	7.7	9.28	0	0.53	0	0
12	2	195	2	NA	6	NA	2	*	0	5.99	4.22	0	0.67	0	0.22
12	2	195	3	NA	5	1	NA	*	0	5.46	11.09	0	0.88	0.18	0
Averages				**NA**	**4**	**3**	**4**	**NA**	**0**	**6.48**	**7.12**	**0.00**	**0.52**	**0.45**	**0.47**
Standard Deviations				**NA**	**2**	**3**	**2**	**NA**	**0**	**1.70**	**5.08**	**0.00**	**0.41**	**0.62**	**0.38**
CVs				**NA**	**64%**	**74%**	**55%**	**NA**	**NA**	**26.29%**	**71.33%**	**NA**	**78.14%**	**138.77%**	**81.64%**

Table 17. Hematalogical Results Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen Number	Animal ID	ACTLYM	MONO	EOS	BASO	MORPH	ABBHET	ABHET	ABLYMP	ABACTL	ABMONO	ABEOS	ABBASO
				%	%	%	%		x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL
										2 99-10.10	0 21-14.17	0.00-0.18	0.00-2.03	0.00-1.42	0.03-1.73
1	8	136	1	NA	5	4	1	*	0	5.36	8.05	0	0.75	0.6	0.15
1	8	136	2	NA	2	6	6	*	0	7.33	8.84	0	0.38	1.13	1.13
1	8	136	3	NA	7	5	1	*	0	8.04	8.23	0	1.31	0 94	0.19
2	8	104	1	NA	4	3	2	*	0	5.16	11.04	0	0.71	0 53	0.36
2	8	104	2	NA	NA	1	2	*	0	5.78	14.98	0	0	0 21	0.43
2	8	104	3	NA	3	4	1	*	0	5.61	2.58	0	0.27	0 36	0.09
3	8	111	1	NA	NA	3	NA	*	0	5.2	4.5	0	0	0.3	0
3	8	111	2	NA	5	1	2	*	0	7.28	2.57	0	0.54	0.11	0.21
3	8	111	3	NA	2	2	NA	*	0	7.75	7.13	0	0.31	0 31	0
4	8	124	1	NA	6	2	2	*	0	6.56	2	0	0.57	0.19	0.19
4	8	124	2	NA	1	4	3	*	0	6.82	7.44	0	0.16	0.62	0.47
4	8	124	3	NA	1	NA	2	*	0	5.99	4.77	0	0.11	0	0.22
5	8	129	1	NA	3	3	3	*	0	7.24	11.06	0	0.6	0.6	0.6
5	8	129	2	NA	5	2	6	*	0	7.11	1.85	0	0.52	0 21	0.62
5	8	129	3	NA	4	3	2	*	0	8.46	4.37	0	0.56	0.42	0.28
6	8	178	1	NA	NA	4	4	*	0	8.15	16.04	0	0	1.05	1.05
6	8	178	2	NA	1	8	4	*	0	6.11	9.99	0	0.19	1.48	0.74
6	8	178	3	NA	3	2	7	*	0	9.23	6.7	0	0.54	0 36	1.27
7	8	145	1	NA	NA	NA	1	*	0	6.97	13.33	0	0	0	0.21
7	8	145	2	NA	5	8	NA	*	0	6.19	9.65	0	0.91	1.46	0
7	8	145	3	NA	7	3	5	*	0	7.45	0.37	0	0.64	0 28	0.46
8	8	155	1	NA	4	2	2	*	0	6.32	1.13	0	0.32	0.16	0.16
8	8	155	2	NA	3	10	4	*	0	5.25	0.56	0	0.21	0.7	0.28
8	8	155	3	NA	4	2	NA	*	0	8.1	20.1	0	1.2	0.6	0
9	8	165	1	NA	8	NA	1	*	0	5.78	10.15	0	1.4	0	0.18
9	8	165	2	NA	2	NA	3	*	0	4.77	5.77	0	0.22	0	0.33
9	8	165	3	NA	4	2	2	*	0	7.55	12.88	0	0.89	0.44	0.44
10	8	167	1	NA	1	3	4	*	0	5.31	11.53	0	0.18	0 55	0.73
10	8	167	2	NA	NA	3	5	*	0	6.28	1.63	0	0	0 26	0.43
10	8	167	3	NA	4	2	3	*	0	4.69	7.5	0	0.54	0 27	0.4
11	8	187	1	NA	7	3	NA	*	0	8.18	18.1	0	2.04	0 88	0
11	8	187	2	NA	6	4	3	*	0	4.4	14.74	0	1.32	0 88	0.66
11	8	187	3	NA	2	NA	NA	*	0	7.7	13.27	0	0.43	0	0
12	8	193	1	NA	3	NA	1	*	0	4.32	4.51	0	0.28	0	0.09
12	8	193	2	NA	3	5	1	*	0	8.72	0.84	0	0.32	0 53	0.11
12	8	193	3	NA	1	8	4	*	0	3.6	9.45	0	0.15	1.2	0.6
Averages				**NA**	**4**	**4**	**3**	**NA**	**0**	**6.52**	**7.99**	**0.00**	**0.52**	**0.49**	**0.36**
Standard Deviations				**NA**	**2**	**2**	**2**	**NA**	**0**	**1.40**	**5.27**	**0.00**	**0.47**	**0.41**	**0.33**
CVs				**NA**	**53%**	**60%**	**58%**	**NA**	**NA**	**21.42%**	**66.01%**	**NA**	**90.83%**	**84.23%**	**89.84%**

Table 17. Hematalogical Results Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen No.	Animal ID	TP g/dL 2.8-3.4	ALB g/dL	GLOBU g/dL	A/G	CK U/L 1003-2318	ALT U/L <5	GLU mg/dL 202-262	PHOS mg/dL 6.7-8.6
1	1	97	1	2.9	1	1.9	0.5	20043	6	248	3.4
1	1	97	2	2.9	1	1.9	0.5	19858	5	252	2.9
1	1	97	3	3.1	1.1	2	0.6	18807	6	249	3.6
2	1	103	1	3	1	2	0.5	9857	<5	226	2.8
2	1	103	2	2.9	<1.0	2	0.5	9175	<5	249	2.2
2	1	103	3	3	1	2	0.5	14678	<5	260	4.1
3	1	110	1	3.4	1.1	2.3	0.5	8414	5	231	3.1
3	1	110	2	3.1	1	2.1	0.5	10106	5	235	2.8
3	1	110	3	2.7	<1.0	1.9	0.4	6031	<5	246	2.9
4	1	122	1	3.2	1.1	2.1	0.5	2850	<5	264	2.3
4	1	122	2	2.9	1	1.9	0.5	11904	<5	228	4
4	1	122	3	2.9	1	1.9	0.5	14227	<5	229	2.3
5	1	132	1	2.5	<1.0	1.7	0.5	10344	<5	248	1.8
5	1	132	2	2.2	<1.0	1.5	0.5	7129	5	262	3.2
5	1	132	3	2.4	<1.0	1.6	0.5	11605	<5	245	2.4
6	1	177	1	3	1.1	1.9	0.6	5688	5	237	2.8
6	1	177	2	3.2	1	2.2	0.5	>22500	5	247	3.9
6	1	177	3	3.4	1.2	2.2	0.5	7930	5	235	3.4
7	1	141	1	2.7	<1.0	1.8	0.5	14006	<5	254	2.4
7	1	141	2	2.9	1.1	1.8	0.6	14623	<5	253	2.5
7	1	141	3	2.7	<1.0	1.8	0.5	7325	<5	234	2.2
8	1	152	1	3.3	1.1	2.2	0.5	12792	<5	248	2.2
8	1	152	2	3.3	1.1	2.2	0.5	6847	<5	251	3.1
8	1	152	3	2.6	<1.0	1.7	0.5	7884	<5	257	3.6
9	1	160	1	3.3	1.2	2.1	0.6	8535	<5	262	3.9
9	1	160	2	2.8	<1.0	1.9	0.5	8735	<5	255	3
9	1	160	3	2.9	1.1	1.8	0.6	19244	6	235	4
10	1	170	1	2.8	1	1.8	0.6	5317	<5	244	2.8
10	1	170	2	2.7	<1.0	1.9	0.4	12847	5	255	2.3
10	1	170	3	3.2	1	2.2	0.5	16129	5	242	4.1
11	1	186	1	2.6	<1.0	1.7	0.5	8176	5	250	1.7
11	1	186	2	3.5	1.6	1.9	0.8	7406	11	244	4.8
11	1	186	3	2.6	<1.0	1.8	0.4	10663	<5	247	2.8
12	1	190	1	2.9	1	1.9	0.5	7895	5	293	2.3
12	1	190	2	2.8	1	1.8	0.6	10887	5	278	3.1
12	1	190	3	3	1	2	0.5	11172	5	248	2.3
Averages				**2.9**	**1.1**	**1.9**	**0.5**	**10832**	**6**	**248**	**3.0**
Standard Deviations				**0.3**	**0.1**	**0.2**	**0.1**	**4336**	**1**	**14**	**0.7**
CVs				**10.1%**	**12.0%**	**9.6%**	**13.7%**	**40%**	**26%**	**5%**	**24.8%**

Table 17. Hematalogical Results Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen Number	Animal ID	TP g/dL 2.8-3.4	ALB g/dL	GLOBU g/dL	A/G	CK U/L 1003-2318	ALT U/L <5	GLU mg/dL 202-262	PHOS mg/dL 6.7-8.6
1	2	133	1	3.1	<1.0	2.2	0.4	>22500	<5	239	5.3
1	2	133	2	3.2	1.1	2.1	0.5	>22500	<5	251	6.5
1	2	133	3	2.8	<1.0	1.9	0.5	>22500	6	244	6.6
2	2	102	1	2.9	1	1.9	0.5	13232	<5	253	6.3
2	2	102	2	2.8	<1.0	1.9	0.5	>22500	10	227	6.2
2	2	102	3	2.5	<1.0	1.7	0.5	>22500	7	248	6.4
3	2	113	1	2.8	<1.0	2	0.4	>22500	5	220	5.9
3	2	113	2	2.8	<1.0	1.9	0.5	>22500	5	239	5.9
3	2	113	3	2.8	<1.0	1.9	0.5	>22500	6	238	6.5
4	2	123	1	3	<1.0	2.1	0.4	>22500	6	255	5.6
4	2	123	2	2.5	<1.0	1.8	0.4	>22500	6	223	6.2
4	2	123	3	3	1	2	0.5	>22500	5	239	6.6
5	2	126	1	3	1	2	0.5	>22500	7	258	6.3
5	2	126	2	3.2	1.1	2.1	0.5	>22500	<5	244	6.1
5	2	126	3	2.8	1	1.8	0.6	>22500	10	248	5.6
6	2	140	1	2.7	<1.0	1.8	0.5	14054	<5	242	6.3
6	2	140	2	2.6	<1.0	NC	NC	>22500	5	255	6
6	2	140	3	3.4	1.1	2.3	0.5	20221	5	241	7.2
7	2	144	1	3.4	1.2	2.2	0.5	>22500	5	243	7.5
7	2	144	2	3.1	1	2.1	0.5	>22500	7	240	6.3
7	2	144	3	3.1	1.1	2	0.6	>22500	6	263	6.7
8	2	151	1	3.3	1.2	2.1	0.6	>22500	6	232	8
8	2	151	2	2.9	1	1.9	0.5	>22500	6	240	6.6
8	2	151	3	3.4	1.1	2.3	0.5	>22500	9	231	7
9	2	166	1	2.9	1	1.9	0.5	>22500	5	220	6.8
9	2	166	2	2.9	1	1.9	0.5	>22500	6	227	7.5
9	2	166	3	2.8	<1.0	1.9	0.5	>22500	5	236	7.6
10	2	169	1	2.6	<1.0	1.7	0.5	>22500	6	234	6.3
10	2	169	2	3.1	1.1	2	0.6	>22500	8	253	6.8
10	2	169	3	2.9	<1.0	2	0.5	14140	<5	234	6.7
11	2	188	1	3.2	1.1	2.1	0.5	>22500	5	227	6.9
11	2	188	2	3	<1.0	2.2	0.4	9252	<5	252	6.4
11	2	188	3	3.5	1.4	2.1	0.7	>22500	6	228	7
12	2	195	1	3.5	1.4	2.1	0.7	>22500	7	248	6.9
12	2	195	2	3.4	1.2	2.2	0.5	>22500	6	252	6.4
12	2	195	3	3	1	2	0.5	>22500	6	246	5.8
Averages				**3.0**	**1.1**	**2.0**	**0.5**	**14180**	**6**	**241**	**6.5**
Standard Deviations				**0.3**	**0.1**	**0.2**	**0.1**	**3927**	**1**	**11**	**0.6**
CVs				**9.1%**	**11.1%**	**7.7%**	**13.8%**	**28%**	**22%**	**5%**	**9.0%**

Table 17. Hematalogical Results Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen Number	Animal ID	TP g/dL 2.8-3.4	ALB g/dL	GLOBU g/dL	A/G	CK U/L 1003-2318	ALT U/L <5	GLU mg/dL 202-262	PHOS mg/dL 6.7-8.6
1	8	136	1	3.7	1.7	2	0.9	>22500	10	250	6.6
1	8	136	2	3.1	1	2.1	0.5	>22500	<5	243	6.3
1	8	136	3	2.5	1	1.5	0.7	>22500	12	262	6.9
2	8	104	1	2.9	<1.0	2	0.5	21227	<5	234	5.8
2	8	104	2	3.3	1.2	2.1	0.6	>22500	6	226	6
2	8	104	3	2.8	<1.0	1.9	0.5	>22500	5	253	5.8
3	8	111	1	3	1.1	1.9	0.6	>22500	10	224	5.9
3	8	111	2	2.4	<1.0	1.6	0.5	>22500	<5	234	6.6
3	8	111	3	2.9	1	1.9	0.5	>22500	6	242	6.1
4	8	124	1	3	1.1	1.9	0.6	>22500	6	240	5.9
4	8	124	2	3.2	1	2.2	0.5	>22500	8	255	6
4	8	124	3	2.8	<1.0	1.9	0.5	>22500	10	241	5.8
5	8	129	1	2.9	<1.0	2	0.5	>22500	5	245	5.1
5	8	129	2	3.2	1.1	2.1	0.5	>22500	7	240	5.7
5	8	129	3	2.8	<1.0	1.9	0.5	>22500	7	257	5.9
6	8	178	1	2.8	1.1	1.7	0.6	>22500	5	242	6.3
6	8	178	2	3.1	1	2.1	0.5	>22500	7	243	6.9
6	8	178	3	3.1	1.1	2	0.6	>22500	6	246	7
7	8	145	1	2.9	1	1.9	0.5	>22500	6	253	6.5
7	8	145	2	2.7	<1.0	1.8	0.5	>22500	11	251	5.9
7	8	145	3	3	1	2	0.5	>22500	5	243	6.5
8	8	155	1	3	1.1	1.9	0.6	>22500	6	238	6.9
8	8	155	2	2.8	<1.0	1.9	0.5	>22500	6	233	6
8	8	155	3	3	1.1	1.9	0.6	>22500	9	250	6.3
9	8	165	1	3	1.1	1.9	0.6	>22500	8	247	6.7
9	8	165	2	3	1	2	0.5	>22500	5	238	6.9
9	8	165	3	3.3	1.1	2.2	0.5	>22500	5	236	6.6
10	8	167	1	3	1	2	0.5	>22500	5	254	6.9
10	8	167	2	3.2	1.1	2.1	0.5	>22500	7	247	7
10	8	167	3	3.2	1.2	2	0.6	16325	5	242	6.9
11	8	187	1	3	1.1	1.9	0.6	>22500	6	247	6.9
11	8	187	2	2.9	1.1	1.8	0.6	>22500	5	223	6.1
11	8	187	3	3	1.1	1.9	0.6	>22500	7	242	6.5
12	8	193	1	3.3	1.1	2.2	0.5	>22500	8	245	6.5
12	8	193	2	3.3	1.2	2.1	0.6	>22500	<5	251	6.4
12	8	193	3	3.1	1	2.1	0.5	>22500	11	244	6
Averages				**3.0**	**1.1**	**2.0**	**0.6**	**18776**	**7**	**243**	**6.3**
Standard Deviations				**0.2**	**0.1**	**0.2**	**0.1**	**3466**	**2**	**9**	**0.5**
CVs				**8.0%**	**12.3%**	**7.9%**	**14.7%**	**18%**	**30%**	**4%**	**7.4%**

Table 17. Hematalogical Results Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Grp	Pen No.	Animal ID	Chemistry Comments
1	1	97	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
1	1	97	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
1	1	97	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
2	1	103	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
2	1	103	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
2	1	103	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
3	1	110	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
3	1	110	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
3	1	110	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
4	1	122	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
4	1	122	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
4	1	122	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
5	1	132	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
5	1	132	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
5	1	132	3	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
6	1	177	1	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
6	1	177	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
6	1	177	3	TP The spec men s mode ately hemolyzed. L pem a and hemolys s may skew se um chem st y esu ts. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
7	1	141	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
7	1	141	2	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
7	1	141	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
8	1	152	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
8	1	152	2	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
8	1	152	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
9	1	160	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
9	1	160	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
9	1	160	3	TP The spec men s mode ately hemolyzed. L pem a and hemolys s may skew se um chem st y esu ts. ALB Album n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
10	1	170	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
10	1	170	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
10	1	170	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
11	1	186	1	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
11	1	186	2	TP The spec men s seve ely hemolyzed. L pem a and hemolys s may skew se um chem st y esu ts. The sample s mode ate to seve ely l pem c. L pem a and hemolys s may skew se um chem st y esu ts. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
11	1	186	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
12	1	190	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
12	1	190	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
12	1	190	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.

Block	Trt Grp	Pen No.	Animal ID	Chemistry Comments
1	2	133	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
1	2	133	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
1	2	133	3	TP: The sample is slightly hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
2	2	102	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
2	2	102	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
2	2	102	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
3	2	113	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
3	2	113	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
3	2	113	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
4	2	123	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
4	2	123	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
4	2	123	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
5	2	126	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
5	2	126	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
5	2	126	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
6	2	140	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
6	2	140	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
6	2	140	3	TP: The sample is slightly hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
7	2	144	1	TP: The specimen is moderately hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
7	2	144	2	TP: The sample is slightly hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
7	2	144	3	TP: The specimen is moderately hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
8	2	151	1	TP: The specimen is severely hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
8	2	151	2	TP: The specimen is moderately hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
8	2	151	3	TP: The sample is slightly hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
9	2	166	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
9	2	166	2	TP: The sample is slightly hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
9	2	166	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
10	2	169	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
10	2	169	2	TP: The sample is slightly hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
10	2	169	3	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
11	2	188	1	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
11	2	188	2	VALB: No significant hemolysis or lipemia present. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
11	2	188	3	TP: The specimen is moderately hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
12	2	195	1	TP: The sample is slightly hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
12	2	195	2	TP: The sample is slightly hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.
12	2	195	3	TP: The specimen is moderately hemolyzed. Lipemia and hemolysis may skew serum chemistry results. ALB: Albumin result may be invalid due to unknown binding capacity of avian/reptile albumin to chemistry reagent used in this assay.

Block	Trt Grp	Pen No.	Animal ID	Chemistry Comments
1	8	136	1	TP The spec men s seve ely hemolyzed. L pem a and hemolys s may skew se um chem st y esults. The sample s mode ate to seve ely l pem c. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
1	8	136	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
1	8	136	3	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
2	8	104	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
2	8	104	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
2	8	104	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
3	8	111	1	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
3	8	111	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
3	8	111	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
4	8	124	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
4	8	124	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
4	8	124	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
5	8	129	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
5	8	129	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
5	8	129	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
6	8	178	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
6	8	178	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
6	8	178	3	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
7	8	145	1	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
7	8	145	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
7	8	145	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
8	8	155	1	TP The spec men s mode ately hemolyzed. L pem a and hemolys s may skew se um chem st y esu ts. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
8	8	155	2	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.
8	8	155	3	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
9	8	165	1	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
9	8	165	2	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
9	8	165	3	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
10	8	167	1	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
10	8	167	2	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esu ts. ALB Album n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
10	8	167	3	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
11	8	187	1	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
11	8	187	2	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
11	8	187	3	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
12	8	193	1	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay.
12	8	193	2	TP The sample s sl ghtly hemolyzed. L pem a and hemolys s may skew se um chem st y esults. ALB Album n esu t may be nval d due to unknown b nd ng capac ty of av an/ ept le album n to chem st y eagent used n th s assay
12	8	193	3	VALB No s gn f cant hemolys s o l pem a p esent. ALB A bum n esult may be nval d due to unknown b nd ng capac ty of av an/ ept le a bum n to chem st y eagent used n th s assay.

Table 17. Hematalogical Results Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Grp	Pen No.	Animal ID	Hematology comments
1	1	97	1	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
1	1	97	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
1	1	97	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
2	1	103	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
2	1	103	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
2	1	103	3	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
3	1	110	1	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
3	1	110	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
3	1	110	3	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
4	1	122	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
4	1	122	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
4	1	122	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
5	1	132	1	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
5	1	132	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
5	1	132	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
6	1	177	1	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
6	1	177	2	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
6	1	177	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
7	1	141	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
7	1	141	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
7	1	141	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
8	1	152	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
8	1	152	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
8	1	152	3	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
9	1	160	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
9	1	160	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
9	1	160	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
10	1	170	1	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
10	1	170	2	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
10	1	170	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
11	1	186	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
11	1	186	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: 2+ polychromasia No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technolog
11	1	186	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
12	1	190	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
12	1	190	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
12	1	190	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.

Block	Trt Grp	Pen No.	Animal ID	Hematology comments
1	2	133	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
1	2	133	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
1	2	133	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
2	2	102	1	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
2	2	102	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
2	2	102	3	TE: Thrombocyte estimate from smear appears to be 120,000-140,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
3	2	113	1	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
3	2	113	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
3	2	113	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
4	2	123	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
4	2	123	2	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
4	2	123	3	TE: Thrombocyte estimate from smear appears to be 20,000-40,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
5	2	126	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
5	2	126	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
5	2	126	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
6	2	140	1	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
6	2	140	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
6	2	140	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
7	2	144	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
7	2	144	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
7	2	144	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
8	2	151	1	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
8	2	151	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
8	2	151	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
9	2	166	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
9	2	166	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
9	2	166	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
10	2	169	1	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
10	2	169	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
10	2	169	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
11	2	188	1	TE: Thrombocyte estimate from smear appears to be 140,000-160,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
11	2	188	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
11	2	188	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
12	2	195	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
12	2	195	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
12	2	195	3	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.

Block	Trt Grp	Pen No.	Animal ID	Hematology comments
1	8	136	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
1	8	136	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
1	8	136	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
2	8	104	1	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
2	8	104	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
2	8	104	3	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
3	8	111	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
3	8	111	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
3	8	111	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
4	8	124	1	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
4	8	124	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
4	8	124	3	TE: Thrombocyte estimate from smear appears to be 20,000-40,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
5	8	129	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
5	8	129	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
5	8	129	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
6	8	178	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
6	8	178	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
6	8	178	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
7	8	145	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
7	8	145	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
7	8	145	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
8	8	155	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
8	8	155	2	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
8	8	155	3	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
9	8	165	1	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
9	8	165	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
9	8	165	3	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
10	8	167	1	TE: Thrombocyte estimate from smear appears to be 80,000-100,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
10	8	167	2	TE: Thrombocyte estimate from smear appears to be 40,000-60,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
10	8	167	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
11	8	187	1	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
11	8	187	2	TE: Thrombocyte estimate from smear appears to be 180,000-200,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
11	8	187	3	TE: Thrombocyte estimate from smear appears to be 100,000-120,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
12	8	193	1	TE: Thrombocyte estimate from smear appears to be 120,000-140,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
12	8	193	2	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.
12	8	193	3	TE: Thrombocyte estimate from smear appears to be 60,000-80,000. MORPH: No blood parasites seen. VDIFA2: This blood smear has been reviewed by a technologist/technician.

Table 18. Hematalogical Results Summarized by Treatment Group (Condensed Table)
AGV-15-5
BUILDING 7

Trt Group	HGB	HCT	RBC	MCV	MCH	MCHC	RDW	WBC	HET	LYMPH	ACTLYM	MONO	EOS	BASO	ABBHET	Treatment Description
	g/dL	%	x10^6/uL	fL	pg	g/dL	%	x10^3/uL	%	%	%	%	%	%	x10^3/uL	
	9.8-12.1	25.9-32.6	2.42-2 99	100.3-115.7	38.2-43.0	36 3-38.9	8.0-10 2	5.5-24.2								
1	12.4	35.3	2.80	125.9	44.2	35.1	10.1	14.6	46	44	2	4	3	5	0	Low Phosphate (LP)
2	12.1	33.5	2.80	119.8	43.3	36.1	9.4	15.0	49	42	NA	4	3	4	0	High Phosphate (HP)
8	12 2	33.8	2.81	120.4	43.6	36.2	9.2	15.9	46	45	NA	4	4	3	0	60000 Units Phytase (LP)

Trt Group	ABHET	ABLYMP	ABACTL	ABMONO	ABEOS	ABBASO	TP	ALB	GLOBU	A/G	CK	ALT	GLU	PHOS	Treatment Description
	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	x10^3/uL	g/dL	g/dL	g/dL		U/L	U/L	mg/dL	mg/dL	
	2.99-10.10	0.21-14.17	0.00-0.18	0.00-2.03	0.00-1.42	0.03-1.73	2.8-3.4				1003-2318	<5	202-262	6.7-8.6	
1	5.85	7.35	0.01	0.59	0.20	0.61	2.9	1.1	1.9	0.5	10832	6	248	3.0	Low Phosphate (LP)
2	6.48	7.12	0.00	0.52	0.45	0.47	3.0	1.1	2.0	0.5	14180	6	241	6 5	High Phosphate (HP)
8	6.52	7.99	0.00	0.52	0.49	0 36	3.0	1.1	2.0	0.6	18776	7	243	6 3	60000 Units Phytase (LP)

Table 20. Day 21 Tibia Ash Results (08DEC15) Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen No.	% Ash
1	1	97	22.083
2	1	103	25.222
3	1	110	23.006
4	1	122	24.335
5	1	132	22.466
6	1	177	24.114
7	1	141	24.216
8	1	152	21.153
9	1	160	22.191
10	1	170	22.250
11	1	186	21.937
12	1	190	21.305
Average			**22.857**
Standard Deviations			**1.312**
CV			**5.742%**
1	2	133	26.931
2	2	102	26.045
3	2	113	28.196
4	2	123	29.081
5	2	126	26.442
6	2	140	28.569
7	2	144	29.862
8	2	151	28.271
9	2	166	26.721
10	2	169	26.715
11	2	188	25.151
12	2	195	28.084
Average			**27.506**
Standard Deviations			**1.380**
CV			**5.016%**
1	3	135	23.519
2	3	101	26.830
3	3	115	25.237
4	3	120	26.779
5	3	128	25.639
6	3	137	25.539
7	3	142	26.676
8	3	154	27.654
9	3	161	25.439
10	3	171	26.441
11	3	185	26.184
12	3	191	26.924
Average			**26.072**
Standard Deviations			**1.083**
CV			**4.155%**

Block	Trt Group	Pen No.	% Ash
1	4	98	22.764
2	4	105	29.078
3	4	116	24.988
4	4	119	27.154
5	4	127	27.047
6	4	179	26.255
7	4	148	25.747
8	4	153	27.939
9	4	162	25.547
10	4	174	27.225
11	4	182	24.817
12	4	189	26.595
Average			**26.263**
Standard Deviations			**1.649**
CV			**6.279%**
1	5	99	23.149
2	5	108	28.113
3	5	112	26.268
4	5	118	29.311
5	5	130	28.258
6	5	138	27.973
7	5	143	28.246
8	5	149	27.412
9	5	163	27.196
10	5	173	28.459
11	5	183	27.165
12	5	192	26.481
Average			**27.336**
Standard Deviations			**1.576**
CV			**5.764%**
1	6	134	26.253
2	6	106	29.154
3	6	109	28.336
4	6	117	28.717
5	6	131	25.636
6	6	139	29.797
7	6	147	26.768
8	6	150	27.100
9	6	164	27.180
10	6	172	26.755
11	6	184	28.009
12	6	196	28.121
Average			**27.652**
Standard Deviations			**1.241**
CV			**4.488%**

Block	Trt Group	Pen No.	% Ash
1	7	100	28.040
2	7	107	28.103
3	7	114	28.667
4	7	121	26.669
5	7	125	25.191
6	7	180	26.952
7	7	146	27.877
8	7	156	26.882
9	7	159	27.351
10	7	168	26.925
11	7	181	27.869
12	7	194	26.837
Average			**27.280**
Standard Deviations			**0.915**
CV			**3.355%**

1	8	136	27.302
2	8	104	28.961
3	8	111	27.729
4	8	124	27.594
5	8	129	26.838
6	8	178	25.958
7	8	145	27.404
8	8	155	28.243
9	8	165	29.057
10	8	167	29.803
11	8	187	27.184
12	8	193	28.292
Average			**27.864**
Standard Deviations			**1.065**
CV			**3.823%**

Graph 6. Day 21 Average Tibia Ash % Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Trt Group	Avg. % Ash	Treatment Description
1	22.857	Low Phosphate (LP)
2	27.506	High Phosphate (HP)
3	26.072	250 Units Phytase (LP)
4	26.263	500 Units Phytase (LP)
5	27.336	1000 Units Phytase (LP)
6	27.652	3000 Units Phytase (LP)
7	27.280	6000 Units Phytase (LP)
8	27.864	60000 Units Phytase (LP)

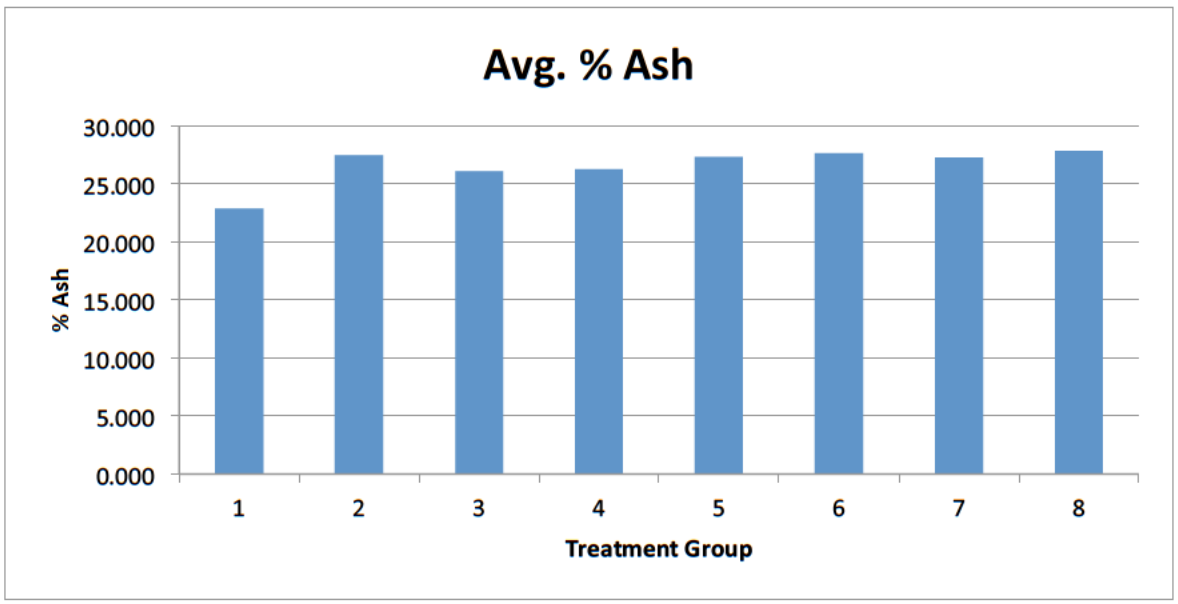


Table 22. Day 42 Tibia Ash Results (29DEC15) Summarized by Treatment Group
AGV-15-5
BUILDING 7

Block	Trt Group	Pen No.	% Ash
1	1	97	24.971
2	1	103	23.101
3	1	110	22.488
4	1	122	24.660
5	1	132	25.589
6	1	177	26.756
7	1	141	25.820
8	1	152	26.283
9	1	160	26.746
10	1	170	24.215
11	1	186	24.276
12	1	190	25.231
Average			**25.011**
Standard Deviations			**1.349**
CV			**5.394%**

1	2	133	29.334
2	2	102	27.661
3	2	113	27.220
4	2	123	29.389
5	2	126	27.233
6	2	140	28.269
7	2	144	28.792
8	2	151	27.730
9	2	166	29.790
10	2	169	30.474
11	2	188	28.694
12	2	195	27.698
Average			**28.524**
Standard Deviations			**1.062**
CV			**3.722%**

1	3	135	27.606
2	3	101	25.826
3	3	115	26.390
4	3	120	27.288
5	3	128	26.595
6	3	137	26.721
7	3	142	27.485
8	3	154	26.254
9	3	161	25.220
10	3	171	27.777
11	3	185	25.826
12	3	191	25.630
Average			**26.551**
Standard Deviations			**0.845**
CV			**3.181%**

Block	Trt Group	Pen No.	% Ash
1	4	98	24.458
2	4	105	27.722
3	4	116	28.389
4	4	119	27.059
5	4	127	28.143
6	4	179	26.839
7	4	148	27.778
8	4	153	27.654
9	4	162	28.295
10	4	174	28.492
11	4	182	28.197
12	4	189	25.696
Average			**27.394**
Standard Deviations			**1.223**
CV			**4.465%**

1	5	99	25.149
2	5	108	26.254
3	5	112	27.447
4	5	118	28.233
5	5	130	29.253
6	5	138	27.621
7	5	143	29.207
8	5	149	27.036
9	5	163	28.621
10	5	173	27.316
11	5	183	28.061
12	5	192	26.860
Average			**27.588**
Standard Deviations			**1.197**
CV			**4.338%**

1	6	134	27.116
2	6	106	29.487
3	6	109	27.624
4	6	117	28.655
5	6	131	26.454
6	6	139	29.526
7	6	147	27.951
8	6	150	29.084
9	6	164	27.198
10	6	172	28.405
11	6	184	28.149
12	6	196	27.900
Average			**28.129**
Standard Deviations			**0.958**
CV			**3.406%**

Block	Trt Group	Pen No.	% Ash
1	7	100	26.803
2	7	107	29.096
3	7	114	28.541
4	7	121	28.042
5	7	125	28.360
6	7	180	28.097
7	7	146	29.643
8	7	156	29.087
9	7	159	28.300
10	7	168	24.922
11	7	181	27.296
12	7	194	27.102
Average			**27.941**
Standard Deviations			**1.271**
CV			**4.549%**

1	8	136	30.386
2	8	104	27.890
3	8	111	28.599
4	8	124	29.687
5	8	129	29.394
6	8	178	29.291
7	8	145	27.405
8	8	155	28.921
9	8	165	29.174
10	8	167	29.280
11	8	187	27.822
12	8	193	29.645
Average			**28.958**
Standard Deviations			**0.877**
CV			**3.030%**

Graph 7. Day 42 Average Tibia Ash % Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Trt Group	Avg. % Ash	Treatment Description
1	25.011	Low Phosphate (LP)
2	28.524	High Phosphate (HP)
3	26.551	250 Units Phytase (LP)
4	27.394	500 Units Phytase (LP)
5	27.588	1000 Units Phytase (LP)
6	28.129	3000 Units Phytase (LP)
7	27.941	6000 Units Phytase (LP)
8	28.958	60000 Units Phytase (LP)

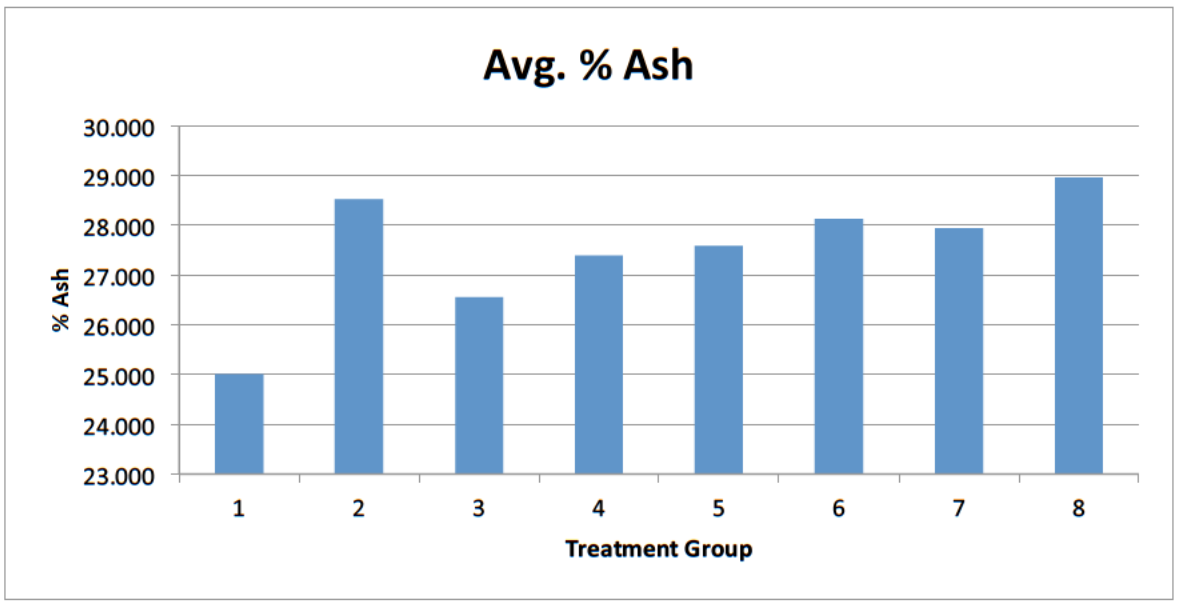


Table 23. Day 21 % Phosphorus Digestibility
AGV-15-5
BUILDING 7

Block	Trt Group	Pen No.	Titanium in Ileal Content (ppm)	Phosphorus in Ileal Content (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Adjusted for Dry Matter: Titanium in Ileal Content Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Adjusted for Dry Matter: Titanium in Feed Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Feed Adjusted for Dry Matter	Moisture in Feed (grams per 100 grams sample)	% Phosphorus Digestibility
1	1	97	1430	0.24	84.84	216.79	0.04	1300	0.572	1143.87	0.50	12.01	61.86%
1	4	98	1500	0.18	84.32	235.20	0.03	1300	0.572	1143.87	0.50	12.01	72.73%
1	5	99	1360	0.20	83.87	219.37	0.03	1300	0.572	1143.87	0.50	12.01	66.58%
1	7	100	1500	0.19	80.21	296.85	0.04	1300	0.572	1143.87	0.50	12.01	71.21%
2	3	101	910	0.17	83.79	147.51	0.03	1300	0.572	1143.87	0.50	12.01	57.54%
2	2	102	1420	0.24	82.19	252.90	0.04	1440	0.765	1268.21	0.67	11.93	68.19%
2	1	103	1330	0.18	83.40	220.78	0.03	1300	0.572	1143.87	0.50	12.01	69.24%
2	8	104	1230	0.11	83.45	203.57	0.02	1300	0.572	1143.87	0.50	12.01	79.67%
2	4	105	1300	0.17	83.28	217.36	0.03	1300	0.572	1143.87	0.50	12.01	70.28%
2	6	106	1320	0.26	80.33	259.64	0.05	1300	0.572	1143.87	0.50	12.01	55.23%
2	7	107	1340	0.25	82.25	237.85	0.04	1300	0.572	1143.87	0.50	12.01	57.60%
2	5	108	1220	0.25	82.59	212.40	0.04	1300	0.572	1143.87	0.50	12.01	53.43%
3	6	109	1380	0.22	83.41	228.94	0.04	1300	0.572	1143.87	0.50	12.01	63.77%
3	1	110	1170	0.17	83.39	194.34	0.03	1300	0.572	1143.87	0.50	12.01	66.98%
3	8	111	1060	0.13	83.12	178.93	0.02	1300	0.572	1143.87	0.50	12.01	72.13%
3	5	112	1140	0.19	82.91	194.83	0.03	1300	0.572	1143.87	0.50	12.01	62.12%
3	2	113	1050	0.16	85.79	149.21	0.02	1440	0.765	1268.21	0.67	11.93	71.32%
3	7	114	1290	0.22	80.28	254.39	0.04	1300	0.572	1143.87	0.50	12.01	61.24%
3	3	115	1230	0.18	84.16	194.83	0.03	1300	0.572	1143.87	0.50	12.01	66.74%
3	4	116	1510	0.34	80.98	287.20	0.06	1300	0.572	1143.87	0.50	12.01	48.83%
4	6	117	1020	0.10	84.45	158.61	0.02	1300	0.572	1143.87	0.50	12.01	77.72%
4	5	118	1490	0.16	81.50	275.65	0.03	1300	0.572	1143.87	0.50	12.01	75.59%
4	4	119	1070	0.17	85.17	158.68	0.03	1300	0.572	1143.87	0.50	12.01	63.89%
4	3	120	1300	0.20	83.76	211.12	0.03	1300	0.572	1143.87	0.50	12.01	65.03%
4	7	121	1420	0.20	82.98	241.68	0.03	1300	0.572	1143.87	0.50	12.01	67.99%
4	1	122	1200	0.13	83.51	197.88	0.02	1300	0.572	1143.87	0.50	12.01	75.38%
4	2	123	1240	0.20	85.11	184.64	0.03	1440	0.765	1268.21	0.67	11.93	69.64%
4	8	124	1140	0.22	82.09	204.17	0.04	1300	0.572	1143.87	0.50	12.01	56.14%
5	7	125	1270	0.18	83.54	209.04	0.03	1300	0.572	1143.87	0.50	12.01	67.79%
5	2	126	1110	0.24	82.36	195.80	0.04	1440	0.765	1268.21	0.67	11.93	59.30%
5	4	127	1170	0.23	81.61	215.16	0.04	1300	0.572	1143.87	0.50	12.01	55.32%
5	3	128	1220	0.16	83.23	204.59	0.03	1300	0.572	1143.87	0.50	12.01	70.19%
5	8	129	1070	0.11	82.56	186.61	0.02	1300	0.572	1143.87	0.50	12.01	76.64%
5	5	130	1060	0.19	84.17	167.80	0.03	1300	0.572	1143.87	0.50	12.01	59.26%
5	6	131	1350	0.21	80.44	264.06	0.04	1300	0.572	1143.87	0.50	12.01	64.65%
5	1	132	1220	0.20	81.65	223.87	0.04	1300	0.572	1143.87	0.50	12.01	62.74%
1	2	133	1170	0.30	83.29	195.51	0.05	1440	0.765	1268.21	0.67	11.93	51.73%
1	6	134	1530	0.23	81.03	290.24	0.04	1300	0.572	1143.87	0.50	12.01	65.83%
1	3	135	1030	0.07	84.89	155.63	0.01	1300	0.572	1143.87	0.50	12.01	84.55%
1	8	136	1260	0.14	80.95	240.03	0.03	1300	0.572	1143.87	0.50	12.01	74.75%
6	3	137	1130	0.15	81.68	207.02	0.03	1300	0.572	1143.87	0.50	12.01	69.83%
6	5	138	1260	0.10	81.39	234.49	0.02	1300	0.572	1143.87	0.50	12.01	81.96%
6	6	139	1240	0.19	82.47	217.37	0.03	1300	0.572	1143.87	0.50	12.01	65.18%
6	2	140	1320	0.28	80.97	251.20	0.05	1440	0.765	1268.21	0.67	11.93	60.07%

Block	Trt Group	Pen No.	Titanium in Ileal Content (ppm)	Phosphorus in Ileal Content (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Adjusted for Dry Matter: Titanium in Ileal Content Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Adjusted for Dry Matter: Titanium in Feed Adjusted for Dry Matter	Adjusted for Dry Matter: Phosphorus in Feed Adjusted for Dry Matter	Moisture in Feed (grams per 100 grams sample)	% Phosphorus Digestibility
7	1	141	1440	0.23	79.84	290.30	0.05	1300	0.572	1143.87	0.50	12.01	63.70%
7	3	142	1360	0.14	82.57	237.05	0.02	1300	0.572	1143.87	0.50	12.01	76.60%
7	5	143	1280	0.23	83.58	210.18	0.04	1300	0.572	1143.87	0.50	12.01	59.16%
7	2	144	1270	0.21	83.31	211.96	0.04	1440	0.765	1268.21	0.67	11.93	68.87%
7	8	145	1100	0.14	84.85	166.65	0.02	1300	0.572	1143.87	0.50	12.01	71.07%
7	7	146	1520	0.18	81.46	281.81	0.03	1300	0.572	1143.87	0.50	12.01	73.09%
7	6	147	1190	0.21	83.31	198.61	0.04	1300	0.572	1143.87	0.50	12.01	59.89%
7	4	148	1280	0.30	81.54	236.29	0.06	1300	0.572	1143.87	0.50	12.01	46.73%
8	5	149	1330	0.17	81.25	249.38	0.03	1300	0.572	1143.87	0.50	12.01	70.95%
8	6	150	1180	0.17	84.19	186.56	0.03	1300	0.572	1143.87	0.50	12.01	67.26%
8	2	151	1210	0.18	83.13	204.13	0.03	1440	0.765	1268.21	0.67	11.93	72.00%
8	1	152	1280	0.19	84.16	202.75	0.03	1300	0.572	1143.87	0.50	12.01	66.26%
8	4	153	1040	0.18	82.68	180.13	0.03	1300	0.572	1143.87	0.50	12.01	60.66%
8	3	154	1090	0.22	84.32	170.91	0.03	1300	0.572	1143.87	0.50	12.01	54.13%
8	8	155	1040	0.13	83.61	170.46	0.02	1300	0.572	1143.87	0.50	12.01	71.59%
8	7	156	1300	0.23	83.31	216.97	0.04	1300	0.572	1143.87	0.50	12.01	59.79%
9	7	159	1210	0.24	84.47	187.91	0.04	1300	0.572	1143.87	0.50	12.01	54.92%
9	1	160	1510	0.21	80.64	292.34	0.04	1300	0.572	1143.87	0.50	12.01	68.39%
9	3	161	1110	0.15	83.55	182.60	0.02	1300	0.572	1143.87	0.50	12.01	69.29%
9	4	162	1820	0.31	78.21	396.58	0.07	1300	0.572	1143.87	0.50	12.01	61.29%
9	5	163	1210	0.22	83.04	205.22	0.04	1300	0.572	1143.87	0.50	12.01	58.68%
9	6	164	1210	0.19	83.88	195.05	0.03	1300	0.572	1143.87	0.50	12.01	64.31%
9	8	165	1370	0.24	85.55	197.97	0.03	1300	0.572	1143.87	0.50	12.01	60.19%
9	2	166	1380	0.20	84.35	215.97	0.03	1440	0.765	1268.21	0.67	11.93	72.72%
10	8	167	1180	0.12	83.76	191.63	0.02	1300	0.572	1143.87	0.50	12.01	76.89%
10	7	168	1500	0.17	81.35	279.75	0.03	1300	0.572	1143.87	0.50	12.01	74.24%
10	2	169	1060	0.22	81.22	199.07	0.04	1440	0.765	1268.21	0.67	11.93	60.93%
10	1	170	1370	0.27	81.09	259.07	0.05	1300	0.572	1143.87	0.50	12.01	55.21%
10	3	171	1130	0.17	83.39	187.69	0.03	1300	0.572	1143.87	0.50	12.01	65.81%
10	6	172	1230	0.18	82.72	212.54	0.03	1300	0.572	1143.87	0.50	12.01	66.74%
10	5	173	1110	0.24	84.21	175.27	0.04	1300	0.572	1143.87	0.50	12.01	50.86%
10	4	174	1000	0.10	85.51	144.90	0.01	1300	0.572	1143.87	0.50	12.01	77.27%
6	1	177	1130	0.20	83.68	184.42	0.03	1300	0.572	1143.87	0.50	12.01	59.77%
6	8	178	1180	0.16	82.36	208.15	0.03	1300	0.572	1143.87	0.50	12.01	69.18%
6	4	179	1260	0.22	81.33	235.24	0.04	1300	0.572	1143.87	0.50	12.01	60.32%
6	7	180	1090	0.14	82.78	187.70	0.02	1300	0.572	1143.87	0.50	12.01	70.81%
11	7	181	1200	0.14	83.31	200.28	0.02	1300	0.572	1143.87	0.50	12.01	73.48%
11	4	182	1380	0.30	81.10	260.82	0.06	1300	0.572	1143.87	0.50	12.01	50.59%
11	5	183	1130	0.18	82.44	198.43	0.03	1300	0.572	1143.87	0.50	12.01	63.80%
11	6	184	1220	0.17	84.56	188.37	0.03	1300	0.572	1143.87	0.50	12.01	68.33%
11	3	185	1210	0.23	84.45	188.16	0.04	1300	0.572	1143.87	0.50	12.01	56.80%
11	1	186	1150	0.24	83.49	189.87	0.04	1300	0.572	1143.87	0.50	12.01	52.57%
11	8	187	1220	0.13	84.55	188.49	0.02	1300	0.572	1143.87	0.50	12.01	75.78%
11	2	188	1200	0.18	83.12	202.56	0.03	1440	0.765	1268.21	0.67	11.93	71.76%
12	4	189	1280	0.25	81.42	237.82	0.05	1300	0.572	1143.87	0.50	12.01	55.61%
12	1	190	1340	0.22	82.15	239.19	0.04	1300	0.572	1143.87	0.50	12.01	62.69%
12	3	191	1180	0.23	79.88	237.42	0.05	1300	0.572	1143.87	0.50	12.01	55.70%
12	5	192	1140	0.20	82.95	194.37	0.03	1300	0.572	1143.87	0.50	12.01	60.13%
12	8	193	1310	0.18	79.56	267.76	0.04	1300	0.572	1143.87	0.50	12.01	68.77%
12	7	194	1210	0.17	84.08	192.63	0.03	1300	0.572	1143.87	0.50	12.01	68.07%
12	2	195	1300	0.26	83.81	210.47	0.04	1440	0.765	1268.21	0.67	11.93	62.35%
12	6	196	1120	0.18	83.34	186.59	0.03	1300	0.572	1143.87	0.50	12.01	63.47%

Table 24. Day 21 % Phosphorus Digestibility Summarized by Treatment Group
AGV-15-5
BUILDING 7

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen No.	Titanium in Ileal Content (ppm)	Phosphorus in Ileal Content (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	Moisture in Feed (grams per 100 grams sample)	% Phosphorus Digestibility
1	1	97	1430	0.24	84.84	216.79	0.04	1300	0.572	1143.87	0.50	12.01	61.86%
2	1	103	1330	0.18	83.40	220.78	0.03	1300	0.572	1143.87	0.50	12.01	69.24%
3	1	110	1170	0.17	83.39	194.34	0.03	1300	0.572	1143.87	0.50	12.01	66.98%
4	1	122	1200	0.13	83.51	197.88	0.02	1300	0.572	1143.87	0.50	12.01	75.38%
5	1	132	1220	0.20	81.65	223.87	0.04	1300	0.572	1143.87	0.50	12.01	62.74%
6	1	177	1130	0.20	83.68	184.42	0.03	1300	0.572	1143.87	0.50	12.01	59.77%
7	1	141	1440	0.23	79.84	290.30	0.05	1300	0.572	1143.87	0.50	12.01	63.70%
8	1	152	1280	0.19	84.16	202.75	0.03	1300	0.572	1143.87	0.50	12.01	66.26%
9	1	160	1510	0.21	80.64	292.34	0.04	1300	0.572	1143.87	0.50	12.01	68.39%
10	1	170	1370	0.27	81.09	259.07	0.05	1300	0.572	1143.87	0.50	12.01	55.21%
11	1	186	1150	0.24	83.49	189.87	0.04	1300	0.572	1143.87	0.50	12.01	52.57%
12	1	190	1340	0.22	82.15	239.19	0.04	1300	0.572	1143.87	0.50	12.01	62.69%
Averages			**1298**	**0.21**	**82.65**	**225.97**	**0.04**	**NA**	**NA**	**NA**	**NA**	**NA**	**63.73%**
Standard Deviations			**125**	**0.04**	**1.55**	**37.28**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**6.20%**
CVs			**9.67%**	**18.03%**	**1.87%**	**16.50%**	**22.71%**	**NA**	**NA**	**NA**	**NA**	**NA**	**9.73%**
1	2	133	1170	0.30	83.29	195.51	0.05	1440	0.765	1268.21	0.67	11.93	51.73%
2	2	102	1420	0.24	82.19	252.90	0.04	1440	0.765	1268.21	0.67	11.93	68.19%
3	2	113	1050	0.16	85.79	149.21	0.02	1440	0.765	1268.21	0.67	11.93	71.32%
4	2	123	1240	0.20	85.11	184.64	0.03	1440	0.765	1268.21	0.67	11.93	69.64%
5	2	126	1110	0.24	82.36	195.80	0.04	1440	0.765	1268.21	0.67	11.93	59.30%
6	2	140	1320	0.28	80.97	251.20	0.05	1440	0.765	1268.21	0.67	11.93	60.07%
7	2	144	1270	0.21	83.31	211.96	0.04	1440	0.765	1268.21	0.67	11.93	68.87%
8	2	151	1210	0.18	83.13	204.13	0.03	1440	0.765	1268.21	0.67	11.93	72.00%
9	2	166	1380	0.20	84.35	215.97	0.03	1440	0.765	1268.21	0.67	11.93	72.72%
10	2	169	1060	0.22	81.22	199.07	0.04	1440	0.765	1268.21	0.67	11.93	60.93%
11	2	188	1200	0.18	83.12	202.56	0.03	1440	0.765	1268.21	0.67	11.93	71.76%
12	2	195	1300	0.26	83.81	210.47	0.04	1440	0.765	1268.21	0.67	11.93	62.35%
Averages			**1228**	**0.22**	**83.22**	**206.12**	**0.04**	**NA**	**NA**	**NA**	**NA**	**NA**	**65.74%**
Standard Deviations			**118**	**0.04**	**1.44**	**27.56**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**6.68%**
CVs			**9.63%**	**19.18%**	**1.73%**	**13.37%**	**24.29%**	**NA**	**NA**	**NA**	**NA**	**NA**	**10.16%**
1	3	135	1030	0.07	84.89	155.63	0.01	1300	0.572	1143.87	0.50	12.01	84.55%
2	3	101	910	0.17	83.79	147.51	0.03	1300	0.572	1143.87	0.50	12.01	57.54%
3	3	115	1230	0.18	84.16	194.83	0.03	1300	0.572	1143.87	0.50	12.01	66.74%
4	3	120	1300	0.20	83.76	211.12	0.03	1300	0.572	1143.87	0.50	12.01	65.03%
5	3	128	1220	0.16	83.23	204.59	0.03	1300	0.572	1143.87	0.50	12.01	70.19%
6	3	137	1130	0.15	81.68	207.02	0.03	1300	0.572	1143.87	0.50	12.01	69.83%
7	3	142	1360	0.14	82.57	237.05	0.02	1300	0.572	1143.87	0.50	12.01	76.60%
8	3	154	1090	0.22	84.32	170.91	0.03	1300	0.572	1143.87	0.50	12.01	54.13%
9	3	161	1110	0.15	83.55	182.60	0.02	1300	0.572	1143.87	0.50	12.01	69.29%
10	3	171	1130	0.17	83.39	187.69	0.03	1300	0.572	1143.87	0.50	12.01	65.81%
11	3	185	1210	0.23	84.45	188.16	0.04	1300	0.572	1143.87	0.50	12.01	56.80%
12	3	191	1180	0.23	79.88	237.42	0.05	1300	0.572	1143.87	0.50	12.01	55.70%
Averages			**1158**	**0.17**	**83.31**	**193.71**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**66.02%**
Standard Deviations			**120**	**0.05**	**1.38**	**28.10**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**9.07%**
CVs			**10.40%**	**26.17%**	**1.66%**	**14.50%**	**29.02%**	**NA**	**NA**	**NA**	**NA**	**NA**	**13.74%**

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen No.	Titanium in Ileal Content (ppm)	Phosphorus in Ileal Content (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	Moisture in Feed (grams per 100 grams sample)	% Phosphorus Digestibility
1	4	98	1500	0.18	84.32	235.20	0.03	1300	0.572	1143.87	0.50	12.01	72.73%
2	4	105	1300	0.17	83.28	217.36	0.03	1300	0.572	1143.87	0.50	12.01	70.28%
3	4	116	1510	0.34	80.98	287.20	0.06	1300	0.572	1143.87	0.50	12.01	48.83%
4	4	119	1070	0.17	85.17	158.68	0.03	1300	0.572	1143.87	0.50	12.01	63.89%
5	4	127	1170	0.23	81.61	215.16	0.04	1300	0.572	1143.87	0.50	12.01	55.32%
6	4	179	1260	0.22	81.33	235.24	0.04	1300	0.572	1143.87	0.50	12.01	60.32%
7	4	148	1280	0.30	81.54	236.29	0.06	1300	0.572	1143.87	0.50	12.01	46.73%
8	4	153	1040	0.18	82.68	180.13	0.03	1300	0.572	1143.87	0.50	12.01	60.66%
9	4	162	1820	0.31	78.21	396.58	0.07	1300	0.572	1143.87	0.50	12.01	61.29%
10	4	174	1000	0.10	85.51	144.90	0.01	1300	0.572	1143.87	0.50	12.01	77.27%
11	4	182	1380	0.30	81.10	260.82	0.06	1300	0.572	1143.87	0.50	12.01	50.59%
12	4	189	1280	0.25	81.42	237.82	0.05	1300	0.572	1143.87	0.50	12.01	55.61%
Averages			**1301**	**0.23**	**82.26**	**233.78**	**0.04**	**NA**	**NA**	**NA**	**NA**	**NA**	**60.29%**
Standard Deviations			**232**	**0.07**	**2.05**	**65.47**	**0.02**	**NA**	**NA**	**NA**	**NA**	**NA**	**9.60%**
CVs			**17.81%**	**31.66%**	**2.50%**	**28.00%**	**40.23%**	**NA**	**NA**	**NA**	**NA**	**NA**	**15.91%**
1	5	99	1360	0.20	83.87	219.37	0.03	1300	0.572	1143.87	0.50	12.01	66.58%
2	5	108	1220	0.25	82.59	212.40	0.04	1300	0.572	1143.87	0.50	12.01	53.43%
3	5	112	1140	0.19	82.91	194.83	0.03	1300	0.572	1143.87	0.50	12.01	62.12%
4	5	118	1490	0.16	81.50	275.65	0.03	1300	0.572	1143.87	0.50	12.01	75.59%
5	5	130	1060	0.19	84.17	167.80	0.03	1300	0.572	1143.87	0.50	12.01	59.26%
6	5	138	1260	0.10	81.39	234.49	0.02	1300	0.572	1143.87	0.50	12.01	81.96%
7	5	143	1280	0.23	83.58	210.18	0.04	1300	0.572	1143.87	0.50	12.01	59.16%
8	5	149	1330	0.17	81.25	249.38	0.03	1300	0.572	1143.87	0.50	12.01	70.95%
9	5	163	1210	0.22	83.04	205.22	0.04	1300	0.572	1143.87	0.50	12.01	58.68%
10	5	173	1110	0.24	84.21	175.27	0.04	1300	0.572	1143.87	0.50	12.01	50.86%
11	5	183	1130	0.18	82.44	198.43	0.03	1300	0.572	1143.87	0.50	12.01	63.80%
12	5	192	1140	0.20	82.95	194.37	0.03	1300	0.572	1143.87	0.50	12.01	60.13%
Averages			**1228**	**0.19**	**82.83**	**211.45**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**63.54%**
Standard Deviations			**124**	**0.04**	**1.04**	**30.37**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**8.98%**
CVs			**10.06%**	**20.89%**	**1.26%**	**14.36%**	**18.41%**	**NA**	**NA**	**NA**	**NA**	**NA**	**14.13%**
1	6	134	1530	0.23	81.03	290.24	0.04	1300	0.572	1143.87	0.50	12.01	65.83%
2	6	106	1320	0.26	80.33	259.64	0.05	1300	0.572	1143.87	0.50	12.01	55.23%
3	6	109	1380	0.22	83.41	228.94	0.04	1300	0.572	1143.87	0.50	12.01	63.77%
4	6	117	1020	0.10	84.45	158.61	0.02	1300	0.572	1143.87	0.50	12.01	77.72%
5	6	131	1350	0.21	80.44	264.06	0.04	1300	0.572	1143.87	0.50	12.01	64.65%
6	6	139	1240	0.19	82.47	217.37	0.03	1300	0.572	1143.87	0.50	12.01	65.18%
7	6	147	1190	0.21	83.31	198.61	0.04	1300	0.572	1143.87	0.50	12.01	59.89%
8	6	150	1180	0.17	84.19	186.56	0.03	1300	0.572	1143.87	0.50	12.01	67.26%
9	6	164	1210	0.19	83.88	195.05	0.03	1300	0.572	1143.87	0.50	12.01	64.31%
10	6	172	1230	0.18	82.72	212.54	0.03	1300	0.572	1143.87	0.50	12.01	66.74%
11	6	184	1220	0.17	84.56	188.37	0.03	1300	0.572	1143.87	0.50	12.01	68.33%
12	6	196	1120	0.18	83.34	186.59	0.03	1300	0.572	1143.87	0.50	12.01	63.47%
Averages			**1249**	**0.19**	**82.84**	**215.55**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**65.20%**
Standard Deviations			**132**	**0.04**	**1.50**	**38.65**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**5.28%**
CVs			**10.56%**	**20.56%**	**1.81%**	**17.93%**	**27.47%**	**NA**	**NA**	**NA**	**NA**	**NA**	**8.10%**

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen No.	Titanium in Ileal Content (ppm)	Phosphorus in Ileal Content (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	Moisture in Feed (grams per 100 grams sample)	% Phosphorus Digestibility
1	7	100	1500	0.19	80.21	296.85	0.04	1300	0.572	1143.87	0.50	12.01	71.21%
2	7	107	1340	0.25	82.25	237.85	0.04	1300	0.572	1143.87	0.50	12.01	57.60%
3	7	114	1290	0.22	80.28	254.39	0.04	1300	0.572	1143.87	0.50	12.01	61.24%
4	7	121	1420	0.20	82.98	241.68	0.03	1300	0.572	1143.87	0.50	12.01	67.99%
5	7	125	1270	0.18	83.54	209.04	0.03	1300	0.572	1143.87	0.50	12.01	67.79%
6	7	180	1090	0.14	82.78	187.70	0.02	1300	0.572	1143.87	0.50	12.01	70.81%
7	7	146	1520	0.18	81.46	281.81	0.03	1300	0.572	1143.87	0.50	12.01	73.09%
8	7	156	1300	0.23	83.31	216.97	0.04	1300	0.572	1143.87	0.50	12.01	59.79%
9	7	159	1210	0.24	84.47	187.91	0.04	1300	0.572	1143.87	0.50	12.01	54.92%
10	7	168	1500	0.17	81.35	279.75	0.03	1300	0.572	1143.87	0.50	12.01	74.24%
11	7	181	1200	0.14	83.31	200.28	0.02	1300	0.572	1143.87	0.50	12.01	73.48%
12	7	194	1210	0.17	84.08	192.63	0.03	1300	0.572	1143.87	0.50	12.01	68.07%
Averages			**1321**	**0.19**	**82.50**	**232.24**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**66.69%**
Standard Deviations			**138**	**0.04**	**1.41**	**39.09**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**6.64%**
CVs			**10.47%**	**18.94%**	**1.70%**	**16.83%**	**20.43%**	**NA**	**NA**	**NA**	**NA**	**NA**	**9.96%**

1	8	136	1260	0.14	80.95	240.03	0.03	1300	0.572	1143.87	0.50	12.01	74.75%
2	8	104	1230	0.11	83.45	203.57	0.02	1300	0.572	1143.87	0.50	12.01	79.67%
3	8	111	1060	0.13	83.12	178.93	0.02	1300	0.572	1143.87	0.50	12.01	72.13%
4	8	124	1140	0.22	82.09	204.17	0.04	1300	0.572	1143.87	0.50	12.01	56.14%
5	8	129	1070	0.11	82.56	186.61	0.02	1300	0.572	1143.87	0.50	12.01	76.64%
6	8	178	1180	0.16	82.36	208.15	0.03	1300	0.572	1143.87	0.50	12.01	69.18%
7	8	145	1100	0.14	84.85	166.65	0.02	1300	0.572	1143.87	0.50	12.01	71.07%
8	8	155	1040	0.13	83.61	170.46	0.02	1300	0.572	1143.87	0.50	12.01	71.59%
9	8	165	1370	0.24	85.55	197.97	0.03	1300	0.572	1143.87	0.50	12.01	60.19%
10	8	167	1180	0.12	83.76	191.63	0.02	1300	0.572	1143.87	0.50	12.01	76.89%
11	8	187	1220	0.13	84.55	188.49	0.02	1300	0.572	1143.87	0.50	12.01	75.78%
12	8	193	1310	0.18	79.56	267.76	0.04	1300	0.572	1143.87	0.50	12.01	68.77%
Averages			**1180**	**0.15**	**83.03**	**200.37**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**71.07%**
Standard Deviations			**103**	**0.04**	**1.68**	**28.77**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**6.92%**
CVs			**8.76%**	**27.91%**	**2.02%**	**14.36%**	**29.35%**	**NA**	**NA**	**NA**	**NA**	**NA**	**9.73%**

Graph 8. Day 21 %P Digestibility Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Trt Group	Avg. %P Digestibility	Treatment Description
1	63.73%	Low Phosphate (LP)
2	65.74%	High Phosphate (HP)
3	66.02%	250 Units Phytase (LP)
4	60.29%	500 Units Phytase (LP)
5	63.54%	1000 Units Phytase (LP)
6	65.20%	3000 Units Phytase (LP)
7	66.69%	6000 Units Phytase (LP)
8	71.07%	60000 Units Phytase (LP)

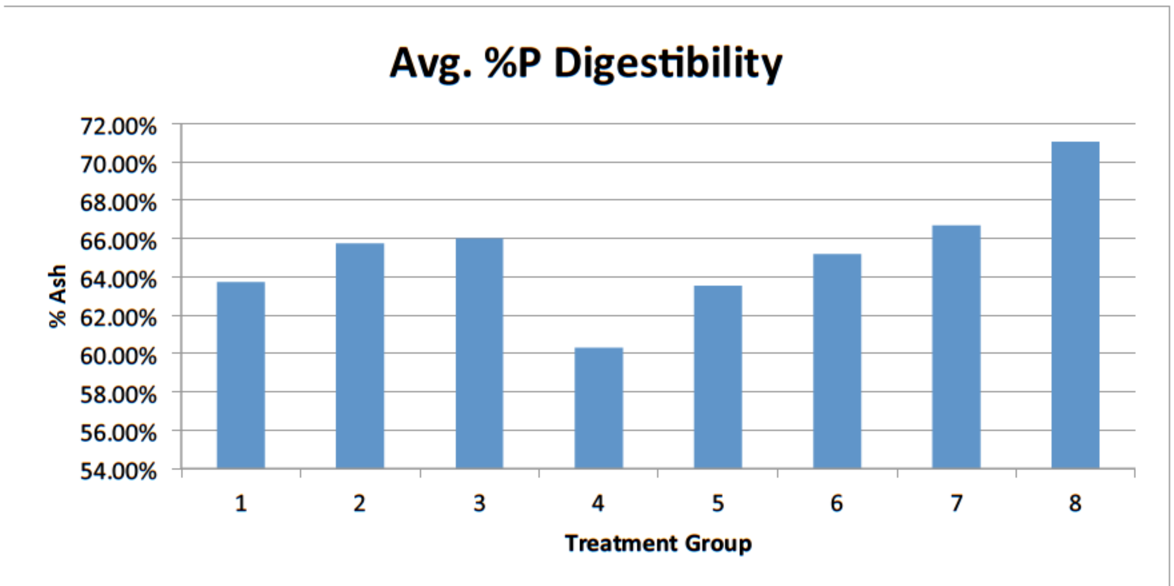


Table 26. Day 42 % Phosphorus Digestibility Summarized by Treatment Group
AGV-15-5
BUILDING 7

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen No.	Titanium in Ileal Content (ppm)	Phosphorus in Ileal Content (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	Moisture in Feed (grams per 100 grams sample)	% Phosphorus Digestibility
1	1	97	1050	0.17	85.74	149.73	0.02	1510	0.494	1321.85	0.43	12.46	50.51%
2	1	103	1590	0.22	83.21	266.96	0.04	1510	0.494	1321.85	0.43	12.46	57.71%
3	1	110	1090	0.20	80.42	213.42	0.04	1510	0.494	1321.85	0.43	12.46	43.91%
4	1	122	1370	0.25	82.81	235.50	0.04	1510	0.494	1321.85	0.43	12.46	44.22%
5	1	132	1040	0.16	84.42	162.03	0.02	1510	0.494	1321.85	0.43	12.46	52.97%
6	1	177	1280	0.30	80.42	250.62	0.06	1510	0.494	1321.85	0.43	12.46	28.36%
7	1	141	1020	0.15	84.31	160.04	0.02	1510	0.494	1321.85	0.43	12.46	55.05%
8	1	152	1150	0.14	84.82	174.57	0.02	1510	0.494	1321.85	0.43	12.46	62.79%
9	1	160	1180	0.14	82.94	201.31	0.02	1510	0.494	1321.85	0.43	12.46	63.73%
10	1	170	970	0.15	84.39	151.42	0.02	1510	0.494	1321.85	0.43	12.46	52.73%
11	1	186	1260	0.23	83.88	203.11	0.04	1510	0.494	1321.85	0.43	12.46	44.20%
12	1	190	1210	0.22	84.10	192.39	0.03	1510	0.494	1321.85	0.43	12.46	44.42%
Averages			**1184**	**0.19**	**83.46**	**196.76**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**50.05%**
Standard Deviations			**175**	**0.05**	**1.63**	**39.32**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**9.80%**
CVs			**14.77%**	**26.21%**	**1.96%**	**19.98%**	**34.35%**	**NA**	**NA**	**NA**	**NA**	**NA**	**19.59%**
1	2	133	1100	0.18	85.06	164.34	0.03	1440	0.605	1266.77	0.53	12.03	61.05%
2	2	102	1380	0.24	82.95	235.29	0.04	1440	0.605	1266.77	0.53	12.03	58.61%
3	2	113	1630	0.27	82.51	285.09	0.05	1440	0.605	1266.77	0.53	12.03	60.57%
4	2	123	1320	0.29	81.14	248.95	0.05	1440	0.605	1266.77	0.53	12.03	47.71%
5	2	126	1580	0.33	82.61	274.76	0.06	1440	0.605	1266.77	0.53	12.03	50.29%
6	2	140	1100	0.17	83.67	179.63	0.03	1440	0.605	1266.77	0.53	12.03	63.22%
7	2	144	980	0.13	84.39	152.98	0.02	1440	0.605	1266.77	0.53	12.03	68.43%
8	2	151	1150	0.27	84.98	172.73	0.04	1440	0.605	1266.77	0.53	12.03	44.12%
9	2	166	1080	0.15	84.42	168.26	0.02	1440	0.605	1266.77	0.53	12.03	66.94%
10	2	169	1270	0.22	80.49	247.78	0.04	1440	0.605	1266.77	0.53	12.03	58.77%
11	2	188	1310	0.26	83.67	213.92	0.04	1440	0.605	1266.77	0.53	12.03	52.76%
12	2	195	1060	0.18	85.93	149.14	0.03	1440	0.605	1266.77	0.53	12.03	59.58%
Averages			**1247**	**0.22**	**83.49**	**207.74**	**0.04**	**NA**	**NA**	**NA**	**NA**	**NA**	**57.67%**
Standard Deviations			**207**	**0.06**	**1.62**	**49.05**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**7.50%**
CVs			**16.61%**	**27.73%**	**1.94%**	**23.61%**	**33.28%**	**NA**	**NA**	**NA**	**NA**	**NA**	**13.01%**
1	3	135	1070	0.13	83.78	173.55	0.02	1510	0.494	1321.85	0.43	12.46	62.86%
2	3	101	880	0.11	84.65	135.08	0.02	1510	0.494	1321.85	0.43	12.46	61.79%
3	3	115	1280	0.17	83.37	212.86	0.03	1510	0.494	1321.85	0.43	12.46	59.40%
4	3	120	1170	0.16	83.28	195.62	0.03	1510	0.494	1321.85	0.43	12.46	58.20%
5	3	128	1160	0.23	81.72	212.05	0.04	1510	0.494	1321.85	0.43	12.46	39.39%
6	3	137	1240	0.18	83.56	203.86	0.03	1510	0.494	1321.85	0.43	12.46	55.63%
7	3	142	1450	0.28	83.97	232.44	0.04	1510	0.494	1321.85	0.43	12.46	40.97%
8	3	154	950	0.13	85.29	139.75	0.02	1510	0.494	1321.85	0.43	12.46	58.17%
9	3	161	1280	0.23	83.76	207.87	0.04	1510	0.494	1321.85	0.43	12.46	45.08%
10	3	171	1050	0.20	81.01	199.40	0.04	1510	0.494	1321.85	0.43	12.46	41.78%
11	3	185	1110	0.18	86.19	153.29	0.02	1510	0.494	1321.85	0.43	12.46	50.43%
12	3	191	1400	0.23	82.06	251.16	0.04	1510	0.494	1321.85	0.43	12.46	49.78%
Averages			**1170**	**0.19**	**83.55**	**193.08**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**51.96%**
Standard Deviations			**171**	**0.05**	**1.46**	**35.96**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**8.52%**
CVs			**14.60%**	**27.10%**	**1.75%**	**18.63%**	**31.11%**	**NA**	**NA**	**NA**	**NA**	**NA**	**16.40%**

						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen No.	Titanium in Ileal Content (ppm)	Phosphorus in Ileal Content (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	Moisture in Feed (grams per 100 grams sample)	% Phosphorus Digestibility
1	4	98	1590	0.29	81.62	292.24	0.05	1510	0.494	1321.85	0.43	12.46	44.25%
2	4	105	1470	0.28	82.85	252.11	0.05	1510	0.494	1321.85	0.43	12.46	41.78%
3	4	116	1390	0.25	83.48	229.63	0.04	1510	0.494	1321.85	0.43	12.46	45.02%
4	4	119	1320	0.25	82.97	224.80	0.04	1510	0.494	1321.85	0.43	12.46	42.11%
5	4	127	1080	0.20	84.47	167.72	0.03	1510	0.494	1321.85	0.43	12.46	43.39%
6	4	179	1060	0.18	82.78	182.53	0.03	1510	0.494	1321.85	0.43	12.46	48.09%
7	4	148	1340	0.19	84.39	209.17	0.03	1510	0.494	1321.85	0.43	12.46	56.66%
8	4	153	910	0.11	83.83	147.15	0.02	1510	0.494	1321.85	0.43	12.46	63.05%
9	4	162	790	0.10	87.17	101.36	0.01	1510	0.494	1321.85	0.43	12.46	61.31%
10	4	174	1310	0.22	81.56	241.56	0.04	1510	0.494	1321.85	0.43	12.46	48.67%
11	4	182	1200	0.18	83.35	199.80	0.03	1510	0.494	1321.85	0.43	12.46	54.15%
12	4	189	1390	0.24	82.79	239.22	0.04	1510	0.494	1321.85	0.43	12.46	47.22%
Averages			**1238**	**0.21**	**83.44**	**207.27**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**49.64%**
Standard Deviations			**236**	**0.06**	**1.49**	**51.61**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**7.40%**
CVs			**19.07%**	**29.00%**	**1.78%**	**24.90%**	**33.92%**	**NA**	**NA**	**NA**	**NA**	**NA**	**14.91%**
1	5	99	1360	0.21	81.57	250.65	0.04	1510	0.494	1321.85	0.43	12.46	52.80%
2	5	108	1180	0.19	84.86	178.65	0.03	1510	0.494	1321.85	0.43	12.46	50.78%
3	5	112	1050	0.11	84.08	167.16	0.02	1510	0.494	1321.85	0.43	12.46	67.98%
4	5	118	1190	0.20	83.66	194.45	0.03	1510	0.494	1321.85	0.43	12.46	48.63%
5	5	130	1200	0.18	83.13	202.44	0.03	1510	0.494	1321.85	0.43	12.46	54.15%
6	5	138	1090	0.18	84.08	173.53	0.03	1510	0.494	1321.85	0.43	12.46	49.52%
7	5	143	1100	0.16	84.11	174.79	0.03	1510	0.494	1321.85	0.43	12.46	55.54%
8	5	149	1410	0.22	82.70	243.93	0.04	1510	0.494	1321.85	0.43	12.46	52.31%
9	5	163	1300	0.22	83.53	214.11	0.04	1510	0.494	1321.85	0.43	12.46	48.27%
10	5	173	1220	0.15	84.34	191.05	0.02	1510	0.494	1321.85	0.43	12.46	62.42%
11	5	183	1350	0.27	83.03	229.10	0.05	1510	0.494	1321.85	0.43	12.46	38.87%
12	5	192	1280	0.23	82.99	217.73	0.04	1510	0.494	1321.85	0.43	12.46	45.08%
Averages			**1228**	**0.19**	**83.51**	**203.13**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**52.19%**
Standard Deviations			**115**	**0.04**	**0.88**	**28.16**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**7.60%**
CVs			**9.35%**	**21.65%**	**1.06%**	**13.86%**	**24.72%**	**NA**	**NA**	**NA**	**NA**	**NA**	**14.55%**
1	6	134	1150	0.18	82.40	202.40	0.03	1510	0.494	1321.85	0.43	12.46	52.16%
2	6	106	1620	0.20	82.17	288.85	0.04	1510	0.494	1321.85	0.43	12.46	62.26%
3	6	109	970	0.15	84.79	147.54	0.02	1510	0.494	1321.85	0.43	12.46	52.73%
4	6	117	1390	0.20	82.14	248.25	0.04	1510	0.494	1321.85	0.43	12.46	56.02%
5	6	131	1290	0.18	82.86	221.11	0.03	1510	0.494	1321.85	0.43	12.46	57.35%
6	6	139	960	0.15	84.37	150.05	0.02	1510	0.494	1321.85	0.43	12.46	52.24%
7	6	147[1]	1230	0.10	IS	NA	NA	1510	0.494	1321.85	0.43	12.46	NA
8	6	150	1390	0.19	81.88	251.87	0.03	1510	0.494	1321.85	0.43	12.46	58.22%
9	6	164	1060	0.10	83.78	171.93	0.02	1510	0.494	1321.85	0.43	12.46	71.16%
10	6	172	1270	0.15	84.02	202.95	0.02	1510	0.494	1321.85	0.43	12.46	63.90%
11	6	184	1310	0.26	82.56	228.46	0.05	1510	0.494	1321.85	0.43	12.46	39.33%
12	6	196	1330	0.23	84.50	206.15	0.04	1510	0.494	1321.85	0.43	12.46	47.14%
Averages			**1248**	**0.17**	**83.22**	**210.87**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**55.68%**
Standard Deviations			**190**	**0.05**	**1.08**	**43.54**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**8.56%**
CVs			**15.23%**	**27.31%**	**1.30%**	**20.65%**	**26.88%**	**NA**	**NA**	**NA**	**NA**	**NA**	**15.38%**

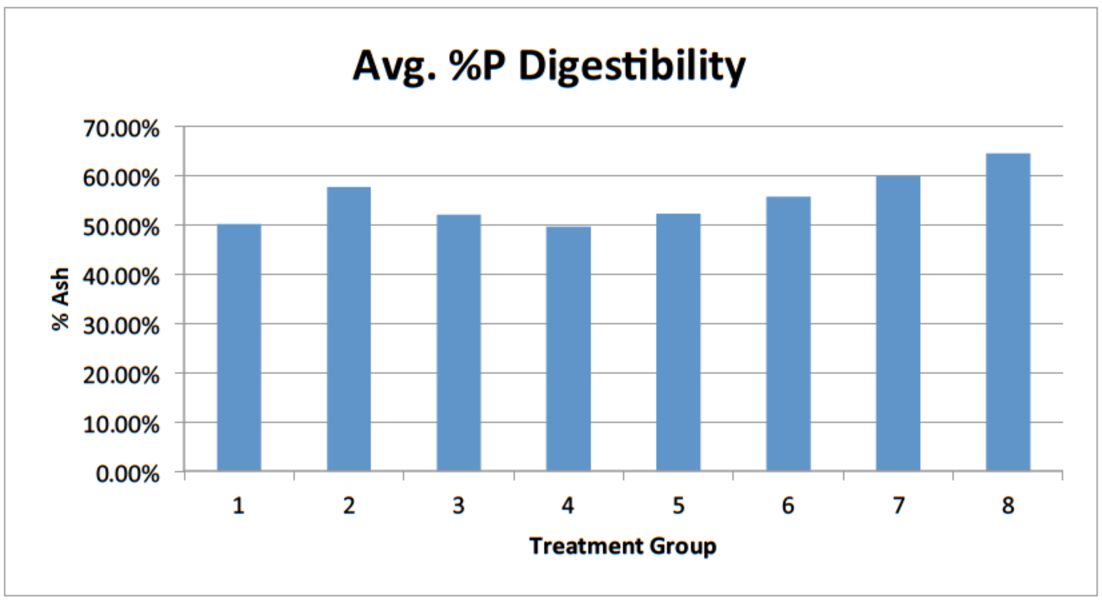
						Adjusted for Dry Matter				Adjusted for Dry Matter			
Block	Trt Group	Pen No.	Titanium in Ileal Content (ppm)	Phosphorus in Ileal Content (grams per 100 grams sample)	Moisture in Ileal Content (grams per 100 grams sample)	Titanium in Ileal Content Adjusted for Dry Matter	Phosphorus in Ileal Content Adjusted for Dry Matter	Titanium in Feed (ppm)	Phosphorus in Feed (grams per 100 grams feed)	Titanium in Feed Adjusted for Dry Matter	Phosphorus in Feed Adjusted for Dry Matter	Moisture in Feed (grams per 100 grams sample)	% Phosphorus Digestibility
1	7	100	1040	0.15	82.90	177.84	0.03	1510	0.494	1321.85	0.43	12.46	55.91%
2	7	107	1310	0.18	84.62	201.48	0.03	1510	0.494	1321.85	0.43	12.46	58.00%
3	7	114	1140	0.19	84.19	180.23	0.03	1510	0.494	1321.85	0.43	12.46	49.06%
4	7	121	1060	0.14	83.80	171.72	0.02	1510	0.494	1321.85	0.43	12.46	59.63%
5	7	125	1400	0.24	81.09	264.74	0.05	1510	0.494	1321.85	0.43	12.46	47.60%
6	7	180	1180	0.20	84.41	183.96	0.03	1510	0.494	1321.85	0.43	12.46	48.19%
7	7	146	1080	0.13	82.67	187.16	0.02	1510	0.494	1321.85	0.43	12.46	63.21%
8	7	156	1500	0.14	83.18	252.30	0.02	1510	0.494	1321.85	0.43	12.46	71.47%
9	7	159	1220	0.08	84.32	191.30	0.01	1510	0.494	1321.85	0.43	12.46	79.96%
10	7	168	2560	0.24	84.97	384.77	0.04	1510	0.494	1321.85	0.43	12.46	71.34%
11	7	181	1370	0.20	83.85	221.26	0.03	1510	0.494	1321.85	0.43	12.46	55.38%
12	7	194	1140	0.16	83.34	189.92	0.03	1510	0.494	1321.85	0.43	12.46	57.10%
Averages			**1333**	**0.17**	**83.61**	**217.22**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**59.74%**
Standard Deviations			**413**	**0.05**	**1.06**	**60.48**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**10.14%**
CVs			**30.96%**	**27.39%**	**1.27%**	**27.84%**	**28.96%**	**NA**	**NA**	**NA**	**NA**	**NA**	**16.98%**

1	8	136	1490	0.14	80.78	286.38	0.03	1510	0.494	1321.85	0.43	12.46	71.28%
2	8	104[1]	1320	0.12	IS	NA	NA	1510	0.494	1321.85	0.43	12.46	NA
3	8	111	1310	0.25	82.57	228.33	0.04	1510	0.494	1321.85	0.43	12.46	41.67%
4	8	124	1500	0.19	82.09	268.65	0.03	1510	0.494	1321.85	0.43	12.46	61.28%
5	8	129	1510	0.10	81.91	273.16	0.02	1510	0.494	1321.85	0.43	12.46	79.76%
6	8	178	1170	0.14	84.54	180.88	0.02	1510	0.494	1321.85	0.43	12.46	63.42%
7	8	145	1040	0.12	86.55	139.88	0.02	1510	0.494	1321.85	0.43	12.46	64.73%
8	8	155	990	0.09	84.84	150.08	0.01	1510	0.494	1321.85	0.43	12.46	72.21%
9	8	165	1400	0.16	82.76	241.36	0.03	1510	0.494	1321.85	0.43	12.46	65.07%
10	8	167	1040	0.11	84.74	158.70	0.02	1510	0.494	1321.85	0.43	12.46	67.67%
11	8	187	1530	0.18	78.68	326.20	0.04	1510	0.494	1321.85	0.43	12.46	64.04%
12	8	193	1170	0.16	84.34	183.22	0.03	1510	0.494	1321.85	0.43	12.46	58.20%
Averages			**1289**	**0.15**	**83.07**	**221.53**	**0.03**	**NA**	**NA**	**NA**	**NA**	**NA**	**64.48%**
Standard Deviations			**202**	**0.04**	**2.21**	**62.71**	**0.01**	**NA**	**NA**	**NA**	**NA**	**NA**	**9.60%**
CVs			**15.64%**	**30.68%**	**2.66%**	**28.31%**	**37.95%**	**NA**	**NA**	**NA**	**NA**	**NA**	**14.89%**

[1] CL: The ileal sample was of insufficient volume to determine a % moisture content. The results are therefore excluded from the summary. SG 35MAR16

Graph 9. Day 42 %P Digestibility Summarized by Treatment Group
CQR Study Number AGV-15-5
Facility Number 7

Trt Group	Avg. %P Digestibility	Treatment Description
1	50.05%	Low Phosphate (LP)
2	57.67%	High Phosphate (HP)
3	51.96%	250 Units Phytase (LP)
4	49.64%	500 Units Phytase (LP)
5	52.19%	1000 Units Phytase (LP)
6	55.68%	3000 Units Phytase (LP)
7	59.74%	6000 Units Phytase (LP)
8	64.48%	60000 Units Phytase (LP)



Appendix 12. Label for the GraINzyme® Phytase product

GraINzyme® Phytase

Lot Number:

This product consists of corn meal produced from a genetically engineered variety of corn that produces phytase in the grain. Phytase is an enzyme that increases the availability of phytic acid and phytin bound phosphorus in poultry diets.

Guaranteed Analysis: This product contains a minimum of 3500 FTU/g phytase (derived from *Escherichia coli* strain K-12). One unit of phytase (FTU) is defined as the quantity of enzyme which liberates 1 micromole of inorganic phosphate per minute from sodium phytate at 37°C, pH 5.5.

Ingredients: Corn meal containing GraINzyme® Phytase

Directions for use in poultry:
Add (b) (4) kg/ton of complete feed to deliver 250 to 6,000 FTU/kg of feed;
If pelleting feed do not exceed 90°C.
Store at room temperature.

Expiration date: use within 3 months of date of manufacture

Produced by: Agrivida, Inc., 200 Boston Ave., Medford, MA 02155 USA

Net weight: 50 Lbs

See Material Safety Data Sheet for further information

T-1

Agrivida
www.agrivida.com
200 Boston Avenue, #2975
Medford, MA 02155
Phone: 781-391-1262
Fax: 781-391-4262

May 11, 2016

Dr. Geoffrey Wong
Food and Drug Administration
Division of Animal Feeds (HFV-224)
Office of Surveillance and Compliance
Center for Veterinary Medicine
7519 Standish Place
Rockville, Maryland 20855

GRAS Notification of GraINzyme® Phytase by Agrivida, Inc.

Dear Dr. Wong,

Under the pilot program for the notification of self determination of "Generally Recognized As Safe" (GRAS) for novel animal feed additives that was published in the Federal Register Vol. 75, 31800-31803 on June 4, 2010, Agrivida, Inc. is hereby submitting a notification of the GRAS use of the 6-phytase, GraINzyme® Phytase, in the feed of poultry. This enzyme releases phosphate groups from phytin and phytate that are present in plant based feed ingredients, thereby improving the availability of phosphorus in animal feeds.

Based upon scientific procedures and information, Agrivida, Inc. has concluded that the use of GraINzyme® Phytase in poultry feed is GRAS and that it is therefore exempt from the requirement for premarket approval under Section 201 (s) of the Federal Food, Drug and Cosmetic Act. Agrivida, Inc. has conducted appropriate scientific investigation of the safety and functionality of the GraINzyme® Phytase, the results of which support our conclusion of the GRAS nature of this product for use in poultry feed. The details and results of these studies were made available to a panel of independent experts for their review and based upon this information the panel has agreed and confirmed that GraINzyme® Phytase is GRAS for its intended use.

A description of the studies conducted and results that support the GRAS status of GraINzyme® Phytase are included in the enclosed dossier. Also included are copies of the literature that was cited in the dossier that support the scientific principles underlying our conclusions on the GRAS status of GraINzyme® Phytase. In addition, a compact disc is included that contains two copies of the dossier in Portable Document Format (PDF). The information that Agrivida, Inc. considers to be confidential business information is identified in one of these files.

The complete data and original information that are the basis of this GRAS Notification are available to the Food and Drug Administration for review and copying upon request during normal business hours at our offices located at 200 Boston Avenue, Medford, MA 02155.

Sincerely,

J. M. Ligon

James M. Ligon, Ph.D.
Vice President, Regulatory Affairs and Stewardship
Agrivida, Inc.

RECEIVED
JUN 15 2016
By

Agrivida
200 Boston Avenue, #2975
Medford, MA 02155
Phone: 781-391-1262
Fax: 781-391-4262
www.agrivida.com

June 6, 2016

Dr. Geoffrey Wong
Food and Drug Administration
Division of Animal Feeds (HFV-224)
Office of Surveillance and Compliance
Center for Veterinary Medicine
7519 Standish Place
Rockville, Maryland 20855

GRAS Notification of GraINzyme® Phytase by Agrivida, Inc.

Dear Dr. Wong,

As a follow up to our phone discussion today in regards to Agrivida's GRAS Notification for the GraINzyme® Phytase product I am including the following supplementary information that you requested that supports this notification:

1. The original cover letter that accompanied the GRASN submission document for the GraINzyme® Phytase that was dated May 11, 2016. This letter includes a statement that the intended use of the product is as a feed additive for poultry and a statement that all information related to the submission that is held by Agrivida, Inc. is available for review by FDA.

2. A document that includes statements concerning the safety to humans that consume meat derived from animals that are fed feed containing the GraINzyme® Phytase product and the self-limiting level of use of the GraINzyme® Phytase product for the target animals.

It is my understanding that this additional information will address the information identified by FDA/CVM in our discussion today that is necessary for the review by FDA/CVM of the GraINzyme® Phytase GRAS Notification. If there is other information that is needed by FDA/CVM related to the GraINzyme® Phytase GRAS Notification please bring this to my attention and I will work to provide that information to you.

Sincerely,

J M Ligon

James M. Ligon, Ph.D.
Vice President, Regulatory Affairs and Stewardship
Agrivida, Inc.

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June 6, 2016

Supplementary information for the GRAS Notification for GraINzyme® Phytase

1. Human safety of meat produced from animals treated with the GraINzyme® Phytase.

   The meat derived from animals that consume feed treated with GraINzyme® Phytase is safe for human consumption and does not present any human safety concerns. The GraINzyme® Phytase is an enzyme and enzymes are proteins. The dietary fate of the GraINzyme® Phytase in animals that consume feed treated with it is the same as that of all other proteins in the animal's diet that are digested into the constituent amino acids of the dietary proteins. As part of an Early Food Safety Evaluation for the GraINzyme® Phytase that was submitted to FDA/CFSAN, Agrivida, Inc. demonstrated that the GraINzyme® Phytase enzyme is sensitive to digestion in a simulated gastric environment. Therefore, the GraINzyme® Phytase is expected to be digested in the gastro-intestinal tracts of animals and is not expected to be absorbed intact into the blood of animals that consume it or to be deposited into the tissues of the animals, including the meat. The safety of phytase feed additives for humans that consume meat from animals that consume feed treated with phytases is further supported by the fact that phytases have been included in the feed of poultry for decades without any adverse effects on human safety.

2. Self-limiting level of use of the GraINzyme® Phytase.

   The GraINzyme® Phytase is produced by maize genetically engineered with the *phy02* phytase gene derived from *Escherichia coli* strain K12 to produce the GraINzyme® Phytase in the grain. Typically grain derived from the maize production host contains between 4,000 and 6,000 FTU/g of grain. Other than the presence of the GraINzyme® Phytase, the GraINzyme® Phytase containing maize grain is nutritionally equivalent to normal maize grain that is used as a major feed ingredient in the feed of poultry. The presence of the GraINzyme® Phytase in maize grain does not affect the taste, palatability or other organoleptic properties of the grain. Therefore, the maximum amount of GraINzyme® Phytase product that might be theoretically consumed by an animal is the total amount of maize meal included in the feed. In the case of poultry feed based on a maize/soybean meal diet, the maize meal typically comprises between 50 and 60% of the total feed. Accordingly, the maximum amount of GraINzyme® Phytase that might be consumed by poultry is equivalent to the amount of GraINzyme® Phytase contained in the maize meal of the diet assuming that all of the maize meal was GraINzyme® Phytase product. However, since the GraINzyme® Phytase product will be marketed in either 20 kg bags or 1 ton totes with a product label that directs the user to add the appropriate amount of the product when mixing the feed, the likelihood that a feed would be prepared using the GraINzyme® Phytase product to replace all of the maize meal in the diet is very remote. Assuming that a 1 ton tote of GraINzyme® Phytase product was used in place of normal maize meal to make a poultry feed, the maximum amount of feed that could be produced would be less than 2 tons. In the unlikely event of that this transpired, the resulting feed would not be expected to cause adverse effects on the poultry that consumes it. Phytase is an enzyme whose only enzymatic activity is the sequential removal of phosphate moieties from phytic acid with the ultimate production of inositol. If large amounts of phytase were included in a feed it would be expected that most or all of the phytic acid in the diet would be converted to inositol with the concomitant release of phosphate and once all phytic acid had been converted to inositol there would be no substrate for the phytase which would thereafter cease to have any function in the gastrointestinal tract. Two studies have been reported in which the maize portion of a typical poultry diet was replaced with maize expressing the NOV9X phytase that is the same phytase contained in the phytase product Quantum. The GraINzyme® Phytase is nearly identical to the NOV9X phytase differing in only 12 amino acid residues out of the total of 412 in each of these phytases. The chickens in these studies that received approximately 360,000 FTU NOV9X phytase/kg of feed demonstrated good performance without any signs of toxicity (Nyannor and Adeola, 2008; Nyannor et al., 2009).

Based on the above, it is expected that if in the unlikely event that grain from GraINzyme® Phytase expressing maize were to be substituted for all of the maize in a typical maize/soybean meal poultry diet that it would not adversely affect the performance of the birds and it would not cause any safety concerns for the animals. Additionally, the meat derived from such animals would not be expected to contain GraINzyme® Phytase protein or to be unsafe for human consumption.

References:

Nyannor, E.K.D. and O. Adeola (2008). Corn expressing an Escherichia coli-derived Phytase gene: Comparative evaluation study in broiler chicks. Poultry Sci. 87:2015-2022.

Nyannor, E.K.D., M.R. Bedford, and O. Adeola (2009). Corn expressing an Escherichia coli-derived phytase gene: Residual phytase activity and microstructure of digesta in broiler chicks. Poultry Sci. 88:1413-1420.

GraINzyme® Phytase

A phytase feed enzyme produced by *Zea mays* expressing a phytase gene derived from *Escherichia coli* K12

AMMENDMENT TO GRAS NOTICE No. AGRN 000-021

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March 20, 2017

Introduction

The FDA Center for Veterinary Medicine (CVM) is reviewing GRAS Notice No. AGRN 000-021, submitted by Agrivida, Inc. in May 2016 for its GraINzyme Phytase product. During the review, CVM has developed questions related to the GRAS notice. These questions were presented to Agrivida at a teleconference on March 7, 2017 and are contained in the minutes of the meeting. Agrivida has carefully considered each of the questions from CVM and has formulated responses to address each question. These responses are contained in this amendment to the GRAS Notice No. AGRN 000-021. In this amendment, the question or issue raised by CVM is stated, followed by Agrivida's response. The questions and responses herein are numbered and organized in the same manner as they were presented in the minutes of the teleconference prepared by CVM and dated March 13, 2017. In cases where literature citations are referenced in the responses, the full citations are included at the end of each response.

1. Chemistry and method of manufacturing

<u>Issue/question from CVM</u>:
CVM pointed out that phytase activity assay in corn containing Phy02 phytase was performed at 37°C. However, it is not clear why the assay to determine phytase activity in feeds was conducted at 65°C. The firm stated that they will check the method information and provide a response.

<u>Agrivida response</u>:
Agrivida mistakenly included the incorrect experimental protocol for determining Phy02 phytase activity in feed mixtures in Appendix 6 of the original notice. The correct protocol is the same as that contained in the original notice but it is carried out at 37°C, not at 65°C. The correct protocol that Agrivida has routinely used for more than 3 years to measure Phy02 phytase activity in feed mixtures is included below and should replace paragraph 2 in Appendix 6 of the original GRAS notice. This protocol was used for all Phy02 phytase measurements in feed mixtures reported in the Phy02 GRAS document.

Amended Protocol for Determining Phy02 Phytase Activity in Feed Mixtures.
Feed samples were milled in a knife mill and sieved with a 1mm screen. Two 20 g samples of each milled feed sample were extracted at room temperature with 100ml of extraction buffer (30 mM Sodium Carbonate/Bicarbonate pH 10.8). Each extract was diluted 25- to 100-fold in assay buffer [redacted] (b) (4) and 75 uL of the diluted extracts or 75ul of buffer-only controls were dispensed into individual wells of a round-bottom 96-well plate. 150 uL of freshly prepared, prewarmed (37°C), phytic acid (9.1 mM dodecasodium salt from Biosynth International, Staad, Switzerland, prepared in assay buffer) was added to each well. Plates were sealed and incubated for 60 min at 37°C. 150 uL of stop solution (20 mM ammonium molybdate, 5 mM ammonium vanadate, 4% nitric acid) was added to each well, mixed thoroughly via pipetting, and allowed to incubate at room temperature for 10 min. Plates were centrifuged at 3000×G for 10 minutes, and 100 uL of the clarified supernatants were transferred to the wells of a flat-bottom 96-well plate. Absorbance at

415 nm from each sample was compared to that of negative controls (buffer-only, no enzyme) and potassium phosphate standards. The standard curve is prepared by mixing 50 ul of potassium phosphate standards (0-1.44 mM, prepared in assay buffer) with 100 uL of freshly prepared phytic acid, followed by 100 uL of stop solution.

2. Bioengineering process to construct and characterize the production maize host

- Issue/question from CVM:
  On page 7 of the notice, the amino acid sequence of Phy02 phytase was compared to a native *E. coli* strain K-12 *appA* phytase enzyme described in Dassa and coworkers, 1990 (J. Bacteriol. 172:5497-5500). Dassa and coworkers indicate that the mature *appA* is 410 amino acids. However, it's stated in the notice that Phy02 phytase contains 412 amino acids. The firm needs to clarify the discrepancy in the number of amino acids.

  Agrivida response:
  The mature Phy02 protein sequence, when deduced from the phytase cDNA sequence in the construct [redacted] (b) (4) contains 411 amino acids rather than the referenced 412 amino acids. The wild type *E. coli* AppA protein that is presented in Figure 1 of the notice has amino acid coordinates 3(Q) – 412(L), which is 410 amino acid residues, as described by Dassa, *et. al*. In this AppA sequence, the mature protein starts at the second amino acid residue (amino acid number 3 in Figure 1), which is Glutamine (Q). An extra Alanine (Ala, A, numbered as amino acid 2) residue at the Phy02 protein N-terminal end represents the last amino acid residue of the 22 amino acid N-terminal signal peptide of the *E. coli* AppA protein. This Ala residue was retained in [redacted] (b) (4) equence in order to improve cleavage of the plant specific signal sequence from the mature Phy02 protein.

- Issue/question from CVM:
  The plasmid map provided in the notice indicates that vector plasmid, [redacted] (b) (4) is 21,196 (bp). The size of the plasmid based on summation of the individual elements provided in Table 1 is 16,856 bp. A difference of 4,340 bp has not been accounted for. The firm needs to describe the origin of these sequences and whether these sequences were inserted into the genome and, if they are inserted into the genome, whether these sequences would result in the production of subtansces that would raise a safety concern.

  Agrivida response:
  Table 1 lists only relevant genetic elements within the [redacted] (b) (4) construct and does not contain intervening DNA sequences that are present in [redacted] (b) (4). Within [redacted] (b) (4) there are two groups of intervening DNA sequences that are present between the genetic elements described in Table 1. One group is represented by those intervening sequences that are positioned on the T-DNA and that are inserted into the maize genome. These sequences are all non-coding sequences and pose no significant safety risk since they do not encode proteins. Together this group of sequences accounts for 535 nucleotides and consists of the following sequences:

- Restriction enzyme recognition sites that have been used for developing (b) (4) and are positioned either on polylinker (multiple cloning site) or between genetic elements within the T-DNA – 199 bp of DNA sequence in total. All of these restriction enzyme recognition sites are naturally occurring in the maize genome.
- Kozak sequence that plays an important role in the translation initiation process (Kozak, 1986) – 18 bp. Kozak elements occur naturally in the genomes of eukaryotes.
- 42 bp non-coding plasmid specific spacer sequence between PMI and (b) (4) terminator.
- Short non-coding plasmid specific sequences at the 5' or 3' ends of the T-DNA. These sequences include 25 bp left (LB) and right (RB) border repeats that are present on all *Agrobacterium* mediated plant transformation vectors and are required for the T-DNA transfer to occur in plant cells. These sequences are present in many genetically modified crops that have been cultivated on a broad scale and include:
    - 181 bp of RB specific sequence derived from *Agrobacterium tumefaciens* Ti plasmid of the strain (GenBank Accession #AH003392).
    - 95 bp of LB specific sequence derived from *Agrobacterium tumefaciens* Ti plasmid of the strain c58 (GenBank Accession #AH003396).

The second group of intervening genetic elements in (b) (4) are specific to the plasmid DNA backbone and are not inserted into the maize genome. This group of genetic elements includes important functional sequences for plasmid replication and selection in *E. coli* or *A. tumefaciens* (b) (4) as well as spacer sequences between functional genetic elements. The intervening sequences account for the remaining 3805 nucleotides that are not included in Table 1.

References

Kozak M. (1986) Point mutations define a sequence flanking the AUG initiator codon that modulates translation by eukaryotic ribosomes. *Cell* **44**:283–92.

- Issue/question from CVM:

The probe used in the Southern blot analyses to determine the number of insertions was approximately 580 bp. The firm needs provide a complete description of the nucleotide sequence that was included in the probe. The firm needs to address whether event PY203 contains inserts in which the sequence corresponding with the Southern blot probe was lost. The failure to identify each of the sites of insertion may affect the estimate of the number of inserts that are present in the genome, number of copies of the target gene that are inserted into the genome, and construct organization integrity, and stability of the construct, which could result in the production of unintended proteins.

Agrivida response:

The RB (right border) probe used in the Southern blot analysis to confirm the number of PY203 DNA insertions was 296 bp in length. The full sequence of the RB probe (designated TDNA_RB_probe) aligned to the right border of the vector portion of the

(b) (4) plasmid (b) (4)_Partial_RB), the primers used to amplify the probe (Primer_639 and Primer_640 [aligned as reverse complement; Primer_640_RevComp]), the right border of the 3293 T-DNA (PY203-3293_TDNA), and the right border of the 3507 T-DNA (PY203-3507_TDNA) are shown in Figure A1.

Figure A1. Clustal Omega alignment of the partial right border (RB) vector portion of the (b) (4) plasmid ((b)_Partial_RB), the 296 bp RB probe (TDNA_RB-probe), the primers used to amplify the RB probe (Primer_639 and Primer_640_RevComp), the PY203-3293 T-DNA right border (PY203-3293_TDNA), and the PY203-3507 T-DNA right border (PY203-3507_TDNA). CLUSTAL Omega (1.2.4) multiple sequence alignment at http://www.ebi.ac.uk/Tools/services/rest/clustalo was used for alignment. RevComp = reverse complement DNA sequence.

(b) (4)

The RB probe was selected to enable visualization of both PY203 T-DNA insertions 3293 and 3507 using multiple restriction enzyme digests of genomic PY203 DNA. This selection was based on the previously identified genomic flanking regions and complete cloning of the two PY203 T-DNA insertions (§ 2.4.3 of the Phy02 GRAS notice). Identification of the genomic insertion sites involved extensive genome walking PCR reactions initiated from within the T-DNA and extending into the flanking genome regions in both directions. In this analysis we only isolated genomic flanking DNA corresponding to two loci, which is consistent with the conclusion that PY203 contains only two loci, and agrees with the loci segregation data and Southern blot data (detailed further below).

In addition to the RB probe Southern blot analysis, a probe (PMI11) corresponding to a 461 bp region of the PMI coding DNA sequence (CDS) was used to hybridize to restriction enzyme-digested PY203 genomic DNA. The full sequence of the PMI11 probe aligned to the PMI CDS from the vector portion of the (b) (4) plasmid and the primers (Primer_11 and Primer_12 aligned as reverse complement; Primer_12_RevComp) used to amplify the probe are shown in Figure A2. Hybridization of the PMI11 probe to BamHI-digested PY203 genomic DNA resulted in detection of one ≈7,753 bp band (Figure A3), which was expected based on isolation of only two T-DNA loci in PY203 with one T-DNA (3293) containing a full-length PMI CDS and one T-DNA (3507) completely lacking the PMI CDS. These results support the conclusion that no other PMI-containing T-DNAs are present in the PY203 event.

Figure A2. Clustal Omega alignment of the PMI coding DNA sequence (CDS) from the vector portion of the (b) (4) plasmid (PMI_CDS), the 461 bp PMI11 probe (PMI11_probe), and the primers used to amplify the PMI11 probe (Primer_11 & Primer_12_RevComp). CLUSTAL Omega (1.2.4) multiple sequence alignment at http://www.ebi.ac.uk/Tools/services/rest/clustalo was used for alignment. CDS = coding DNA sequence; RevComp = reverse complement DNA sequence.

```
PMI_CDS              ATGCAGAAACTCATTAACTCAGTGCAAAACTATGCCTGGGGCAGCAAAACGGCGTTGACT   60
PMI11_probe          ------------------------------------------------------------   0
Primer_11            ------------------------------------------------------------   0
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              GAACTTTATGGTATGGAAAATCCGTCCAGCCAGCCGATGGCCGAGCTGTGGATGGGCGCA   120
PMI11_probe          ------------------------------------------------------------   0
Primer_11            ------------------------------------------------------------   0
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              CATCCGAAAAGCAGTTCACGAGTGCAGAATGCCGCCGGAGATATCGTTTCACTGCGTGAT   180
PMI11_probe          ------------------------------------------------------------   0
Primer_11            ------------------------------------------------------------   0
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              GTGATTGAGAGTGATAAATCGACTCTGCTCGGAGAGGCCGTTGCCAAACGCTTTGGCGAA   240
PMI11_probe          ------------------------------------------------------------   0
Primer_11            ------------------------------------------------------------   0
Primer_12_RevComp    ------------------------------------------------------------   0
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PMI_CDS              CTGCCTTTCCTGTTCAAAGTATTATGCGCAGCACAGCCACTCTCCATTCAGGTTCATCCA   300
PMI11_probe          --------------------------------ACAGCCACTCTCCATTCAGGTTCATCCA   28
Primer_11            --------------------------------ACAGCCACTCTCCATTCAGGTTCA----   24
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              AACAAACACAATTCTGAAATCGGTTTTGCCAAAGAAAATGCCGCAGGTATCCCGATGGAT   360
PMI11_probe          AACAAACACAATTCTGAAATCGGTTTTGCCAAAGAAAATGCCGCAGGTATCCCGATGGAT   88
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              GCCGCCGAGCGTAACTATAAAGATCCTAACCACAAGCCGGAGCTGGTTTTTGCGCTGACG   420
PMI11_probe          GCCGCCGAGCGTAACTATAAAGATCCTAACCACAAGCCGGAGCTGGTTTTTGCGCTGACG   148
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              CCTTTCCTTGCGATGAACGCGTTTCGTGAATTTTCCGAGATTGTCTCCCTACTCCAGCCG   480
PMI11_probe          CCTTTCCTTGCGATGAACGCGTTTCGTGAATTTTCCGAGATTGTCTCCCTACTCCAGCCG   208
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              GTCGCAGGTGCACATCCGGCGATTGCTCACTTTTTACAACAGCCTGATGCCGAACGTTTA   540
PMI11_probe          GTCGCAGGTGCACATCCGGCGATTGCTCACTTTTTACAACAGCCTGATGCCGAACGTTTA   268
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              AGCGAACTGTTCGCCAGCCTGTTGAATATGCAGGGTGAAGAAAAATCCCGCGCGCTGGCG   600
PMI11_probe          AGCGAACTGTTCGCCAGCCTGTTGAATATGCAGGGTGAAGAAAAATCCCGCGCGCTGGCG   328
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              ATTTTAAAATCGGCCCTCGATAGCCAGCAGGGTGAACCGTGGCAAACGATTCGTTTAATT   660
PMI11_probe          ATTTTAAAATCGGCCCTCGATAGCCAGCAGGGTGAACCGTGGCAAACGATTCGTTTAATT   388
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    ------------------------------------------------------------   0

PMI_CDS              TCTGAATTTTACCCGGAAGACAGCGGTCTGTTCTCCCCGCTATTGCTGAATGTGGTGAAA   720
PMI11_probe          TCTGAATTTTACCCGGAAGACAGCGGTCTGTTCTCCCCGCTATTGCTGAATGTGGTGAAA   448
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    -------------------------------------------------ATGTGGTGAAA   11

PMI_CDS              TTGAACCCTGGCGAAGCGATGTTCCTGTTCGCTGAAACACCGCACGCTTACCTGCAAGGC   780
PMI11_probe          TTGAACCCTGGCG-----------------------------------------------   461
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    TTGAACCCTGGCG-----------------------------------------------   24

PMI_CDS              GTGGCGCTGGAAGTGATGGCAAACTCCGATAACGTGCTGCGTGCGGGTCTGACGCCTAAA   840
PMI11_probe          ------------------------------------------------------------   461
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    ------------------------------------------------------------   24

PMI_CDS              TACATTGATATTCCGGAACTGGTTGCCAATGTGAAATTCGAAGCCAAACCGGCTAACCAG   900
PMI11_probe          ------------------------------------------------------------   461
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    ------------------------------------------------------------   24

PMI_CDS              TTGTTGACCCAGCCGGTGAAACAAGGTGCAGAACTGGACTTCCCGATTCCAGTGGATGAT   960
PMI11_probe          ------------------------------------------------------------   461
Primer_11            ------------------------------------------------------------   24
Primer_12_RevComp    ------------------------------------------------------------   24
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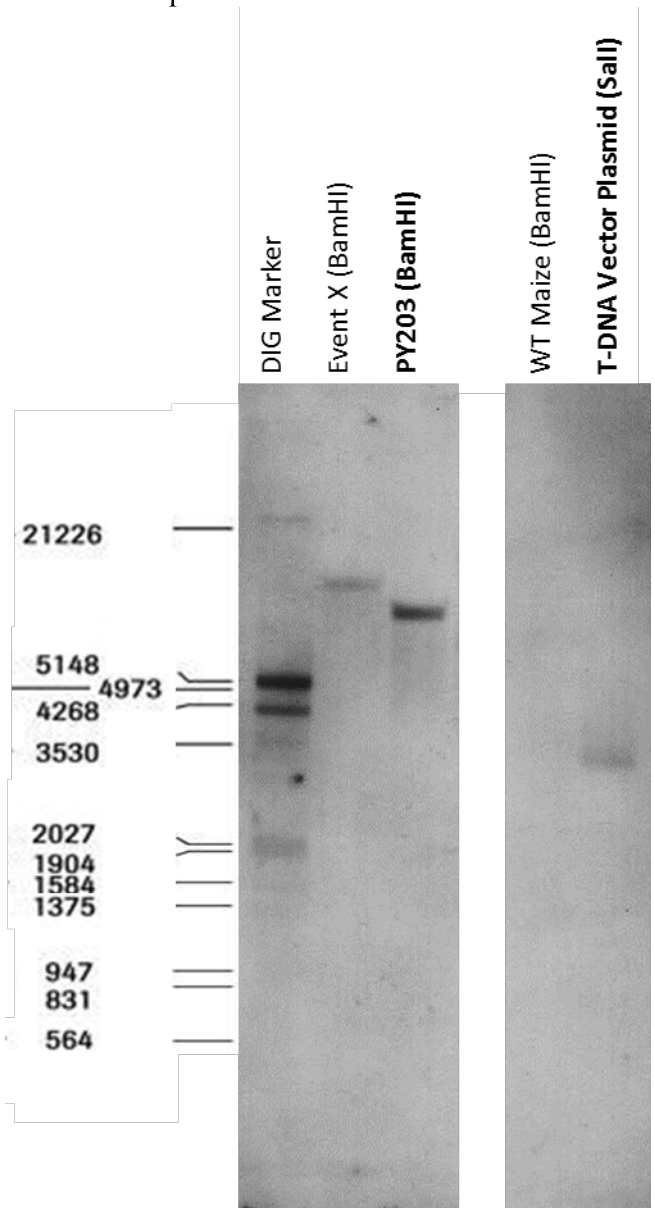
```
PMI_CDS             TTTGCCTTCTCGCTGCATGACCTTAGTGATAAAGAAACCACCATTAGCCAGCAGAGTGCC   1020
PMI11_probe         ------------------------------------------------------------   461
Primer_11           ------------------------------------------------------------   24
Primer_12_RevComp   ------------------------------------------------------------   24

PMI_CDS             GCCATTTTGTTCTGCGTCGAAGGCGATGCAACGTTGTGGAAAGGTTCTCAGCAGTTACAG   1080
PMI11_probe         ------------------------------------------------------------   461
Primer_11           ------------------------------------------------------------   24
Primer_12_RevComp   ------------------------------------------------------------   24

PMI_CDS             CTTAAACCGGGTGAATCAGCGTTTATTGCCGCCAACGAATCACCGGTGACTGTCAAAGGC   1140
PMI11_probe         ------------------------------------------------------------   461
Primer_11           ------------------------------------------------------------   24
Primer_12_RevComp   ------------------------------------------------------------   24

PMI_CDS             CACGGCCGTTTAGCGCGTGTTTACAACAAGCTGTAA       1176
PMI11_probe         ------------------------------------       461
Primer_11           ------------------------------------       24
Primer_12_RevComp   ------------------------------------       24
```

Figure A3. Southern blot hybridization of BamHI-restricted genomic DNA from event PY203 with a DNA probe from the PMI coding DNA sequence (CDS; PMI11 probe). DIG-labeled DNA marker fragments are shown (left lane) with their corresponding sizes in base pairs indicated to the left of the blot. A separate lane of restricted genomic DNA from untransformed maize probed with the PMI11 probe is shown on the right to demonstrate that the probe does not hybridize to genomic DNA from untransformed maize. BamHI-digested genomic DNA from an unrelated maize PMI-containing T-DNA event (Event X) was included as a positive control for genomic DNA hybridization of the PMI11 probe. A band ≈3,401 bp in size was detected in the SalI-digested T-DNA vector control as expected.



The presence of only two T-DNA insertions in PY203 is also supported by the segregation ratios of specific (b) (4) T-DNA elements as detected by PCR in progeny from an outcross of the original PY203 T0 plant. PCR amplification of the three promoter-Phy02 junctions in the T-DNA vector portion of the (b) (4) plasmid (Figure A4 and Table A1) from 61 progeny of a cross between the original PY203 T0 plant and inbred E (T1 generation PY203_F1E Total [Groups 1 and 2]) resulted in 72% segregation for two of the three junctions closest to the RB (b) (4)-Phy02 and (b) (4) hy02; Figure A4 and Table A2), which is not significantly different from the 75% segregation (Chi Square = 0.605) expected for an event carrying 2 loci with both of these elements. Segregation of the Glb1 promoter-Phy02 (b) (4) Phy02) PCR fragment was 49%, which was not significantly different from 50% (Chi Square = 0.898) as expected for a single locus. For 36 of the plants from this population (T1 PY203_F1E Group 1), a PMI PCR fragment (PMI11) cosegregated with the (b) (4) Phy02 PCR fragment at 44%, which was also not significantly different from 50% (Chi Square = 0.505) as expected for a single locus. These results support the conclusions that, 1) PY203 contains two T-DNA insertions as follows: one insertion (3293) that contains the complete (b) (4) T-DNA, and one insertion (3507)that lacks elements (b) (4) Phy02 junction and PMI11) close to the left border, and 2) PY203 does not contain other insertions that carry the promoter-Phy02 or PMI T-DNA elements.

Figure A4. Maps of the PY203 T-DNA loci, 3293 and 3507, indicating the locations of the three promoter-Phy-02 PCR products ((b) (4) Phy02 (b) (4) Phy02, and (b) (4) Phy02) and the PMI11 PCR product that were used to detect T-DNA-derived inserti within the genome of PY203. Primers used for amplifications are shown in parentheses.

(b) (4)

Table A1. List of primers used for PCR segregation analysis.

Primer Name	Sequence	Target
420	[redacted] (b) (4)	[redacted]
421	[redacted]	[redacted]
422	[redacted]	[redacted]
436	[redacted]	[redacted]
11	ACAGCCACTCTCCATTCAGGTTCA	PMI
12	CGCCAGGGTTCAATTTCACCACAT	PMI

Table A2. Results of [redacted] (b) (4) T-DNA element PCR from PY203 F1E (T1) progeny. Chi square analyses were performed using expected segregation from a 1- or 2-locus event. Seg. = segregation; Est. = estimated; Loc. = T-DNA locus.

Generation (Event cross)	# Plants	PCR Product (size)	# PCR +	Expected % Seg. (1 loc, 2 loc)	Observed % Seg.	Est. Loc. #	ChiSq (1 or 2-loc)
T1 (PY203_F1E) Group 1	36	[redacted] (b)-Phy02 (194 bp)	25	50%, 75%	69%	2	
		[redacted] (b)-Phy02 (168 bp)	25	50%, 75%	69%	2	
		[redacted] (b)-Phy02 (233 bp)	16	50%, 75%	44%	1	
		PMI11 (461 bp)	16	50%, 75%	44%	1	0.505
T1 (PY203_F1E) Group 2	25	[redacted] (b)-Phy02 (194 bp)	19	50%, 75%	76%	2	
		[redacted] (b)-Phy02 (168 bp)	19	50%, 75%	76%	2	
		[redacted] (b)-Phy02 (233 bp)	14	50%, 75%	56%	1	
T1 (PY203_F1E) Total	61	[redacted] (b)-Phy02 (194 bp)	44	50%, 75%	72%	2	0.605
		[redacted] (b)-Phy02 (168 bp)	44	50%, 75%	72%	2	0.605
		[redacted] (b)-Phy02 (233 bp)	30	50%, 75%	49%	1	0.898

- Issue/question from CVM:
  Locus 3507 contains the first 1,490 bp of the inserted *Z. mays* [redacted] (b) (4) promoter joined with corn genomic sequence. The results of an open reading frame analysis across each of the junction sequences and the constructs are not included in the notice. The firm needs to adequately address whether the introduced sequences at either loci would lead to the production of unintended proteins in the bioengineered corn that could raise a safety concern.

  Agrivida response:
  At the 3' end of the T-DNA in locus 3507 there is a truncation of the T-DNA that begins in the maize [redacted] (b) (4) gene promoter described by [redacted] (b) (4) The maize [redacted] (b) (4) gene promoter is known to contain in the proximal ~1.4 kb

functionally important genetic elements for transcriptional activity [redacted] (b) (4) showed that even small deletions within this important 1.4 kb region could abolish transcriptional activity from this promoter. However, this important ~1.4 kb region is entirely missing in the truncated variant of the [redacted] (b) (4) promoter in the locus 3507, and therefore the [redacted] (b) (4) promoter in locus 3507 is not expected to be functional.

Analysis of the sequence homology between known allergenic protein sequences and the deduced protein sequences encoded by all putative open reading frames (ORFs), that were formed at the junctions of the integrated T-DNAs and the maize genome in loci 3293 and 3507 in event PY203, was performed by FASTA search of the allergen database (www.allergenonline.com) using the "Sliding 80mer Window" mode as well as the "8-mer Exact Match" mode. Protein sequences with less than 35% identity over 80 or more amino acids and lacking identity to an 8 amino acid sequence are not considered potentially IgE cross-reactive to the known allergens according to recognized regulatory guidelines (Codex, 2009). The translated protein sequence input for the FASTA search was created from putative ORFs that encode at least 30 amino acids as outlined by Harper et al., 2012.

For each putative ORF sequence presented below, the maize genomic DNA is shown in the lowercase letters and the T-DNA sequence is presented in the uppercase letters.

Locus 3293:
It appears that the [redacted] (b) (4) T-DNA insertion into maize genome at the locus 3293 has occurred 308 bp downstream of the stop codon of the annotated B73 maize genome model gene GRMZM2G159344, whose cDNA expression has been previously confirmed in the inbred line B73 using NimbleGen microarray (Sekhon et al., 2011). This computer-predicted gene as well as its corresponding protein have not been characterized and have no currently known functions. Three putative ORFs were identified at locus 3293 that span the junction sequences between inserted T-DNA and maize genomic DNA flanking regions. These ORFs are depicted on the map of the entirely sequenced locus 3293 (Figure A5). The ORF96 is located 5' of the inserted T-DNA (RB side) and has nucleotide coordinates 1761-1856 on the minus strand of DNA. Two other putative ORFs (ORF156 and ORF 105) are specific to the 3' end of the T-DNA junction (LB side) and have nucleotide coordinates 16844-16999 and 16958-17062 (minus DNA strand) respectively.

Figure A5. Genetic map of PY203 locus 3293 showing the elements derived from the T-DNA and flanking genomic maize DNA. Putative ORFs are indicated below the genetic map.

(b) (4)

[redacted]

Sequences of the ORFs that were formed by T-DNA integration in locus 3293:

```
>ORF96  (dna)
tcaggcctctcccttggctagggctaggagaggttctagtaacttggggaagCACTGATAGTTTAAACTGA
AGGCGGGAAACGACAACCTGATCAT

>ORF96  (AA)
MIRLSFPAFSLNYQCFPKLLEPLLALAKGEA*

>ORF156  (dna)
ATGTATGTTACTAGATCGGGAATTGGCGAGCTCGAATTAATTCAGTACATTAAAAACGTCCGCAATGTGTT
ATTAAGTTGTCTAAGCGTCAATTTGTTTACACCACAATATATCCTagtggacctcgaagtctatctttcga
gcagaaattttga

>ORF156  (AA)
MYVTRSGIGELELIQYIKNVRNVLLSCLSVNLFTPQYILVDLEVYLSSRNF*

>ORF105  (dna)
CTAgtggacctcgaagtctatctttcgagcagaaatttttgaatgcgtattagtggcagatggatgaatgt
ctggcctttcccaaacgttaacaagcatatgcat

>ORF105  (AA)
MHMLVNVWERPDIHPSATNTHSKISARKIDFEVH*
```

The FASTA searches of the allergen database using deduced protein sequences derived from each of the three identified ORFs did not reveal any matches with greater than 35% homology or with identity to a sequence of 8 or more amino acids. Consequently, it is concluded that the T-DNA integration into the maize genome in the locus 3293 did not form putative ORFs that could encode potentially allergenic proteins.

Locus 3507:
Three putative ORFs were identified at the locus 3507 that spanned the junction between inserted T-DNA and maize genomic DNA flanking regions. These putative ORFs are depicted on the map of the sequenced locus 3507 (Figure A6).

Two putative ORFs, ORF93 and ORF99 were identified that span the junction between the RB maize genomic DNA flank and the 5' end of the inserted T-DNA in locus 3507. These putative ORFs have corresponding nucleotide coordinates 2017-2109 and 2049-2147 (minus strand of DNA). The third putative ORF297 (nucleotide coordinates 10455-10751 on the minus DNA strand) spans the junction between the LB maize genomic DNA flank and the 3' end of the inserted T-DNA in locus 3507.

Figure A6. Genetic map of PY203 locus 3507 showing the elements derived from the T-DNA and flanking genomic maize DNA. Putative ORFs are indicated below the genetic map.

(b) (4)

[redacted]

Sequences of the ORFs that were formed by T-DNA integration in locus 3507:

```
>ORF93  (dna)
atgaccaccctgattaggccaaatctgggccgctatttccctgacctcacaaccagccgcaaaggcgcggt
ggacatcctcctcaAACACTGA

>ORF93  (AA)
MTTLIRPNLGRYFPDLTTSRKGAVDILLKH*

>ORF99  (dna)
ctatttccctgacctcacaaccagccgcaaaggcgcggtggacatcctcctcaAACACTGATAGTTTAAAC
TGAAGGCGGGAAACGACAACCTGATCAT
```

```
>ORF99  (AA)
MIRLSFPAFSLNYQCLRRMSTAPLRLVVRSGK*

>ORF297  (dna)
```

(b) (4)
[redacted]

```
>ORF297  (AA)
```

(b) (4)
[redacted]

The FASTA searches of the allergen database using deduced protein sequences derived from each of the three identified putative ORFs at the T-DNA junctions in locus 3507 did not reveal any matches of greater than 35% sequence identity. Consequently, it is concluded that the T-DNA integration into the maize genome in the locus 3507 did not form new ORFs that encode potentially allergenic protein sequences.

In addition, a BLASTP comparison of all putative ORFs in the maize genome flanking regions of loci 3293 and 3507 with all peptides in the NCBI database was performed. This search did not identify significant homologies between any of the putative ORFs and toxic peptides in the NCBI database. Therefore, it is further concluded that the putative ORFs in the flanking regions of loci 3293 and 3507 would not produce toxic peptides were they to be expressed.

<u>References</u>

Codex (2009). Codex Alimentarius Guidelines. Foods derived from modern biotechnology. 2nd ed. Rome: World Health Organization and Food and Agricultural Organization of the United Nations. p. 7–34.

Harper B, McClain S, Ganko EW. (2012) Interpreting the biological relevance of bioinformatic analyses with T-DNA sequence for protein allergenicity. Regulatory Toxicology and Pharmacology **63**: 426-432.

(b) (4)
[redacted]

Sekhon RS, Lin H, Childs KL, Hansey CN, Buell CR, De Leon N, Kaeppler SM. (2011) Genome-wide atlas of transcription during maize development. The Plant Journal **66**: 553-563.

(b) (4)
[redacted]

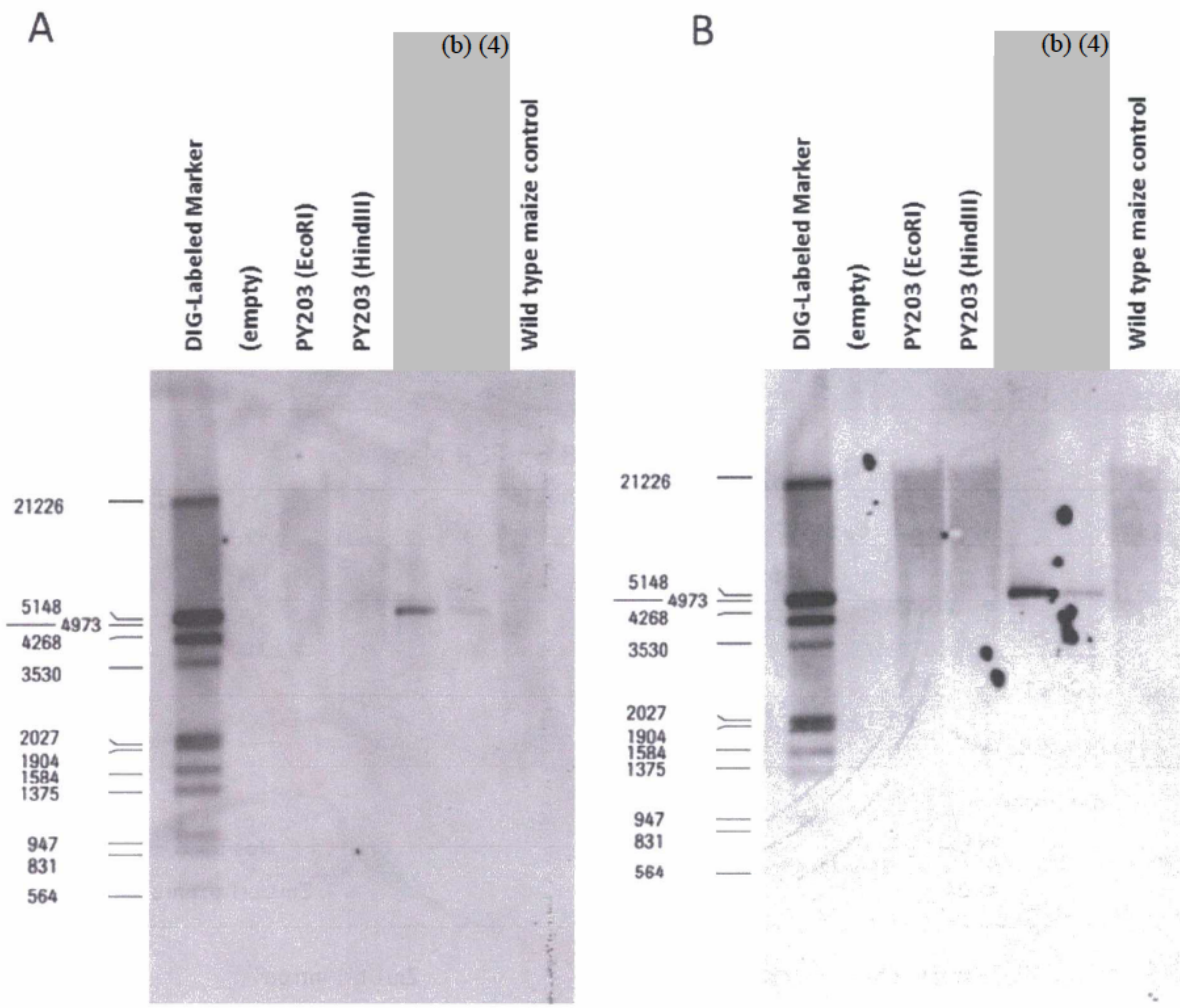
[redacted] (b) (4)

- <u>Issue/question from CVM</u>:
  On pages 17 and 18 of the notice, there is a brief description of the molecular techniques that were used to demonstrate that the antibiotic resistance marker was not inserted into the host's genome. However, CVM could not verify the results of these analyses because the results were not included in the notice. The firm needs to provide the results of these analyses.

  <u>Agrivida response:</u>
  Southern blot and PCR tiling results demonstrating the absence of vector backbone elements, including the antibiotic resistance markers, were not included in the original submission for brevity. These vector backbone element Southern blot results are included here and clearly indicate that backbone elements, ColE1 and the antibiotic resistance markers, [redacted] (b) (4) are not detectable in the genome of the PY203 event (Figure A7; see Table A3 for a list of primers used to amplify probes).

  PCR tiling using overlapping primers across the entire [redacted] (b) (4) plasmid backbone was used to screen PY203 for any detectable backbone (BB) DNA (Figure A8 and Table A4). Maize genomic control primers corresponding to an endogenous maize gene (GWD) were included with each BB reaction as an internal control to confirm our ability to amplify DNA sequences from these samples using PCR. Results from this PCR tiling analysis demonstrate that PY203 does not contain any detectable BB sequence (Figure A9). Only when genomic DNA from PY203 was mixed with [redacted] (b) (4) plasmid DNA could both bands, the endogenous GWD control 740 bp PCR product and the backbone-specific ~1000 bp PCR product, be detected (Figure A9, bottom panel). In addition to PCR tiling across the [redacted] (b) (4) plasmid backbone, we performed PCR with [redacted] (b) (4) primers and confirmed that neither of these antibiotic resistance marker genes was present in the PY203 event (Figure A10 and Table A5). Taken together, these results support the interpretation that no vector backbone-derived sequences and no antibiotic resistance markers were inserted into the host's genome.

Figure A7. Southern blot hybridization of restricted genomic DNA from event PY203 with DNA fragments from the ColE1 (A) and a combination of the two antibiotic resistance genes (b) (4) (B). DIG-labeled DNA marker fragments are shown (left lanes of each respective blot) with their corresponding sizes in base pairs indicated to the left of each blot. Separate lanes of restricted genomic DNA from untransformed maize probed with the ColE1 or (b) (4) probes are shown on the right of each blot to demonstrate that the probe does not hybridize to genomic maize DNA. A band ≈5,129 bp in size was detected in the SalI+NotI-digested (b) (4) plasmid control (1 & ¼ copy) as expected.



Best Copy Available

Table A3 List of primers used amplify [redacted] (b) (4) plasmid backbone probes ColE1, [redacted] (b) (4)

Primer Name	Sequence	Target	Primer pair (Probe size)
722	AACTATCGTCTTGAGTCCAACC	ColE1	722+731 (278 bp)
731	TTTCTGCGCGTAATCTGCTG	ColE1	
735	[redacted] (b) (4)	[redacted]	735+736 (789 bp)
736	[redacted]	[redacted]	
737	[redacted]	[redacted]	737+738 (525 bp)
738	[redacted]	[redacted]	

Figure A8. [redacted] (b) (4) plasmid map with location of overlapping backbone (BB) PCR [redacted] (b) (4)

Table A4. List of primers used for BB and control PCR.

Primer Name	Sequence	Target
531	GACCACACCACTCTATCTGAAC	Maize GWD gene
532	ACTGCATGGCCAACTTCT	Maize GWD gene
479	GTTTACACCACAATATATCCTGCCA	Vector backbone
588	CGACATTTCTCCAAGCAACTAC	Vector backbone
601	CGCAGAAGCTCCCATCTTT	Vector backbone
602	ATCATTCCGTGGCGTTATCC	Vector backbone
589	TTGGTGATCTCGCCTTTCAC	Vector backbone
590	GCTCCTTGGCATACGATTAGAG	Vector backbone
591	GAAGAACGGAAACGCCTTAAAC	Vector backbone
592	GCCTCGTGATACGCCTATTT	Vector backbone
593	CCTATCTCAGCGATCTGTCTATTT	Vector backbone
594	GTCGCCGCATACACTATTCT	Vector backbone
595	GATACCTGTCCGCCTTTCTC	Vector backbone
596	GCCTCTGTCGTTTCCTTTCT	Vector backbone
597	GGTGTCGGCTTGAATGAATTG	Vector backbone
598	GCTCTGATGCCGCATAGTTA	Vector backbone
599	CTTCCGGCTCGATGTCTATTG	Vector backbone
600	CAGAGCGCAGATACCAAATACT	Vector backbone
603	CGGCGTCAACACGGGATAATA	Vector backbone
482	TGACAGGATATATTGGCGGGTAAAC	Vector backbone

Figure A9. PCR results of nine individual overlapping (b) (4) BB primer sets each multiplexed with a maize control primer set (531+532; 740 bp) for PY203 genomic DNA, WT E genomic DNA, and (b) (4) plasmid DNA. The ability to amplify all nine BB PCR fragments along with the maize control PCR fragment was confirmed by running multiplex PCR with combined PY203 genomic DNA and (b) (4) plasmid DNA. PCR products were separated on an ethidium bromide-stained 1% agarose gel.

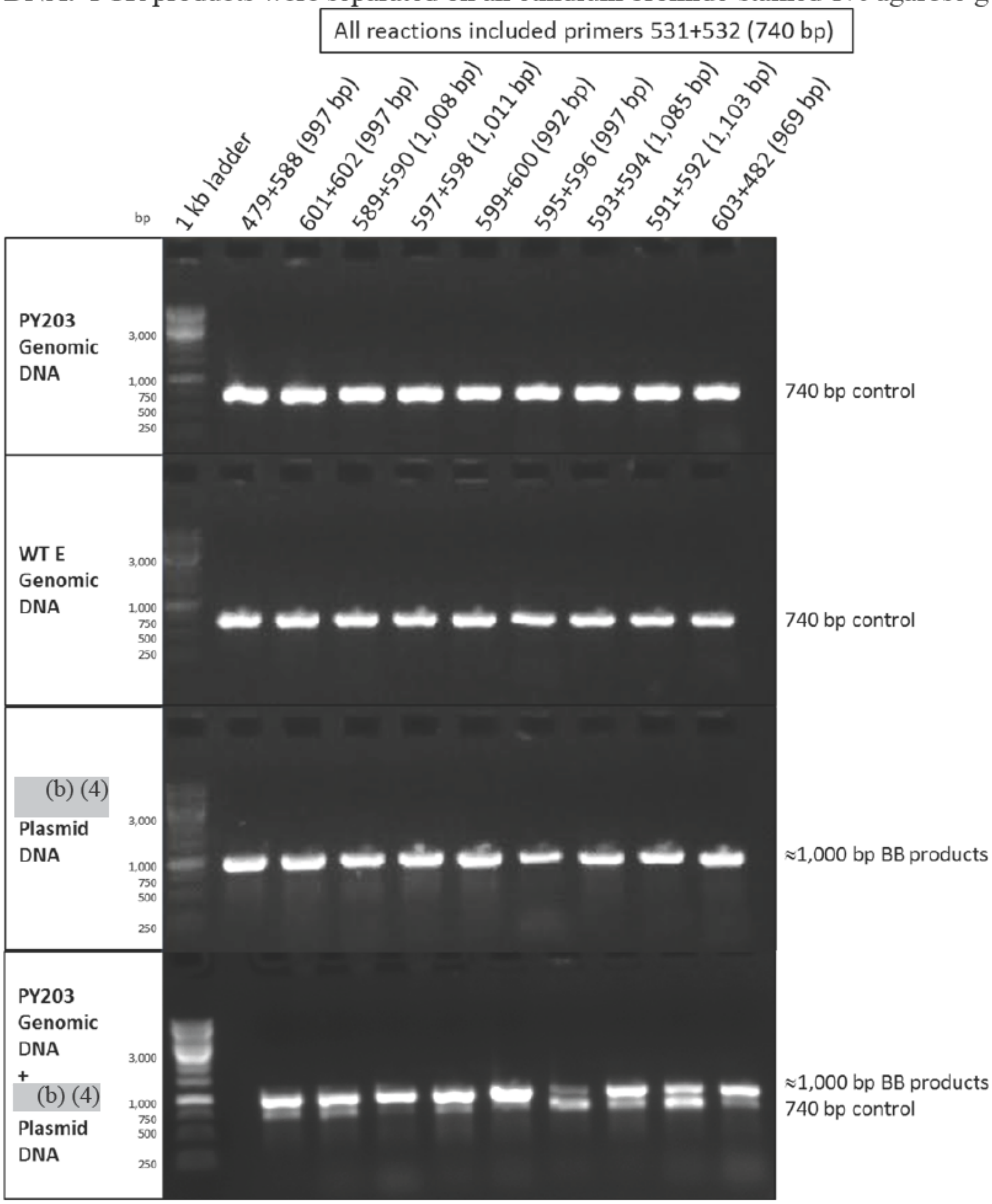


Figure A10. Results of (b) (4) PCR screening of PY203 genomic, WT maize genomic, (b) (4) plasmid, and PY203 + (b) (4) plasmid DNA, each multiplexed with a maize control primer set (371+525; 204 bp). PCR products were separated on an ethidium bromide-stained 1% agarose gel. NTC = no target DNA control.

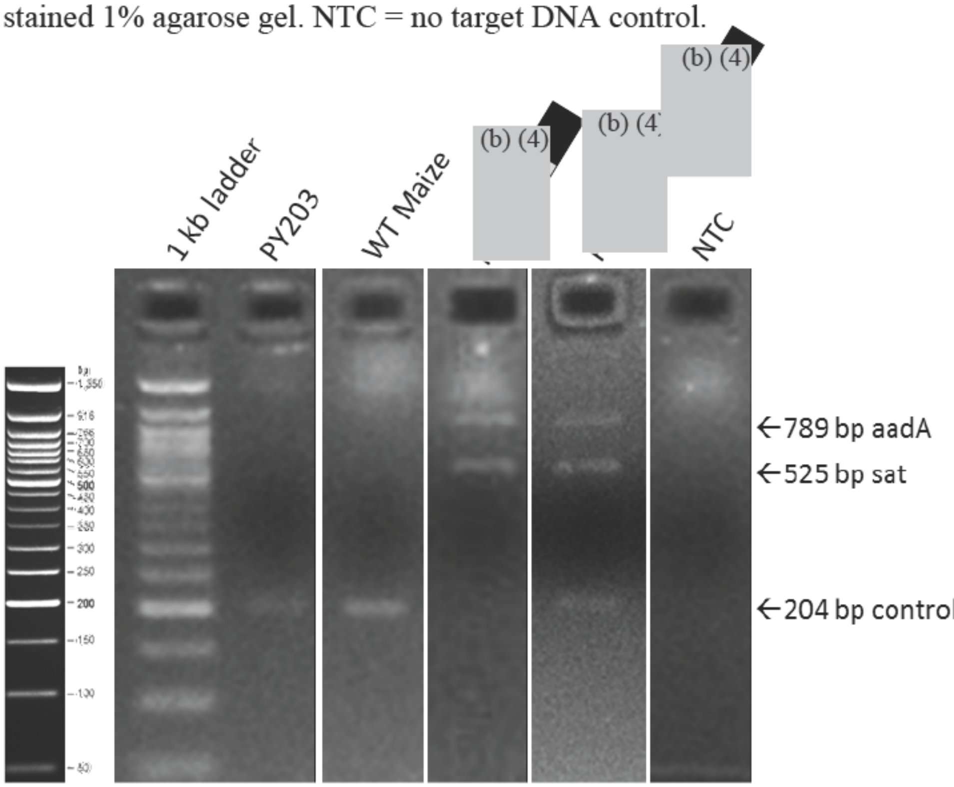


Table A5. List of primers used amplify (b) (4) plasmid backbone antibiotic resistance markers (b) (4) as well as the maize genomic GWD control.

Primer Name	Sequence	Target	Primer pair (Probe size)
371	GGTTATAAGCCCGGTTGAAGTA	GWD	371+525 (204 bp)
525	CTATTCCTTGCTCGGACTGAC	GWD	
735	(b) (4)		735+736 (789 bp)
736			
737			737+738 (525 bp)
738			

<u>CVM also pointed out the following inconsistencies in the notice:</u>

- For locus 3293 there is a four bp sequence between the corn genome sequence and the right border region, whereas in locus 3507 this unspecified sequence is three bp. It does not appear that these nucleotide sequences are derived from the corn genome or the T-DNA.

  <u>Agrivida response</u>:
  Complex DNA rearrangements at T-DNA integration sites into plant genomes such as duplications, insertions, deletions and nucleotide substitutions that occur during the process of T-DNA integration into plant genomes by *Agrobacterium* are well documented in the literature (Gheysen et al., 1987, Ohba et. al., 1995, Stahl et. al., 2002). In the locus 3293, the first 1809 nucleotides of the flank annotated as 1812 bp maize genomic DNA are 100% identical to the 1809 bp of the maize B73 genomic DNA sequence on chromosome (b)(4) (nucleotides 89933570-89935378). The three bp remaining at the 3' end of the flank nucleotides "AAG" could have potentially arisen during T-DNA integration into locus 3293 as the sequence rearrangement of the "AAC" triplet, which is the adjacent sequence to the RB repeat on the construct (b) (4) These three nucleotides "AAG" may have been better annotated as a part of the (b) (4) T-DNA construct. At the left border of the T-DNA of the locus 3293, the nucleotide sequence of 1662 bp of the maize genome is 100% identical on the entire sequence length to 1662 bp of the B73 maize genomic sequence of the maize chromosome (b)(4) nucleotides 89935403-89937064).

  The nucleotide sequence of 2101 bp of maize genomic DNA at the right border of the T-DNA in the locus 3507 are 100% identical to 2101 bp of the B73 maize genomic sequence that is located on the maize chromosome (b) (nucleotides 141216135-141214035). However, it is also plausible to sugges that the 3' end "TCA" sequence in the maize genomic DNA flank could be derived from the 3' end of the RB repeat during *Agrobacterium* mediated T-DNA integration into locus 3507 of maize chromosome (b) At the left T-DNA side of the locus 3507, the 2569 bp nucleotide sequence of the isolated maize genomic DNA flank is 100% identical to the B73 genome sequence between nucleotides 141213994-141211426 on the maize chromosome (b)(4)

  <u>References</u>

  Gheysen G, Van Montagu M, Zambryski P. (1987) Integration of *Agrobacterium tumefaciens* transfer DNA (T-DNA) involves rearrangements of target plant DNA sequences. Proc. Natl. Acad. Sci. USA **84**: 6169-6173.

  Ohba T, Yoshioka Y, Machida C, Machida Y. (1995) DNA rearrangement associated with the integration of T-DNA in tobacco: an example for multiple duplications of DNA around the integration target. The Plant Journal **7**: 157-164.

  Stahl R, Horvath H, Van Fleet J, Voetz M, Von Wettstein D, Wolf N. (2002) T-DNA integration into the barley genome from single and double cassette vectors. Proc. Natl. Acad. Sci. USA **99**: 2146-2151.

- It is indicated in Table 1 that the right border region is 25 bp. However, the right border sequence in both loci appears to be 150 bp. This conclusion is based on the 99.93% identity (149 out of 150 bp) between the right border sequence of a Ti binary vector (KP844566.1) and the corresponding sequence in loci 3293 and 3507. The firm should clarify this discrepancy. There was a single nucleotide change (T>C) in the 3'end of the direct repeat sequence. It is unlikely that a single nucleotide change would have any effect on insertion of the T-DNA into the corn genome. Downstream of the 25 base pair direct repeat sequence is 113 bp of 5' sequence from the promoter region of the nopaline synthase gene from Ti plasmid that adjoins the right border sequence. It is unlikely that the inclusion of the 113 bp of the sequence from the promoter region of the nopaline synthase gene will affect the safety of the enzyme product because the sequence does not contain any regulatory elements (e.g. TATA box

  Agrivida response:
  In Table 1 the 25 bp sequences for RB and LB regions refer to repeat sequences that flank T-DNAs in plant transformation vectors and are required for T-DNA transfer into plant genomes as these sequences are specifically recognized by *A. tumefaciens* VirD1 and VirD2 proteins that initiate the transfer process (Lee and Gelvin, 2008). The functional right border region of the T-DNA of plasmid (b) (4) consists of 25 bp of the right border repeat, 153 bp of the right border region derived from the original pSB11 vector (GenBank Accession # AB027256) that was used to develop (b) (4) plasmid, and 143 bp of a multiple cloning site positioned upstream of the (b) (4) promoter. The 153 bp region that is referenced in the question as 150 bp of right border sequence is identical to 153 bp of similar sequences from multiple Ti plasmid plant transformation vectors, including the pGZ12.0106 vector (GenBank Accession #KP844566.1). This 153 bp of sequence originated from the nopaline Ti plasmid pTiT37 of *Agrobacterium tumefaciens* (GenBank Accession #AH003392.2) and is immediately adjacent to the right border repeat sequence and represents sequence upstream of the nopaline synthase gene promoter according to the sequence disclosed by Bevan et al. (1983). The 153 bp sequence does not include CAAT and TATA boxes that are critical for (b) (4) promoter activity or the 88 bp sequence identified by Shaw et al. (1984) as the (b) (4) promoter. The T→C nucleotide substitution appears to be a carryover nucleotide modification that was inadvertently introduced during (b) (4) vector construction. In multiple plant transformation experiments performed by Agrivida, this nucleotide substitution has had no apparent effect on T-DNA integration into maize genome.

  References

Bevan M, Barnes WM, Chilton MD (1983). Structure and transcription of the nopaline synthase gene region of T-DNA. Nucleic Acids Research **11**:369-385.

Lee LY, Gelvin SB (2008). T-DNA Binary Vectors and Systems. Plant Physiology **146**: 325–332.

Shaw CH, Carter GH, Watson MD, Shaw CH (1984). A functional map of the nopaline synthase promoter. Nucleic Acids Research, **12**:7831-7846.

- Both loci have 142 bp of nucleotide sequence that immediately follows the right border sequence. Our BLASTN search using this sequence did not match any sequences in the NCBI database. This sequence is not described in the notice and its purpose is unclear.

  Agrivida response:
  The 142 bp sequence immediately adjacent to the RB flank in the locus 3293 as well as the identical sequence in the locus 3507 is part of the T-DNA in the (b) (4) plasmid. This sequence has been described in the response to the previous question. In our BLASTN searches of the nucleotide sequence database at NCBI, it returns multiple sequence identity hits that demonstrate that this sequence is part of the T-DNA in multiple Ti-based plant transformation vectors (see below). According to the BLASTN results, this 142 bp sequence originates from *A. tumefaciens* Ti plasmid of strain T37 at its 5' T-DNA end (GenBank Accession # AH003392.2) and is adjacent to the right border repeat.

```
>Seq142bp
CACTGATAGTTTAAACTGAAGGCGGGAAACGACAACCTGATCATGAGCGGAGAATTAAGGGAGTCACGTTA
TGACCCCCGCCGATGACGCGGGACAAGCCGTTTTACGTTTGGAACTGACAGAACCGCAACGTTGAAGGAGC
```

NCBI BLASTN result using the 142 bp sequence immediately adjacent to the RB flank in the locus 3293:

Subset of the homology hits:

Sequences producing significant alignments:

Select: All None Selected:0

Alignments Download GenBank Graphics Distance tree of results

Description	Max score	Total score	Query cover	E value	Ident	Accession
Plant binary vector pLC41 DNA, complete sequence	257	257	100%	4e-65	99%	LC215698.1
Plasmid Ti Ti plasmid (from A.tumefaciens, nopaline strain T37), T-DNA 5' (left) border	257	257	100%	4e-65	99%	AH003392.2
Carica papaya DNA, contig: Contig_446121, strain: PRSV-YK	257	257	100%	4e-65	99%	LC073700.1
Synthetic construct barnase and phosphinothricin N-acetyltransferase genes, complete cds	257	257	100%	4e-65	99%	KP724690.1
Ti Plasmid Binary Vector pGZ12.0106, complete sequence	257	257	100%	4e-65	99%	KP844566.1
Ti Plasmid Binary Vector pGZ12.0224, complete sequence	257	257	100%	4e-65	99%	KP844565.1
BiFC expression vector kanII-StriVR, complete sequence	257	450	100%	4e-65	99%	KR857723.1
BiFC expression vector kanII-StriRV, complete sequence	257	450	100%	4e-65	99%	KR857722.1
BiFC expression vector kanII-pSmRYCE(R), complete sequence	257	450	100%	4e-65	99%	KR857721.1
BiFC expression vector kanII-pSmRYCE, complete sequence	257	450	100%	4e-65	99%	KR857720.1
BiFC expression vector hygII-pSmRYNE(R), complete sequence	257	450	100%	4e-65	99%	KR857719.1
BiFC expression vector hygII-pSmRYNE, complete sequence	257	450	100%	4e-65	99%	KR857718.1
BiFC expression vector kanII-triVR, complete sequence	257	450	100%	4e-65	99%	KR857717.1
BiFC expression vector kanII-triRV, complete sequence	257	450	100%	4e-65	99%	KR857716.1
BiFC expression vector kanII-mVYCE(R), complete sequence	257	450	100%	4e-65	99%	KR857715.1
BiFC expression vector kanII-mVYCE, complete sequence	257	450	100%	4e-65	99%	KR857714.1
BiFC expression vector hygII-VYNE(R), complete sequence	257	450	100%	4e-65	99%	KR857713.1
BiFC expression vector hygII-VYNE, complete sequence	257	450	100%	4e-65	99%	KR857712.1
BiFC expression vector kanII-mRYCE(R), complete sequence	257	450	100%	4e-65	99%	KR857711.1
BiFC expression vector kanII-mRYCE, complete sequence	257	450	100%	4e-65	99%	KR857710.1
BiFC expression vector hygII-mRYNE(R), complete sequence	257	450	100%	4e-65	99%	KR857709.1
BiFC expression vector hygII-mRYNE, complete sequence	257	450	100%	4e-65	99%	KR857708.1
Binary Vector pGZ12.0108, complete genome	257	257	100%	4e-65	99%	KF963132.1

Two top sequence alignments:

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Plant binary vector pLC41 DNA, complete sequence
Sequence ID: LC215698.1 Length: 10684 Number of Matches: 1

Range 1: 10535 to 10676 GenBank Graphics ▼ Next Match ▲ Previous Match

Score	Expect	Identities	Gaps	Strand
257 bits(139)	4e-65	141/142(99%)	0/142(0%)	Plus/Plus

```
Query  1      CACTGATAGTTTAAACTGAAGGCGGGAAACGACAACCTGATCATGAGCGGAGAATTAAGG  60
              |||||||||||||||||||||||||||||||||||| |||||||||||||||||||||||
Sbjct  10535  CACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCATGAGCGGAGAATTAAGG  10594

Query  61     GAGTCACGTTATGACCCCCGCCGATGACGCGGGACAAGCCGTTTTACGTTTGGAACTGAC  120
              ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
Sbjct  10595  GAGTCACGTTATGACCCCCGCCGATGACGCGGGACAAGCCGTTTTACGTTTGGAACTGAC  10654

Query  121    AGAACCGCAACGTTGAAGGAGC  142
              ||||||||||||||||||||||
Sbjct  10655  AGAACCGCAACGTTGAAGGAGC  10676
```

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Plasmid Ti Ti plasmid (from A.tumefaciens, nopaline strain T37), T-DNA 5' (left) border
Sequence ID: AH003392.2 Length: 797 Number of Matches: 1

Range 1: 532 to 673 GenBank Graphics ▼ Next Match ▲ Previous Match

Score	Expect	Identities	Gaps	Strand
257 bits(139)	4e-65	141/142(99%)	0/142(0%)	Plus/Minus

```
Query  1    CACTGATAGTTTAAACTGAAGGCGGGAAACGACAACCTGATCATGAGCGGAGAATTAAGG  60
            |||||||||||||||||||||||||||||||||||| |||||||||||||||||||||||
Sbjct  673  CACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCATGAGCGGAGAATTAAGG  614

Query  61   GAGTCACGTTATGACCCCCGCCGATGACGCGGGACAAGCCGTTTTACGTTTGGAACTGAC  120
            ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
Sbjct  613  GAGTCACGTTATGACCCCCGCCGATGACGCGGGACAAGCCGTTTTACGTTTGGAACTGAC  554

Query  121  AGAACCGCAACGTTGAAGGAGC  142
            ||||||||||||||||||||||
Sbjct  553  AGAACCGCAACGTTGAAGGAGC  532
```

- The firm states in Table 1 that the promoter derived from the (b) (4) gene was 2,071 bp, whereas the sequence provided under NCBI accession number (b) (4) is 2,081 bp. It appears that the 10 bp immediately upstream of he start codon were not included in the promoter sequence that was used in this construct.

  Agrivida response:
  The original (b) (4) gene promoter was isolated by (b) (4) The 123 bp at the 3' end of the (b) (4) promoter that was used in plasmid (b) (4) is identical to the 3' end of the promoter as reported by (b) (4)) as well as the NCBI sequence of the (b) (4) gene promoter (GenBank Accession (b) (4). This promoter sequence is located immediately upstream of the first ATG codon in the (b) (4) protein coding sequence and appears to contain the original 10 bp positioned just before the start codon. Therefore, changes in (b) (4) promoter function are not expected with the 3' end of the promoter used in (b) (4). Furthermore, the longer version of the (b) (4) gene promoter enhances gene expression possibly through more favorab n structure formation for maximizing gene expression levels (Zheng and Murai, 1997). GenBank Accession (b) (4) cited

in the question corresponds to the entire (b) (4) chromosome (b) (4) sequence, where the length of the (b) (4) promoter is not specified in the annotation section. However, the (b) (4) gene promoter sequence that was used in (b) (4) aligns with 99% sequence identity to the sequence with the nucleotides coordinates 13501440-13499370 on (b) (4) chromosom (b) (4) This sequence is positioned immediately upstream of the (b) (4) coding region (nucleotides 13497595-13499369) on the minus DNA strand o (b) (4) chromosome (b) (4) It does not appear that there are any noticeable 10 bp gaps in the entire length of the aligned sequences (see below). A couple individual nucleotide discrepancies in the middle part of the alignment can be attributed to the natural sequence variation between different (b) (4) germplasm accessions that were used for the isolation of the promoter and shotgun sequencing of (b) (4) chromosome (b) (4)

NCBI BLASTN result using the 2071 bp (b) (4) promoter from (b) (4) as a

(b) (4)

(b) (4)

[redacted] (b) (4)

Annotation of the [redacted] (b) (4) sequence on the [redacted] (b) (4) in GenBank Accession [redacted] (b) (4)

[redacted] (b) (4)

- The firm states in Table 1 that the promoter derived from [redacted] (b) (4) gene is 3,004 bp, whereas the corresponding sequence found in locus 3293 is 2,966 bp.

<u>Agrivida response</u>:
The entirely sequenced locus 3293 is composed of 18,621 bp contiguous sequence that includes one intact T-DNA and maize genomic DNA flanking regions. The (b) (4) gene promoter within this sequence has coordinates 8762-11765, which equals to the promoter length of 3004 bp.

- The firm states in Table 1 that the left border region is 25 bp. However, the left border sequence in locus 3293 is 83 bp. This conclusion is based on 100% identity (83 out of 83 bp) between the left border region of cloning vector pPLEX-4004 (AY1590934.1) and the corresponding sequence in locus 3293.

<u>Agrivida response</u>:
In Table 1 the 25 bp sequences of the RB and LB regions refer to repeat sequences that flank T-DNAs in plant transformation vectors and are required for T-DNA transfer into plant genomes as these sequences are specifically recognized by *A. tumefaciens* VirD1 and VirD2 proteins that initiate the transfer process (Lee and Gelvin, 2008). The entire left border region on T-DNA of the locus 3293 contains 91 bp sequence between the (b) (4) terminator and the first 5' nucleotide of the maize genomic flanking DNA. 91 bp sequence includes 2 bp of spacer between the (b) (4) terminator and the *Sac*I (<u>GAGCTC</u>) restriction enzyme cloning site, followed by 83 bp of sequence representing the entire LB region. The 83 bp sequence has 100% sequence identity to the left border regions of multiple plant transformation vectors including pPLEX-4004 (AY1590934.1) according to the BLASTN results at NCBI nucleotide database (see below).

```
>LB region in locus 3293
gcgagctcgaattaattcagtacattaaaaacgtccgcaatgtgttattaagttgtctaagcgtcaatttgtttacaccacaatatatc
ct

Cloning vector pPLEX-4004, complete sequence
Sequence ID: AY159034.1Length: 12880Number of Matches: 1
Related Information
Range 1: 11109 to 11191GenBankGraphics Next Match Previous Match
        Alignment statistics for match #1
   Score     Expect Identities    Gaps     Strand
154 bits(83) 3e-34  83/83(100%) 0/83(0%) Plus/Minus
Query  9      GAATTAATTCAGTACATTAAAAACGTCCGCAATGTGTTATTAAGTTGTCTAAGCGTCAAT  68
              ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
Sbjct  11191  GAATTAATTCAGTACATTAAAAACGTCCGCAATGTGTTATTAAGTTGTCTAAGCGTCAAT  11132

Query  69     TTGTTTACACCACAATATATCCT  91
              |||||||||||||||||||||||
Sbjct  11131  TTGTTTACACCACAATATATCCT  11109
```

<u>References</u>
Lee LY, Gelvin SB (2008). T-DNA Binary Vectors and Systems. Plant Physiology **146**:325–332.

3. Intended use/enzyme functionality

Issue/question from CVM:
In three out of four provided studies, the enzyme analytical recovery from experimental diets (the diets fed to animals) were not provided. The firm should provide this information to substantiate that the analyzed levels of phytase enzyme from the notified stubstance in the experimental diets were in reasonable agreement with target inclusion levels.

Agrivida response:
Colorado Quality Research (CQR) conducted all four of the animal feeding trials reported in the Phy02 phytase GRAS document. CQR collected representative samples of all prepared feeds in all studies before and after pelleting and these were sent to Agrivida. Agrivida determined the phytase activity in these samples and this information was provided to CQR who wrote the final study reports for each trial. CQR included the phytase recovery data for feeds in the trial report from study AGV-15-4 (Study 3) but they did not include this data in the other three study reports. However, all data on phytase recovery before and after pelleting for all feeds in all four studies is presented in Appendix 6 of the GRAS notice. Reference to this data is also stated on page 40 of the GRAS notice (§5.0, paragraph 2).

4. Target animal safety

- CVM stated that the provided studies are not published and the information to support target animal safety cannot be confidential business information.

  Agrivida response:
  Agrivida has agreed that data and information related to the animal functionality studies is not confidential with the exception of information related to the amount of Phy02 phytase activity present in the Phy02 phytase product. Agrivida will submit to CVM a new version of the document that supports the GRAS affirmation by Agrivida in which this information is not indicated as being confidential business information.

- CVM suggested the firm provide justification for applying published information on target animal safety of the Nov9X phytase to the notified Phy02 phytase.

  Agrivida response:
  The primary arguments that support the safety of the Phy02 phytase are that this enzyme is a phytase, a well-known class of enzyme with a long history of safe use in poultry and that the production host is *Zea mays* that has been consumed safely by animals and humans over many millennia. In short, a well-known, safe enzyme produced by a well-known, safe production host equals a safe product. The fact that the Nov9X phytase of the commercial product Quantum is nearly identical to the Phy02 phytase is further support for the affirmation of safety for the Phy02 phytase. In §2.2 of the Phy02 GRAS document the Phy02 and Nov9X phytases are compared. Here it is stated that they are both derived from the AppA phytase of *E. coli* strain K-

12, they are both classified as 6-phytases based on their activities, and a comparison of their amino acid sequences demonstrates 97% amino acid identity between these two phytases. Based on these criteria it is concluded that the Phy02 and Nov9X phytases are nearly identical and that therefore, the safety studies for the later add further support for the safety assessment of the former. Safety studies for the Nov9X phytase were included in a submission to CVM in 2004 and a summary of these was included in a published opinion on the safety of the Nov9X phytase by the European Food Safety Authority (EFSA, 2008).

References

EFSA (2008). Scientific Opinion of the Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) on a request from the European Commission on the safety and efficacy of the product Quantum™ Phytase 5000 L and Quantum™ Phytase 2500 D (6-phytase) as a feed additive for chickens for fattening, laying hens, turkeys for fattening, ducks for fattening and piglets (weaned). *The EFSA Journal* **627**:1-27.

- CVM also recommended that the firm elaborate on the statement that since the Phy02 phytase is an enzyme and enzymes are proteins that are expected to be digested in the gastrointestinal tract, therefore no target animal safety concerns are expected.

Agrivida response:

All enzymes are proteins (Bugg, 2012) and proteins that are ingested in the diet are digested by proteases such as pepsin in the stomach and trypsin, chymotrypsin and others in the small intestine, into their constituent amino acids or small peptides (Berg et al., 2002) that are absorbed into the blood through the walls of the small intestine. As part of an evaluation of food safety of the Phy02 phytase, Phy02 phytase protein was subjected to digestion by pepsin in an aqueous buffer at a pH of 2.0 in a simulation of the gastric environment. In this study the Phy02 phytase was rapidly digested, thereby confirming that in the gastric environment it would be readily digested. The details of this study are contained in a report on the evaluation of food safety of the Phy02 phytase that was submitted and evaluated by FDA/CFSAN. This report can be accessed in its entirety at an FDA/CFSAN webpage at: https://www.fda.gov/downloads/Food/IngredientsPackagingLabeling/GEPlants/Submissions/UCM462259.pdf

These results indicate that, as expected for other enzymes, upon consumption the Phy02 phytase is ultimately digested into amino acids and small peptides. Therefore, since its biological activity (phytase) is known to be safe and since the Phy02 phytase is ultimately digested in the gastrointestinal tract, it is unlikely to present any safety issues when consumed as part of the diet. The conclusion of the animal safety of the Phy02 phytase is based on many different factors, of which this is factor is one.

References

Berg JM, Tymoczko JL, Stryer L. Biochemistry. 5th edition. New York: W H Freeman; 2002. Section 23.1, Proteins Are Degraded to Amino Acids.

Bugg, T. D. H. (2012) All Enzymes Are Proteins, in Introduction to Enzyme and Coenzyme Chemistry, Third Edition, John Wiley & Sons, Ltd, Chichester, UK. doi: 10.1002/9781118348970.ch2

5. General recognition requirement

Issue/question from CVM:
CVM pointed out that most of the information used in the notice to support the utility/enzyme functionality and safety are not published. Almost all of the enzyme functionality data and data that relate to target animal safety are marked as confidential business information (CBI) in the CBI version of the notice.

Agrivida response:
As stated in point 4 above, Agrivida has decided that it will not claim the information in the animal feeding studies as CBI.