M64 Evaluation of the inclusion of a thermostable xylanase in broiler diets. Jake Pieniazek<sup>sc</sup>, Mallori Williams<sup>1</sup>, Joseph Klein, Jason Lee<sup>1</sup>, Cody Flores<sup>sc</sup>, Mallori Williams<sup>1</sup>, Jake Pieniazek<sup>sc</sup>, Patrick Biggs<sup>2</sup>, Jason Lee<sup>1</sup>,<sup>1</sup>Poultry Science Department, Texas A&M Research, Texas A&M System, College Station, TX; <sup>2</sup>BioResource International, Inc, Durham, NC

The objective of the current study was to evaluate xylanase inclusion on male broiler growth performance and ileal digestible energy (IDE). The experimental design consisted of three dietary treatments including a low energy control containing 2940 kcal/kg, 2990 kcal/kg, and 3035 kcal/kg AME in the starter, grower, and finisher diets, respectively. The additional two treatments included the control supplemented with xylanase at 0.01% (X1) or 0.02% (X2). Each treatment consisted of twelve replicate pens with 35 male broilers placed per replicate for a 42 d grow-out. The diets were fed as a crumble during the starter phase and a pellet during the grower and finisher phases, and were pelleted at a temperature of 85°C. Xylanase was added to the feed prior to pelleting. The dietary program consisted of three dietary phases including the starter from 1 to 14 d, grower from 15 to 28 d, and finisher from 29 to 42 d. Body weights and feed consumption were determined at 14, 28, and 42 d. Ileal contents were collected from 5, 4, and 3 birds at 14, 28, and 42 d, respectively, and pooled on a per pen basis. Titanium dioxide was used as an indigestible marker for the determination of ileal digestibility of energy. No significant differences were observed on body weight with the inclusion of xylanase when compared to the control throughout the experiment. At 28 d, the inclusion of xylanase X1 increased (p<0.01) FCR compared to the control diet (1.424 vs 1.545). FCR was also improved (p<0.01) at 42 d for birds fed X1 when compared to the control (1.689 vs 1.733). At 28 d, IDE was increased (p=0.05) 88 kcal/kg when birds were fed X1 when compared to birds fed the control diet. At 42 d, IDE was increased (p<0.05) from 2,930 kcal/kg in the control diet to 3,104 and 3,110 kcal/kg in the birds fed the X1 and X2 diets, respectively. At 42 d, IDE digestibility coefficient was increased (p<0.05) at both inclusion rates (X1 and X2) when compared to the control (0.702 and 0.703 vs 0.663, respectively). In conclusion, increases in IDE with xylanase supplementation at 28 and 42 d were observed to improve FCR.

Key Words: Xylanase, Broiler, Performance, Digestible Energy

M65 Effects of dietary amino acid density, additional fat and xylanase levels in diets on energy and protein utilization by broilers. Manuel Joao Da Costa<sup>sc</sup>, Edgar O. Oviedo-Rondón<sup>1</sup>, Carlos Bôa-Viagem Rabello<sup>2</sup>, Juan Carlos Rios Alva<sup>3</sup>, Wedson Nogueira<sup>1</sup>, Jose Guilherme Barbosa<sup>4</sup>, Craig Wyatt<sup>5</sup>, Prestige Department of Poultry Science, North Carolina State University, Raleigh, NC; <sup>1</sup>Universidade Federal Rural de Pernambuco, Recife, Pernambuco, Brazil; <sup>2</sup>Universidade Estadual Paulista, FVMZ, Jaboticabal, SP, Brazil; <sup>3</sup>Universidade Federal de Santa Maria, Santa Maria, RS, Brazil; <sup>4</sup>AB VISTA, Plantation, FL

Dietary amino acid density (AA), fat content and xylanase levels (X) may affect nutrient utilization. A study was conducted to evaluate the effects of AA, additional energy from fat post-pellet (FL) and xylanase levels in corn-soybean diets with DDGS on broiler nutrient digestibility and energy utilization. A total of 2,112 d-old male Ross 708 broilers were placed in 96 pens. The 16 treatments consisted of diets formulated with 2 AA densities (High and Low, 10% difference), 2 FL (basal and additional fat to increase ME by 100 kcal/kg) and 4 levels of X (0, 8000, 16000 and 32000 BXU/kg). Starter, grower and finisher diets were fed from 1 to 16, 17 to 35 and 36 to 49 d of age, respectively. Fresh feces were collected at 15 and 16 d and at 42 and 43 d. Celite was used as an inert marker. The AMEn, metabolizability coefficient (MC) of gross energy, and protein digestibility (PD) were obtained. Data were analyzed as a CRBD with a 2×2×4 factorial arrangement of treatments. In the starter phase, three way interactions (P<0.001) were detected on all parameters. Broilers fed Low AA, additional FL and 32000 BXU/kg had the best AMEn and MC. The worst AMEn and MC was observed in broilers fed Low AA, additional FL and 16000 BXU/kg. Overall, X improved AMEn, the effects being maximized when 32000 BXU/kg were supplemented in additional FL diets. Furthermore, Low AA, addition of 16000 BXU/kg, without additional FL, supported the best PD and the second best AMEn. Results indicated that Low AA diets had higher PD than High AA. In the finisher phase, an interaction effect between FL and X was detected (P<0.001) on AMEn. Quadratic effects (P<0.001) of X were verified on AMEn and PD. Broilers fed 8000 BXU/kg had improved AMEn. Diets containing 16000 BXU/kg improved PD. On diets without extra FL, 8000 BXU/kg increased AMEn to values similar to those observed in diets with extra FL. In conclusion, X inclusion improved energy and protein utilization in High and Low AA diets. Adding fat may improve X efficiency, especially in High AA starter diets, but it did not enhance X efficiency in the finisher phase.

Key Words: amino acids, broiler, energy, fat, xylanase

M66 Effects of diet type and nutrient density from day 8 to 21 on bone morphology, breaking strength, and mineral density in male broilers. Xi Wang<sup>sc</sup>, E. David Peebles, Mark Bricka, Wei Zhai Mississippi State University, Mississippi State, MS

The effects of diet type, and amino acid (AA) and apparent metabolizable energy (AME) densities on the tibia of 1,120 male Ross × Ross 708 broiler chicks were studied. A completely randomized block design with 2×2×2 factorial arrangement of treatments was applied (10 blocks, 8

Key Words: amino acids, broiler, energy, fat, xylanase
treatments/block, 14 chicks/pen). Diets fed from d 8 to 21 were formulated to contain two diet types [high inclusion of distiller’s dried grains with solubles diet (hDDGS) or high inclusion of meat and bone meal diet (hMBM)], two AA densities (moderate or high) and two AME densities (moderate or high). Lengths, weights and egg weights of birds from 2 chicks/pen on d 21 were measured. Left tibias were tested for breaking strength, ash content, and mineral contents. Chicks fed a high AA diet exhibited longer tibia than did chicks fed a moderate AA diet (6.97 and 6.85 cm, respectively, P = 0.046). Also chicks fed hDDGS diets with a high AME density exhibited larger tibia perimeters compared to those fed hMBM diets with a moderate AME density (2.49 and 2.46 cm, respectively, P = 0.016). Dietary treatments did not affect breaking strength, ash content, or concentrations of calcium, phosphorus, potassium, zinc, manganese, and magnesium in tibia. However, tibia weights, calcium and phosphorus contents relative to BW were decreased in chicks fed higher AME diets (P = 0.012, 0.024, and 0.014, respectively). When birds were fed high AA diets, hMBM improved bone breaking strength relative to BW as compared to the hDDGS diets (22.39 and 19.73 kgf/kg, respectively, P = 0.039). In conclusion, high AA density diets, especially those with a high inclusion of MBM, may stimulate tibia growth. Furthermore, a high AME diet density may have facilitated muscle deposition more than bone growth.

Key Words: amino acid, breaking strength, metabolizable energy, mineral density, tibia

M67 Forty-two day evaluation of a microbial phytase in phosphorus deficient broiler diets via live broiler performance and tibia bone ash.

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The objective of the experiment was to evaluate the impact of two levels of a next generation microbial phytase (CIBENZA® PHYTAVERSE™) inclusion in phosphorus (P) deficient broiler diets (corn-SBM based) on growth performance and tibia ash. The experimental design consisted of 4 dietary treatments including a positive control (PC) consisting of 0.45%, 0.41%, and 0.38% available P (aP) for the starter (d 1-14), grower (d 15-28), and finisher diets (d 29-42), and a negative control (NC) consisting of a reduction of 0.17% aP, and the inclusion of microbial phytase in the P deficient diet at two different inclusion rates (500 and 2,000 units (U)/kg diet). Each treatment included 11 replicate pens with 40 male broilers per replicate. On d 42, tibia ash was determined on 6 broilers per replicate pen. The reduction in aP lowered (p<0.05) broiler performance throughout the entire experiment. During the starter phase, phytase inclusion at 500 U/kg improved FCR to levels comparable to the PC (P>0.05), with 2,000 U/kg resulting in a further improvement compared to the PC (P<0.05). Phytase inclusion significantly improved FCR during the grower phase with the 2,000 U/kg yielding similar results to the PC (P>0.05). Phytase inclusion improved 42d cumulative FCR to levels comparable to the PC (P>0.05). During the starter and grower phases, phytase inclusion increased BW (p<0.05) compared to the NC with the 2,000 U/kg inclusion resulting in a further increase compared to the PC (P<0.05). On d 42, phytase inclusion increased BW compared to the NC with 2,000 U/kg diet yielding similar results to the PC (P>0.05). During the starter phase, 500 U/kg inclusion increased feed consumption (FC) to levels that were comparable (P>0.05) to the PC with the 2,000 U/kg diet inclusion resulting in a further increase compared to the PC (P>0.05). Bone ash was negatively influenced with the reduction of aP in the NC group as compared to the PC. The inclusion of phytase at both 500 and 2000 U/kg increased % bone ash to levels that were comparable to the PC (P>0.05). These data confirm that the next generation microbial phytase improves growth performance and tibia ash in P deficient broiler diets.

Key Words: Phosphorus, Broiler, Phytase, Performance

M68 Twenty-one day evaluation of microbial phytase inclusion in phosphorus deficient broiler diets via live broiler performance and tibia bone ash.

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An experiment was conducted to investigate increasing concentrations of a next generation microbial phytase (CIBENZA® PHYTAVERSE™) on broiler growth performance and tibia bone ash when fed corn-SBM based diets deficient in available phosphorus (aP). The experimental design included 6 dietary treatments, including a negative control (NC) with an aP level of 0.23% (starter) and 0.19% aP (grower), two positive control diets with the addition of 0.12% aP (PC1) and 0.22% aP (PC2), and the NC supplemented with 3 increasing levels of phytase (250, 500, and 2000 units (U)/kg diet). The dietary program included a starter (d 1-14) and grower ration (d 14-21), with Ca levels of 0.93% and 0.84, respectively, and pelleted at 85°C. Each treatment included 12 replicate pens of 8 male broilers per replicate. Broilers were weighed and feed consumption (FC) determined weekly to evaluate body weight (BW) and feed conversion ratio (FCR). On d 21, right tibias were collected from all birds for the determination of tibia ash. As dietary aP decreased in the control diets a reduction (p<0.05) in BW was observed throughout the trial. On d 7, phytase inclusion increased (p<0.05) BW compared to the NC and PC1 to levels that were comparable to the PC2. Phytase inclusion increased (p<0.05) BW throughout the trial, with phytase inclusion at 2000 U/kg yielding similar results to the PC2 diet. As dietary aP decreased a linear (p<0.05) increase in FCR was observed throughout the trial. Phytase inclusion improved (p<0.05) FCR throughout the trial compared to the NC to levels that were similar to the PC2 diet. Similar trends were observed in FC, with phytase inclusion increasing (p<0.05) FC compared to the NC, with the inclusion at 2000 U/kg yielding similar results (P>0.05) results as the PC2 diet throughout the trial. A decrease (p<0.05) in bone ash percentage was observed between the PC1 and NC compared to PC2, with phytase inclusion at 2000 U/kg yielding similar results to the PC2 (P>0.05). Linear regression analysis indicated average P equivalency values for BW and bone ash of 0.137%, 0.147%, and 0.226% for phytase inclusion of 250, 500, and 2000 U/kg, respectively. These data confirm the ability of the next generation phytase to improve growth performance and tibia bone ash in broilers fed aP deficient diets.

Key Words: Phosphorus, Phytase, Broiler, Bone Ash, Performance

M69 Effect of β-mannanase supplementation on performance and egg quality in laying hens fed a low protein and energy diet

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A study was conducted to investigate the effects of β-mannanase on laying performance and egg quality traits of layers fed corn and soybean meal (SBM) based diets with two levels of protein and energy content. A total of 160 Lohmann White laying hens (5 birds/pen) at 51 wk of age having similar body weight were randomly assigned to four dietary treatments with 8 replicate pens per treatment. The four dietary treatments consisted of a Corn/SBM based diet with 18.5 % CP and 2850 kcal/kg ME (CS), CS with 0.04% β-mannanase (CS-E), Corn/SBM based diet with 17% CP and 2750 kcal/kg ME (CSL) and CSL with 0.04% β-mannanase (CSL-E), arranged in a 2 × 2 factorial. The hens were fed the CS diets for an adjustment period of 7 days before the start of the experiment, which was conducted for 12 wk. Egg production was recorded daily, feed intake, egg weight, specific gravity, shell thickness, cell breakage strength and Haugh Units were measured weekly. Birds fed CSL and CSL-E diets had higher (p<0.05) feed intake compared to birds fed CS and CS-E diets until wk 8. However after wk 8 there was decrease (p<
0.05) reduction in feed intake of birds receiving CSL-E diet compared to CSL diet, indicating that β-mannanase supplementation in low protein and energy diets may increase the efficiency of protein and energy utilization in laying hens. However, there was no interaction of enzyme and feed at any stage of the study. There was no enzyme effect on egg production and egg to feed ratio between treatments. Birds receiving CSL and CSL-E diets had lower (p < 0.05) egg shell thickness compared to birds receiving CS and CS-E; however, there was no enzyme effect at both nutrient levels. No significance differences were observed between treatments for specific gravity, shell breakage strength, and albumin height of eggs. β-mannanase supplementation in low protein and energy diets may improve nutrient utilization in laying hens, however, it may not have significant effects on egg production and egg quality parameters of laying hens.

Key Words: β-mannanase, laying hens, nutrient utilization, egg quality

M70 Effect of β-mannanase on growth performance, ileal digestible energy, and intestinal viscosity of male broilers fed a reduced energy diet Rocky Latham1,2, Mallorri Williams1, Kyle Smith1, Kendre Stringfellow2, Roy Brister2, Sergio Clemente2, Jason Lee2 'Texas A&M University, College Station, TX; ’Novus International, Inc., St. Charles, MO; ’Tyson Foods, Springdale, AR

An experiment was conducted to investigate the effect of β-mannanase (Cibenza® DE200) on male broiler growth performance, energy digestibility, and intestinal viscosity in reduced energy diets. A randomized complete block designed study included three treatment groups with 15 replicates of 40 male broilers per replicate for a 49 day experiment for a total placement of 1,800 broilers. The three dietary treatments included a positive control (PC) diet, a negative control (NC) diet (-97 kcal/kg in AME), and NC + β-mannanase (400,000 U/kg). Broilers were fed a starter (0.45 kg/bird), finisher (1.80 kg/bird), and withdrawal (remainder of growout). Growth performance was monitored on a weekly basis and ileal contents collected on day 17 and 37 days of age to determine ileal digestible energy and intestinal viscosity. Titanium dioxide was used as an indigestible marker for the determination of ileal digestible energy. Ileal contents were centrifuged and the supernatant collected for viscosity determination using a Brookfield Cone and Plate Viscometer. The PC treatment maintained significantly higher average body weight when as compared to the NC diet through 42 d of age indicating that the reduction in energy was sufficient to reduce body weight. The inclusion of β-mannanase achieved similar performance to the PC through d 42. Reduction in dietary AME increased cumulative mortality corrected FCR in the NC diet as compared to the PC throughout the experiment. Inclusion of β-mannanase significantly improved FCR as compared to the NC diet throughout the experiment. No differences were observed in intestinal viscosity. Improved FCR could be attributed to a 55 kcal/kg observed increase in digestible energy as compared to the NC diet at 17 days of age. The inclusion of β-mannanase improves body weight and FCR of broilers when fed reduced energy diets.

Key Words: Broiler Performance, Ileal Digestible Energy, DDGS

M71(1) Effects of a mannose rich fraction on fat pad and energy digestibility of first-cycle laying hens fed various concentrations of dietary energy Alysha Gareis-sc, Michael Persia, Paulo Rigolim 1 ‘Iowa State University, Ames, IA; 2 ‘Alltech, Inc., Nicholasville, KY

Energy has become an important aspect of poultry production as corn and feed oil have become linked to fuel markets. The objective of this experiment was to evaluate Actigen®, mannose rich fractions from the cell wall of a specific strain of yeast (MRF), on AMEn and body composition when supplemented to laying hen diets containing various dietary energy concentrations. The experiment was a 2 x 2 factorial, including diets supplemented with and without the MRF and two concentrations of dietary energy (2,850 kcal/kg or 2,750 kcal/kg). Each experimental unit (EU) consisted of one hen per cage (204 sq in/bird) for a total of 12 EU for the 4 dietary treatments. Abdominal fat pad (AFP) weight is a cumulative measure so this experiment was set up for 8 wk to understand if a shorter term feeding experiment could be used when considering body composition. Egg production, egg weight, egg mass, and mortality were recorded daily while feed intake was determined weekly. Body weights were obtained at the beginning and conclusion of the experiment, and hens were euthanized for dual-energy x-ray absorptiometry (DXA) and AFP weight measurements. Data were analyzed using ANOVA with a 2x2 factorial arrangement. Student’s T test was used to separate means if significance was detected. Factorial analysis resulted in a significant main effect of energy, but not MRF on the total g % of fat mass in the hens as determined by DXA analysis. The same main effect of energy was observed for fat pad weight, but only as a trend (P= 0.12). Both MRF and energy resulted in main effects as high dietary energy and MRF both resulted in a significant increase in AMEn. Overall, the MRF treatment increased AMEn but the increased dietary energy did not appear to be stored as increased fat content of the hen.

Key Words: body composition, dietary energy, laying hen, mannose rich fraction

Environment Management II

M71(2) House Environmental Impact of Wood Pellet Burning Stoves J.B. Hess1, K.S. Macklin, J.P. Blake Poultry Science Department, Auburn University, Auburn, AL

Broiler house environment is a crucial factor in bird health, productivity and ultimately in the profitability of growers and poultry integrators alike. Wood pellet burning furnaces (Lee Energy Solutions, Crossville, AL) were tested in paired broiler houses on four broiler farms during fall and winter growouts for two years to determine influences on house ammonia, moisture control and temperature. On each farm, a house using wood burning furnace technology was paired with another house on the farm using conventional propane heat. Prior to bird placement for each farm and each growout, two temperature/humidity probes (Omega Engineering, Stamford, CT) were placed in each test house in the brood chamber to collect daily temperature and humidity information (4 times daily for the entire growout). At 14 days of age, a farm visit was made to collect litter and air ammonia measurements, litter temperature and samples for litter moisture determination. Ammonia measurements were obtained using a closed container of specified dimension (53.34 x 39.37 x 12.7 cm) inverted over the litter bed and determined using a Drager CMS Analyzer equipped with a remote air sampling pump attached to a 30 cm sampling hose located in the top center of the inverted container. Litter ammonia levels (measured as the ammonia leaves the litter) were meaningfully reduced 80% of the time in houses burning wood pellets, with an average reduction of 15 ppm. Brooding humidity levels, important in the maintenance of air quality and crucial in the control of litter moisture, were reduced 75% of the time with wood pellet use. Reductions averaged 8%, with 15% humidity reductions not uncommon during the most difficult portion of the winter season. Brooding temperatures were marginally increased 50% of the time by the pellet burning furnaces despite tight temperature control through house controllers.

Key Words: Broiler, Ammonia, Humidity, Temperature, Wood Pellet Burning Stove