

**Tuesday, January 24**  
**Nutrition III**  
**Room: B313**

**S-T105 Performance characteristics of broiler-chicken fed different energy rations with or without honey water.** A.M Raji\* and F.O Ajasin, *Federal College of Animal Health and Production Technology, Ibadan, Nigeria.*

Feed accounts for about 85% of the cost of production of poultry in Nigeria. Energy and protein sources are the most expensive among conventional ingredient as a result; the use of low cost agro-industrial waste or crop residue in producing poultry feed is necessitated. Honey water is a by-product of honey obtained from the trace of honey remaining in honeycomb after the extraction of honey produced by bees. Bee keeping is now becoming popular as a source of income and boosting crop production due to the high pollinating ability of bees. Three experimental diets A (high energy diet), B (low energy diet) and C (normal energy diet) were used for the experiment. Diet A and B were formulated while, diet C was a commercial feed and served as the control diet. Birds on diets A1 and B1 were given honey water while those on diets A2, B2, and C were served with water only. Feed and water were supplied ad libitum. A total of one thousand (1000) ANAK broiler birds were used for the investigation. Generally, broilers on high energy diets consumed more feed than those on low energy diet. Honey water supplementation depressed weight gain in high energy diet but enhanced weight gain in low energy diet. This could possibly be due to the fact that the honey-water contains a number of enzymes and other substances needed in breaking down the unavailable polysaccharide for the use of the broiler as additional energy. It was also observed that the diets supplemented with honey-water had the metabolizable energy content increased by about 10%. The extra energy may have come from the breakdown of non-starch polysaccharide.

Low energy diet supplemented with honey water had the best feed conversion ratio because it consumed less feed to gain a kilogram of weight compared to other diets.

**Key Words:** broiler chicken, high energy ration, low energy ration

**S-T106 Reduction of the effects of the Ochratoxin A in broilers chickens, with the incorporation of an adsorbent of mycotoxins.** J.A. Fierro-Huesca\*, J.C. Medina-Bravo, and C. Carrera-Hernandez, *NUTEK S.A. de C.V., Tehuacan, Puebla, Mexico.*

We studied the efficacy of an organoaluminosilicate (ZEOTEK, ZTK) to alleviate the toxic effects of ochratoxin A (OA) in broilers from 1 to 49 days of age. A total of 60 broilers were distributed into four treatments with three replicates of 5 birds each: T1, control; T2, 0.2 % of ZTK; T3, 1200 ppb of OA; T4, 0.2 % of ZTK + 1200 ppb of OA. The parameters evaluated were feed intake, weight gain; feed conversion; relative weights of the liver, kidneys, spleen and bursa. A small fraction of these organs was taken and placed in formal solution, for the histological studies. Serum levels of uric acid, creatinine, cholesterol, g-glutamyltransferase (GGT), albumin, total protein and urea, were determined on a clinical chemistry analyzer (Reflotron). OA in the negatively affected diet, relative body weight. In addition, the relative weights of the kidney, the activity of the GGT and uric acid increased ( $p < 0.05$ ), in comparison with the birds of the other treatments. All the other parameters evalu-

ated only showed a numerical difference, but no significant differences. Histological findings observed in birds fed with OA contaminated diets were hypertrophy of renal proximal tubular epithelial cells, focus of infiltrated lymphocytes in the interstitial, accumulation of eosinophilic amorphous substances in the tubular lumina, with thickening of the glomerular basement membrane. The OA to the concentration of 1,200 ppb in the diet affected the performance of broilers. The organoaluminosilicate ZTK was capable to reduce the detrimental effects of this toxin. The addition of ZTK did not negatively affect neither parameters.

**Key Words:** broilers, organoaluminosilicate, ochratoxin A, mycotoxins, ZEOTEK

**S-T107 Laying hen strain differences in calcium and phosphorus needs.** S. Scheideler\*, M. Jalal, and T. Weber, *University of Nebraska, Lincoln.*

A laying hen trial was conducted with a 2 x 2 x 2 factorial arrangement of 2 levels dietary phosphorus (P), 2 levels dietary calcium (Ca) in 2 strains SCWL hens (Hyline W-36 and Hyline W-98). Dietary P and Ca levels changed as the hen aged: Pre-Lay (18-20 wks), Peak (21-40 wks), Peak+ (41-50 wks), Post-Peak (51-60 wks) and End of Lay (61-70 wks). Table 1 shows the levels of Ca and P given the 2 strains of hens during this trial. Each diet was fed to 8 replicate cages with 6 hens/cage. Results of this trial show that strain significantly affected feed intake (FI) and egg size with the W-98 consistently producing larger eggs. Dietary Ca and P had no effect on FI but Ca II did support greater egg wt during the trial. Dietary Ca had no effect on % egg production (EP), while the lower level of P increased EP during end of lay. A significant interaction effect of Ca and strain occurred during the end of lay such that the W-98 hens had greater EP on the high Ca diet. Egg specific gravity (ESG) was significantly improved with higher Ca intakes during the Peak+ and Post Peak periods (this effect was most pronounced in the W-98 strain). Lower P intake improved (ESG) during the Peak+ period (this effect was pronounced in the W-36 strain). In summary, the W-98 hens produced more eggs with better shell quality on the high Ca diets while the W-36 hens performed equally well on either Ca diet. Lower levels of P improved shell quality mostly in the W-36 strain. Strain differences do exist for Ca and P feeding programs. No negative interactions occurred between the levels of Ca and P fed during this trial.

**Table 1. Dietary Calcium and Phosphorus Treatments by Age**

| Treatment  | Pre-Lay | Peak     | Peak+    | Post-Peak | End of Lay |
|------------|---------|----------|----------|-----------|------------|
| Calcium I  | 3.25%   | 3.65 g/d | 3.75 g/d | 3.85 g/d  | 3.95 g/d   |
| Calcium II | 3.60%   | 4.10 g/d | 4.25 g/d | 4.40 g/d  | 4.55 g/d   |
| Phos. I    | 0.45%   | 420 mg/d | 380 mg/d | 340 mg/d  | 300 mg/d   |
| Phos. II   | 0.50%   | 500 mg/d | 450 mg/d | 400 mg/d  | 350 mg/d   |

**Key Words:** strain, calcium, phosphorus

**S-T108 Graded levels of an *E. coli* phytase expressed in yeast increase phosphorus bioavailability and retention in chicks.** N. Augspurger\* and D. Webel, *JBS United, Inc., Sheridan, Indiana.*

Two trials were done to determine the effect of increasing levels of an *E. coli* phytase expressed in yeast (OptiPhos™, JBS United, Inc.) on phosphorus bioavailability and retention in young chicks fed corn-soy-bean meal deficient diets. Each trial utilized male chicks (New Hampshire × Columbian) from d 8 to d 21 posthatch. Trial 1 used four pens of four chicks and Trial 2 used six pens of six chicks. Standard curves were constructed in each trial by supplementing graded levels of inorganic P (iP) from KH<sub>2</sub>PO<sub>4</sub> (Trial 1) or monocalcium phosphate (Trial 2) to a P-deficient basal diet containing 0.75% Ca. Trial 1 compared the effects of three graded levels of phytase (250, 500, 750 FTU/kg) on weight gain, bone ash, and P-releasing efficacy. Weight gain and bone ash (% and mg) responded linearly ( $P < 0.01$ ) to supplemental iP, while the responses to dietary phytase were quadratic ( $P < 0.01$ ). Estimates of P-releasing efficacy (%) were 0.10, 0.13, and 0.15% for 250, 500, and 750 FTU/kg phytase, respectively. Trial 2 investigated the effect of graded levels of phytase (250, 500, and 1,000 FTU/kg) on P bioavailability and retention. The basal diet was supplemented with 1.5% Celite as a source of acid-insoluble ash. All excreta was collected and pooled by pen between d 15 and d 18 on paper-lined trays below each pen to calculate P retention. Weight gain, gain/feed ratio, and bone ash responses increased linearly ( $P < 0.01$ ) with increasing supplemental iP. Growth performance was greater ( $P < 0.01$ ) in diets supplemented with 500 and 1,000 FTU/kg phytase compared to 250 FTU/kg, but bone ash increased ( $P < 0.01$ ) in response to phytase in a dose-dependent manner. Apparent P retention (%) increased ( $P < 0.01$ ) in a dose-dependent manner from 36.4% in the basal diet to 84.4% in the diet containing 1,000 FTU/kg phytase. Phosphorus excretion was reduced ( $P < 0.01$ ) 68% with the addition of 1,000 FTU/kg phytase. Phosphorus release estimates (%) were 0.12, 0.19, and 0.24% for 250, 500, and 1,000 FTU/kg, respectively, based on bone ash (mg), compared to 0.08, 0.13, and 0.19%, respectively, based on apparent P retention.

**Key Words:** chickens, phytase, *E. coli*, phosphorus, retention

**S-T109 The effects of Quantum phytase on egg production and shell traits in Hyline W36 hens.** M.S. Lilburn\*<sup>1</sup> and C. Wyatt<sup>2</sup>, <sup>1</sup>Ohio State University/OARDC, Wooster, <sup>2</sup>Syngenta Animal Nutrition, Research Triangle Park, North Carolina.

Hyline W36 pullets were fed corn-soy-midds diets containing step-down levels of available P (AvP) during the rearing and laying periods (Rearing: Pos Con 0.45, 0.35, 0.30; Neg Con 0.25, 0.20, 0.15; Layer: Pos Con 0.30, 0.15; Neg Con 0.15, 0.12). Three additional treatments were created by supplementing the Neg Con with one of three levels of Quantum™ phytase (200, 500, 1250 units/kg). Pullets were reared in accordance with the Hyline Management guide and had ad libitum access to feed and water. Hens were photostimulated at 18 wk and housed two per cage. There were four cages per feeder (block) and 17 blocks per diet. Each feeder was allocated 772 gm of feed per day (96 g per hen). Hen-day egg production (% HD) was calculated over ten, 28-day production periods and the data was analyzed within period by the GLM procedure of SAS. The main effects tested were diet, block (rep) and the interaction of diet by block. During Periods 7 and 10, eggs were collected on two consecutive days for egg weight and shell weight determination. There were no significant differences in %HD among treatments during the first 7 production periods. The mean %HD was > 90% for all

treatments from periods 2 thru 5 with a peak of > 94% in all treatments in period 3. There was no significant block or block by diet interaction within any period. During periods 9 and 10, dietary AvP was further reduced and this contributed to a significant % HD drop in the Neg Con compared with the mean of all other treatments (Period 9: Neg Con 68.7 vs 81.1 % HD; Period 10: Neg Con 55.1 vs 79.1 % HD). At the end of period 7, egg wt in the Neg Con (60.0 g) was significantly lower than the Pos Con (61.1 g) but was not significantly different than the 200 (60.5 g) or 500 (60.8 g) Quantum phytase treatments. There were no significant diet effects on shell wt. During Period 10, however, egg wt (58.2 g) and shell wt (4.94 g) were significantly lower in the Neg Con compared with all other diets and as little as 200 u Quantum phytase was sufficient to increase both egg wt (62.2 g) and shell wt (5.37 g) back to the level of the Pos Con (61.2 g; 5.27 g, respectively).

**Key Words:** layers, bacterial phytase, pPhosphorus

**S-T110 Effect on dietary TME and sialic acid excretion in young turkeys previously fed diets containing phytase.** V. Pirgozliev\*<sup>1</sup>, T. Acamovic<sup>1</sup>, and M.R. Bedford<sup>2</sup>, <sup>1</sup>Scottish Agricultural College, Edinburgh, Scotland, <sup>2</sup>Syngenta Animal Nutrition Inc., Wiltshire, England.

Dietary constituents interact with the epithelial tissue of the gastrointestinal tract (GIT) and with the microflora therein causing variation in the excretion of endogenous material which may influence the health and wellbeing of poultry. Enzyme supplementation may improve performance, microbial profiles and may reduce endogenous losses, improving the health of the GIT of poultry. A precision feeding experiment was conducted with young turkeys, which were previously fed diets containing phytase, to study the effects on dietary true metabolisable energy (TME), mineral metabolisability and endogenous losses. Sixty-four female BUT 9 turkeys, weighing approximately 2.5 kg and previously fed with four experimental diets (control (C) based on a maize/soy diet, C + 250 international units phytase (FTU), C + 500 FTU, C + 2500 FTU) were used. Thirty-two birds (8 from each of the enzyme treatments) were precision-fed a standard withdrawal diet while the remainder received glucose. Birds from each of the previous treatments were replicated eight times in a randomised block design. The TME was significantly higher ( $P < 0.05$ ) and sialic acid excretion was lower ( $P < 0.05$ ) for turkeys that had been previously fed the diet supplemented with 250 FTU. Interestingly, and in line with our hypothesis, there was a negative, linear relationship between sialic acid excreted ( $P = 0.001$ ;  $R^2 = 0.28$ ) and TME. The results of this study are in accord with previous research (Pirgozliev et al, 2005) and support the hypothesis that moderate phytase supplementation may improve gut health, reduce endogenous losses from the birds and improve nutrient utilisation by turkeys fed diets without supplemental enzymes.

**Key Words:** phytase, nutritional history, turkeys, TME

**S-T111 Phytic acid effect on endogenous A-amylase activity and starch degradation.** M. Faurischou Isaksen\*, *Danisco Innovations, Brabrand, Denmark.*

Previously conducted research has indicated that feeds with higher levels of phytic acid have a negative effect on animal and bird performance. A direct effect of phytic acid on starch degradation could be one of the

reasons potentially responsible for the performance reduction even in digestible P sufficient feeds. The importance of phytic acid, through its effect on calcium ( $\text{Ca}^{++}$ ), has been evaluated *in vitro* on starch degradation in the past.  $\text{Ca}^{++}$  is a co-factor for A-amylase and therefore essential for its activity. The majority of previous experiments have used milled cereal grains, where other components are present and can interfere with the interactions between phytic acid, starch,  $\text{Ca}^{++}$  and A-amylase. This makes the results and chemical processes involved difficult to interpret. Research was conducted with purified components in an attempt to establish more clearly the interactions between phytic acid,  $\text{Ca}^{++}$  and A-amylase. In addition, the effects of  $\text{Ca}^{++}$  and phytase (Phyzyme<sup>®</sup>XP) on starch degradation were investigated. Pure maize or wheat starch was incubated with pancreatic A-amylase under increasing concentrations of phytic acid. Both the activity of A-amylase and the degradation of starch were almost halved at the highest tested concentration of phytic acid (16mM phytic acid) compared to a control with no added phytic acid. To explore further interactions between phytic acid and  $\text{Ca}^{++}$  and/or phytase, additional experiments were conducted with a constant concentration of phytic acid and increasing concentrations of  $\text{Ca}^{++}$ . In contrast to several published studies, it was found that the negative effect of phytic acid on starch degradation was counteracted by the addition of  $\text{Ca}^{++}$ . Furthermore, the negative effect of phytic acid on starch degradation was reduced with the addition of phytase.

The results of this research indicate that the negative effect of phytic acid on a-amylase's ability to degrade starch is primarily, if not totally, due to phytic acid's ability to complex-bind  $\text{Ca}^{++}$ , thereby reducing the activity of A-amylase. Phytase, by degrading phytic acid, can reduce the complex binding ability of phytic acid to improve starch digestibility.

**Key Words:** phytic acid, starch, A-amylase, calcium

**S-T112 Dietary phosphorus quality of over processed soybean meal fed to growing chicks.** M.E. Persia<sup>\*1</sup>, J.A. Eaton<sup>1</sup>, P.L. Utterback<sup>2</sup>, C.M. Parsons<sup>2</sup>, and W.W. Saylor<sup>1</sup>, <sup>1</sup>University of Delaware, Newark, <sup>2</sup>University of Illinois, Urbana.

Experiments were conducted to determine the effects of over-heating soybean meal (SBM) on P quality and utilization in growing chicks. Commercial SBM was divided into two aliquots; the first was autoclaved at 121 C for 40 minutes to simulate over-processing (OPSBM), while the second was maintained as a control (CSBM). In both experiments, diets were formulated on a digestible amino acid basis utilizing synthetic amino acids to account for differences in amino acid digestibility due to heat processing. In the first experiment, cornstarch/dextrose/CSBM diets were formulated to contain 0.20, 0.25, 0.30 and 0.35% nonphytate P (nPP) and a cornstarch/dextrose/OPSBM diet was formulated to contain 0.275% nPP. The five experimental diets were fed to six replicate groups of four male Ross 708 chicks from 8 to 22 d. Standard curve analysis of the OPSBM diet indicated nPP estimates of 0.328% and 0.324% for weight gain and tibia ash, respectively. This represents improvements of 0.053% nPP and 0.049% nPP above formulated dietary values for weight gain and tibia ash, respectively. The second experiment was set up utilizing a 2 by 2 factorial design with OPSBM and CSBM and phytase addition (0 or 600 U/kg) as the factors. Experimental diets were formulated to contain 0.25% nPP and were fed to six replicate groups of four male Ross 708 chicks from 8 to 22 d. Weight gain and tibia ash weight were increased by over-process-

ing (53 g and 0.50 g) and phytase addition (59 g and 0.42 g), representing 8.7 and 25.6% increases with over-processing and 12.0 and 21.8% increases due to phytase addition. There were no interactions between processing level and phytase addition, indicating additive responses between the two factors. Heating SBM beyond typical processing conditions resulted in increased P utilization in young chicks during two 14-d experiments.

**Key Words:** heat processing, soybean meal, nonphytate phosphorus, chick, phytase

**S-T113 Comparison of two phytases pelleted at two temperatures on broiler performance and carcass yield.** T. Parr<sup>\*</sup>, C. Wyatt, and M. Bedford, *Syngenta Animal Nutrition, Research Triangle Park, North Carolina.*

A 42-day trial was conducted to compare the performance and carcass yield of broilers fed a thermo-tolerant, non-coated Pichia-derived phytase (NCP: Quantum<sup>™</sup>) versus a coated, fungal phytase (CFP) pelleted at 80 and 86C. Corn/soybean meal/meat-bone meal diets were formulated based on US commercial dietary nutrient averages and fed to 12 replicate pens (17 male broilers/pen) for each diet. A three-phase feeding regime was used consisting of a positive control (PC) diet with 0.42, 0.35, and 0.33% available phosphorus (AP); 0.95, 0.80, and 0.76% calcium (Ca); 1.25, 1.05 and 0.95% total lysine (TLys), and 3060, 3150 and 3197 kcal/kg ME, respectively. In the negative control (NC) diets, AP (0.13%), Ca (0.085%), ME (45 kcal/kg) and TLys (0.03%) were decreased for each phase, respectively. Each phytase was added at 0, 200 (500U/kg) and 300 (750U/kg) g/mt to the NC diet, and all diets were pelleted, resulting in a total of 12 treatments. At days 17 and 42, birds fed the NC diet had lower ( $P<0.05$ ) body weights (BW) and feed intake (FI) compared to the PC-fed birds, independent of pellet temp. There was an interaction between pelleting temperature and phytase for bird performance. In 80C pellets, addition of both levels of NCP resulted in improved ( $P<0.05$ ) BW, FI and FCR equivalent to the PC level at days 17 and 42, whereas neither level of CFP restored bird performance to the same level. At 86C, NCP showed an improvement in performance over CFP, although neither phytase returned performance to PC-fed 17 and 42 d birds. Hot carcass weights (HCW) (g) were heavier ( $P<0.05$ ) for birds fed NCP diets pelleted at 80C than birds fed either NC or CFP diets, and were equivalent to the PC birds ( $P>0.05$ ). Diets pelleted at 86C resulted in improved HCW for phytase-fed birds although neither phytase source was capable of restoring HCW equivalent to PC-fed birds. This study suggested that the addition of an inherent thermo-tolerant, non-coated phytase was more effective in restoring performance and carcass yield than a coated fungal phytase.

**Key Words:** broiler, phytase, pelleting, performance, carcass yield

**S-T114 The effects of laying hen strain and feeding high levels of choline chloride on egg trimethylamine content.** H. Classen<sup>\*1</sup>, J. Fulton<sup>2</sup>, P. Settar<sup>2</sup>, S. Saxena<sup>2</sup>, and N. O'Sullivan<sup>2</sup>, <sup>1</sup>University of Saskatchewan, Saskatoon, SK, Canada, <sup>2</sup>Hy-Line International, Dallas Center, Iowa.

Feeding some brown egg strains of laying hens high levels of canola meal can result in trimethylamine (TMA) inclusion in eggs and fishy egg

tainting. Hens that produce fishy egg tainting lack the ability to oxidize TMA so that it can be excreted in urine and this inability has been associated with the flavin-containing mono-oxygenase isoform FMO3 on chromosome 8. Because of its genetic basis, it was of interest to establish variation in TMA incorporation into eggs of three pure strains of laying hens (1 – n = 193; 2 – n = 178; 3 – n = 192). An egg was collected from each hen while fed a standard corn-soybean meal diet and additional eggs were collected after the hens were fed the same diet supplemented with 6000 mg choline/kg to measure TMA content by two methods, chemical analysis and a sniff test. The latter utilized humans to differentiate between the presence or absence of a fishy odor. Strains produced eggs with low but significantly different yolk TMA levels before feeding high levels of choline with 1.88, 1.72 and 1.27  $\mu$  TMA per g yolk for strains 1, 2 and 3, respectively. After choline feeding, strain 3 had higher levels of yolk TMA than strains 1 and 2 (17.76 vs 3.45 and 3.35  $\mu$  TMA per g yolk). Differences in yolk TMA content for hens before and after treatment were calculated and values less than 4  $\mu$  TMA per g yolk were classified as non-tainters. The incidence of egg tainting was different among brown egg strains with strain 1, 2 and 3 hens having 0.0, 6.7 and 93.8% of hens producing tainted eggs, respectively. The correlation between the recorded odor and TMA levels was not consistent for all lines, probably due to overloading of nasal odor receptors. Brown shelled strains differ in egg tainting and even in strains with low overall levels, a low incidence of egg tainting could reduce consumer acceptance if hens are fed high levels of canola meal or choline.

**Key Words:** canola, sinapine, fishy egg taint, trimethylamine, strain

**S-T115 Live performance, carcass yield, and skeletal integrity of broilers fed corn-soybean meal diets with supplemental phytase.** J.S. Sands\*<sup>1</sup>, M. Hruby<sup>1</sup>, and E.T. Moran Jr.<sup>2</sup>, <sup>1</sup>*Danisco Animal Nutrition, Wiltshire, United Kingdom*, <sup>2</sup>*Auburn University, Auburn, Alabama*.

An experiment was conducted to assess the efficacy of Phyzyme<sup>®</sup> XP phytase at several levels for alleviating growth depression and lower carcass yields caused by reduced skeletal integrity in broiler males fed sub-optimal nutrient levels. A total of 1000 Ross X Ross 308 male chicks were randomized into 63 pens (15 birds/ pen). Starter and grower feeds each involved 7 dietary treatments with corn and soybean meal as the primary ingredients. Treatment 1 consisted of a positive control (PC); treatments 1, 2, and 3 were negative controls (NC) progressively reduced in nutrients according to Phychek<sup>™</sup>, a phytase nutrient matrix calculator; treatments 5, 6, and 7 consisted of NC 1, 2, and 3 supplemented with phytase at 250, 500 and 750 FTU/ kg of feed, respectively. Birds had continuous access to feed and water and were provided continuous lighting. Feed intake and weight gain were measured. Following the feeding phase, broilers were slaughtered and 3 carcasses representative of each pen were used for evaluation of yield. Structural integrity and ash content of the femur was measured. Data were subjected to ANOVA using the GLM of SAS for a RBCD with significance at P < 0.05. Treatments were separated using Tukeys multiple comparison test.

Decreased nutrient levels in the NC reduced performance compared to the PC (avg. BWG 2.3 vs. 2.6 kg). Adding phytase improved performance (avg. BWG 2.5 kg). Weight and yield of carcasses of broilers receiving the NC was less than observed with the PC (avg. 64.7 vs 65.8 % yield) and was improved by added phytase (avg. 65.6 % yield). Femur strength decreased with the NC as did ash content compared to the PC (avg. 19 vs 28.3 kg breaking load), and was improved by adding

phytase to the NC (avg. 25.4 kg). Generally, decreasing nutrient levels below requirement for broilers impaired performance, carcass yield, and reduced skeletal integrity. Progressive additions of phytase generally led to increasing improvements in all respects, supporting the commercial efficacy of the phytase and validating the recommendation of Phychek<sup>™</sup>.

**Key Words:** broilers, phytase, performance, carcass yield, skeletal integrity

**S-T116 Effectiveness of a novel broadspectrum mycotoxin sequestrant.** V. Sewalt\*, M. Burke, B. Vennekens, S. Van Dyck, and A. Lamprey, *Kemin Industries, Des Moines, Iowa*.

A novel method to activate mycotoxin binding efficiency of aluminosilicate clays was developed and performance of a zeolite clay enhanced by this method evaluated in a two-stage in vitro assay. The assay utilized takes into account both the initial adsorption that occurs at low pH in the stomach and any desorption that occurs at neutral pH in the small intestine. The enhanced zeolite clay exhibited superior binding performance against a broad array of mycotoxins with binding efficiencies of aflatoxins B1, B2 and G2 of 90% or greater at an application rate as low as 1 kg/ton. Binding of zearalenone and ochratoxin A at an efficiency of 75% is achieved at a moderate application rate of 3 kg/ton. Most strikingly, the enhanced zeolite applied at 5 kg/ton binds T2-toxin at high efficiency, which is unequalled by other products also tested in this assay. The superior in vitro binding efficiency of this novel mycotoxin sequestrant is likely to translate to significant in vivo benefits in poultry production.

**Key Words:** mycotoxins, zeolite, T-2 toxin, zearalenone, ochratoxin

**S-T117 Fumaric acid improves feed utilization in broiler diets void of antibiotic growth promoters.** F. Yan\* and P. Waldroup, *University of Arkansas, Fayetteville*.

Producers are concerned about the loss of antibiotic growth promoters (AGP) in poultry diets. Organic acids are often proposed as a potential replacement for AGP. A study was conducted to examine use of fumaric acid in broiler feeds. Diets were formulated for starter (0-14 d), grower (14-35 d), and finisher (35-42 d) periods using nutrient levels typical of the top five producers in the U.S. poultry industry. Diets were based primarily upon corn and soybean meal with 5% ProPak used in all diets as a typical source of animal protein. Diets were fortified with vitamin and mineral supplements obtained from commercial integrators. One diet (negative control) did not contain any antibiotic growth promoters. A second diet (positive control) contained 50 g/ton BMD from 0-35 d of age and 15 g/ton virginiamycin from 35 to 42 d of age. Three additional diets contained fumaric acid at 0.125, 0.25, and 0.50%. Each of the treatments was assigned to six replicate pens of 60 male chicks (Cobb 500). Chicks were placed on previously used softwood shavings litter over concrete floors. The antibiotic program had no significant effect (P<0.05) effect on body weight, feed conversion, feed intake, or mortality. Fumaric acid at 0.50% improved feed conversion at 35 d (P = 0.08) and 42 d (P= 0.04) compared to that of birds fed the negative control diet. This is in agreement with previous reports from our laboratory.

**Key Words:** fumaric acid, antibiotics, broilers, feed utilization

**S-T118 Effects and counteraction of Ochratoxin A and deoxynivalenol in broiler chickens.** V. Starkl\*<sup>1</sup> and H. Sarandan<sup>2</sup>, <sup>1</sup>*Biomin GmbH, Herzogenburg, Austria*, <sup>2</sup>*Faculty of Veterinary Medicine, Timisoara, Romania*.

The public health concerns related to both acute and chronic effects of mycotoxins in animals have prompted more than 100 countries to establish regulatory limits for some of the well-known mycotoxins. In the current trial the effects of Ochratoxin A (OTA) and Deoxynivalenol (DON) on growing broiler chickens were evaluated.

OTA is considered as being highly nephrotoxic, immunosuppressive and carcinogenic. Intoxication with DON is characterized by vomiting, feed refusal, diarrhea, necrosis and lesions in various tissues. A trial was performed to evaluate the effects of OTA and DON contamination on performance and health status of broiler chickens during 42 days of trial period. Additionally the detoxifying capacity of a product based on biotransformation of OTA and DON (Mycofix®Plus) was tested. Five different treatments were performed using a total of 270 day-old chickens including a positive and a negative control (500ppb OTA, 1000ppb DON), two treatment groups with two different inclusion rates of the product to counteract the mycotoxin challenge (Mycofix®Plus 0,5kg/t and 1kg/t, respectively, + 500ppb OTA, 1000ppb DON) and finally one group with 1kg/t Mycofix®Plus to evaluate effects based on the sole product.

Performance parameters were determined on a weekly basis. At the end of the trial, blood samples were taken for hematological, biochemical and immunological analysis. Subsequently, those chickens were slaughtered and liver, kidney and crops histopathologically analyzed. Liver, kidney and bile were qualitatively analyzed on OTA and DON residues.

The negative impact on broiler performance was completely overcome by 1kg/t Mycofix®Plus. Mycotoxins were not detected neither in liver nor in kidneys. Severe renal and hepatic lesions were detected in the mycotoxin groups. The severity of the lesions was reduced in direct proportion to the inclusion rate of the product in the diet. Contact necrosis of the crop was almost annihilated by using the product. The intoxication with OTA and DON severely affected natural humoral immunity and phagocytosis which was both counteracted using Mycofix®Plus.

**Key Words:** ochratoxin A, deoxynivalenol, biotransformation, broiler, mycotoxin

**S-T119 Examination of broiler performance as affected by roller mill-ground corn addition to incomplete-pelleted feed.** W. Dozier\*<sup>1</sup>, K. Behnke<sup>2</sup>, M. Kidd<sup>3</sup>, and S. Branton<sup>1</sup>, <sup>1</sup>*USDA/ARS Poultry Research Unit, Mississippi State, Mississippi*, <sup>2</sup>*Kansas State University, Manhattan*, <sup>3</sup>*Mississippi State University, Mississippi State*.

This study examined the effects of adding increased amounts of rolled corn to pelleted feed (containing an incomplete corn content) on pelleting parameters and growth performance of male broilers. Sixteen hundred Ross x Cobb d-old male chicks were randomly distributed to 32 floor pens (50 birds /pen; 0.08 m<sup>2</sup> bird) and reared in a common environment until 17 d. Four dietary treatments were employed from 18 to 41 d of age: 1) control – no added corn, 2) 15% added rolled corn to pelleted feed, 3) 25% added rolled corn to pelleted feed, and 4) 35% added rolled corn to pelleted feed. The final diets were identical in ingredient composition. The corn used in the pelleted feed was ground through a hammer mill (800 microns), whereas corn added post-pellet was ground through a roller mill (1,500 microns).

The addition of ground corn post-pellet increased (P=0.05) pelleting production rate by 4.7% compared with the control group. This did not include the amount of ground corn added post-pellet, thus added corn would have accentuated these differences in total production rate. From 18 to 29 d of age, including rolled corn at 25% post-pellet did not alter growth performance, but at 35%, growth rate (988 vs. 1,014 g) and feed conversion (1.51 vs. 1.49) were adversely affected (P=0.05) compared with the control group. These differences were not apparent from 30 to 41 and 1 to 41 d of age. Because final broiler performance was not affected by adding corn post-pellet, the potential savings to an integrated feed mill can be substantial by reducing electrical cost to a feed mill and improving over production rate. If 28% rolled corn was added, the electrical cost and production rate would be improved by 36 and 27%, respectively. These improvements collectively would translate to a savings of \$10,800/wk for a feed mill producing 10,000 tons/wk. These data indicate that adding ground corn up to 35% post-pellet can improve feed production rate without adversely affecting broiler performance.

**Key Words:** broiler, corn, feed processing

## Tuesday, January 24 Environment & Management III Room: B314

**S-T120 Estimating weight of broilers through digital imaging.** J.L. Purswell\*, W.B. Roush, W.A. Dozier, III, and S.L. Branton, *USDA-ARS Poultry Research Unit, Mississippi State, Mississippi*.

Monitoring growth is important in assessing flock performance during growout. Weighing birds within a flock can be labor intensive; therefore, a non-contact method of weighing is desirable. The objective of this study was to determine if projected area of the bird is a viable method to estimate BW. One hundred Ross x Ross 708 chicks were placed into four environmental chambers at 1 d of age. Thirty five male birds were labeled with leg bands and weighed at 1, 3, 5, and 7 wks of age. A digital still camera was suspended on two tripods 86 cm above the floor and used to acquire images of each bird directly after weighing. The birds

were individually placed on a matte-black backdrop for photography, and no attempts to correct posture or position were made. The height of the camera remained constant throughout the growing cycle to maintain the same image scale such that total image area would remain constant, and projected area could be directly compared. Images were edited to isolate the two-dimensional projection of the bird and stored as 8-bit binary images; projected pixel area was determined via histogram analysis.

Regression analysis was performed on BW using various combination of linear, logarithmic, and power transformations. Correlations between BW and projected area were observed (R<sup>2</sup> = 0.92), regardless of posture or orientation and transform type. A natural log transform of both BW