

Monday, January 24
Nutrition
Room: B313

S61 Responses of broilers to low crude protein diets formulated based on current nutritional knowledge. S. Clemente-Hernández^{*1,4}, D. Burnham², C. Wiernusz³, F. Salvador¹, E. O. Oviedo-Rondón^{4,5}, ¹Universidad Autónoma de Chihuahua, México, ²Ajinomoto Heartland LLC, ³Cobb-Vantress Inc., ⁴Stephen F. Austin State University, ⁵Facultad de Medicina Veterinaria y Zootecnia, Universidad del Tolima, Colombia.

Low crude protein diets (LCPd) can support average broiler performance as long as attention in formulation is paid to all amino acid (AA) levels. LCPd supplemented with synthetic AA has been previously tested within different dietary periods separately, or fed to the same treatments during the whole grow-out. This project is an academic exercise to evaluate the dynamic effects in live performance and final carcass characteristics of offering either commercial standard CP diets (StCPd) or LCPd during each one of the four dietary phases of a 49 d growth out. LCPd were formulated to be 3 percentage points lower than StCPd, but supplemented with synthetic Lys, Met, Thr, Try, Arg, Ile, Val, and Gly to keep all essential AA levels constant, or under minimum recommended levels for digestible ideal protein profiles, for each period. Possible interactions and covariances among CP levels in the different dietary phases and the significance of each phase over final performance were evaluated. Cobb-500 chickens were placed under simulated commercial conditions and fed with one of two diets (StCPd or LCPd) in starter (0-15d), grower (15-35d), finisher (35-42d) and withdraw (42-49d) dietary periods, for a final factorial combination of 16 feeding treatments. Diets were analyzed for total CP and AA. Data was analyzed by Mixed Model Proc of SAS for repetitive measurements. No significant differences were observed for final BW and FCR at 49 d of age. Feed Intake was significantly affected by feeding treatments. Treatments fed LCPd in finisher and withdraw periods had higher FI. Carcass dressing and breast meat yield percentage were affected significantly by treatments. The highest breast meat yield percentages were observed in chickens fed LCPd in starter and grower and StCPd in finisher and withdraw periods. Breast meat yield was reduced significantly when LCPd were fed in withdraw period. It is concluded that LCPd can support average live performance however carcass composition is influenced by reduction in CP level.

Key Words: Low crude protein diets, Synthetic amino acids, Broilers, Live performance, Carcass traits

S62 Enhancement of immunocompetence in salmonella-challenged and non-challenged broilers fed egg immunoglobulins from hyperimmunized laying hens. R. Plunsk^{*}, P. Ferket, M. Koci, North Carolina State University.

Immunocompetence against food-borne pathogens in chicks may depend on the transfer of specific antibodies (Ab) from hens. Chicks fed immunoglobulins from hens immunized with salmonella may have superior resistance to immunological stress. We studied the effect of dietary supplementation of egg immunoglobulins on the growth and immune response of both salmonella-challenged and unchallenged broiler chicks. Ross-308 male chicks were assigned to 2 rooms containing 240 chicks each. One room was challenged with 10⁸ CFU *S. banana* per bird at 7 days of age, and the other room was unchallenged. Birds were then fed one of 3 isocaloric and isonitrogenous corn/SBM diets supplemented with either: nothing (C); .3% dried egg (American Dehydrated Foods, MO) (E); or .3% Protimax (Trouw Nutrition, USA) (P). Protimax is a spray-dried egg product from hens immunized to yield endpoint titers <100,000 against *S. typhimurium*, *dublin*, *choleraesuis*, and <50,000 against *S. heidelberg* and *enteritidis*. Each diet was fed to 8 replicate cages of 10 chicks. Body weight (BW) of chicks was determined at 7, 14, and 21 d of age and proportional weights of pectoralis muscle (%PM) were determined at 14, 21, and 28 d of age. Immunocompetence was evaluated by measuring Ab titer to sheep erythrocytes (SE), lymphoblastogenesis (ConA) and carbon clearance (CC) from 14 to 28 d of age. There were no consistent diet effects on BW among unchallenged chicks, but P and C increased 21-d BW in the challenged birds relative to E (816, 792 and 783 g, p<.05). %PW was higher in P and E than in C in unchallenged birds at 28 d (15.2, 13.3 vs 12.6%, P<.05) and higher in challenged birds at 21 d. SE Ab titers were increases by P and C in

unchallenged and by P and E in challenged chicks. P reduced ConA response in unchallenged but not in challenged chicks (p<.05). There were no differences between C, E and P observed in CC. Evidently, P enhanced growth performance and appears to augment the immune response of salmonella-challenged chicks.

Key Words: Chicks, Dietary Immunoglobulins, Immunology, Growth, Salmonella

S63 Withdrawn.

S64 The effect of phytase and glucanase supplementation to corn soy diets on AME. M. A. Leslie^{*1}, E. T. Moran¹, M. R. Bedford², ¹Auburn University, ²Zymetrics.

Phytases are known to improve phytate phosphorous availability for the broiler, however, even in their presence only 70% of total phosphorous is typically digested and absorbed from supplemented diets. Much of the phytate phosphorous in plants is separated from digestive enzymes by a fibrous cell wall. An experiment was conducted to determine the effect of supplementing glucanase and phytase, alone and in combination on live performance and feed AME. The experiment was designed as a 2x2x2 factorial arrangement of 0 or 500 ptu of phytase, 0 or 50 units of glucanase, and 0.45% or 0.26% aP that employed 6 replicates of 10 birds per treatment. Birds were reared on a common starter (0.45% aP) from 0 to 5 d, then experimental diets were provided from 5 to 10 d. Birds were fed ad libitum and allowed free access to water for the duration of the trial, except on day 5 when feed was changed and day 10 when feed was withdrawn, when birds were fasted for 4h and 8h respectively. Total fecal collection and carcass composition were used to measure AME and retained (productive energy), respectively. Phytase supplementation increased feed intake, BW gain and DM digestibility (P<0.05) but had no effect on either feed conversion, AME or retained energy. Glucanase supplementation also increased feed intake, but had no effect on gain, AME, nor retained energy. The effect of glucanase on feed conversion approached significance (P=0.06). Birds fed the low aP diets consumed less feed and grew slower than their high aP counterparts. AME was also reduced in low aP diets, while feed conversion and DM digestibility were not affected. A glucanase by aP interaction indicated that glucanase would improve AME of the feed in diets with adequate aP but not when aP was deficient. Phytase supplementation improved feed intake more in birds fed a diet deficient in aP than when adequate. There were no significant interactions between phytase and glucanase for any of the parameters measured. Overall results suggest that supplemental phytase and/or glucanase had minimal effect on energy recovery but can influence feed intake and its conversion to live weight gain.

Key Words: Phytase, Glucanase, Broiler, AME, Productive Energy

S65 Effects of low protein feeding regimens on commercial White Leghorn hen performance and egg yield. X. Sun^{*}, C. Novak, Virginia Tech.

A 3x4 factorial study was carried out to investigate the effects of feeding low protein diets to 4 Commercial White Leghorn strains (B, H36, H98, and L) on performance parameters and egg component yield. Five hundred and seventy six Commercial White Leghorn hens at twenty-four weeks of age were randomly assigned one of three dietary step down feeding regimens (high, medium, or low CP) with 12 pens per treatment (4 birds/pen) until sixty-two weeks of age. Feed changes during the trial occurred at 43 and 53 weeks of age based on egg production. Performance parameters recorded were egg production (EP), egg weight (EW), specific gravity (SG) and egg composition (albumen, yolk, and shell percent), feed intake (FI), and body weight (BW), while feed efficiency (FE), egg mass (EM), and albumen and yolk solid percent were calculated. Effects (P < 0.05) of dietary regimens on FI, BW, EP, EW, EM, FE,

dry albumen (DA) and shell (DS) percent were observed throughout the three phases of the trial. Overall, hens consuming high and medium CP regimen had increased FI (107, 106 vs. 101 g/bird, for high, medium, and low CP, respectively), BW (1708, 1671 vs. 1537 g/bird), EP (88.3, 88.0 vs. 82.4 %), EW (62.6, 61.9 vs. 59.6 g), EM (55.4, 54.5 vs. 49.2 g), improved FE (1.950, 1.957 vs. 2.083), DA (7.00, 6.86 vs. 6.60 % of egg weight), and reduced DS (9.90, 9.81 vs. 10.09%) compared to low CP regimen hens ($P < 0.005$), while hens fed medium CP had similar performance and egg yields compared to hens consuming a high CP regimen. Strain had a significant effect ($P < 0.05$) on all production parameters measured with the exception of FE. The aforementioned results indicated that feeding a high or medium CP regimen enhanced egg production, egg weight, and feed efficiency of White Leghorn hens compared to low CP regimen. Performance differences between strains was expected during the trial, but interestingly, were not affected differently by CP feeding regimens implemented as indicated by the lack of interactions in this experiment.

vCrude protein, Feeding regimen, Strain, Performance, Egg yield

S66 Effect of dietary phytase level and source on second cycle commercial laying hens. I. Effects on hen body weight, carcass composition and intestinal histology. E. A. Koutsos^{*1}, C. L. Wyatt², P. D. Bass¹, ¹California Polytechnic State University, ²Zymetrics.

Two sources of phytase (Zymetrics Quantum and BASF Natuphos) were examined in second cycle laying hens (Hyline W36) for effects on body weight, femur mass and breaking strength, breast muscle mass and intestinal histology. A completely randomized design was utilized in which hens were fed 1 of 6 diets. Diets were based on a basal diet containing 3.75% Ca and 0.1% non-phytate (nPP) with no additional phosphorus (Neg Cont), or with 150U/kg Quantum Phytase (150 Q), 300U/kg Quantum (300 Q), 600U/kg Quantum (600 Q), 300U/kg Natuphos Phytase (300 N), or 0.15% additional nPP (Pos Cont). Birds were housed in a Turbo style commercial two story house in standard size battery cages at 5 birds/cage, 3 cages/rep, 6 reps/diet. Hens were fed for a 15 week period on experimental diets. There was no effect of diet on body weight maintenance, mortality, carcass weight or breast muscle mass ($P > 0.10$). Femur mass and femur breaking strength were not affected by diet, although distance to break femur was greater for hens fed 600 Q versus Neg Cont ($P < 0.05$). Intestinal histology was significantly affected by dietary treatment. In the duodenum, villi width was increased by 600 Q versus Neg Cont ($P < 0.05$) and lamina propria width was increased by 600 Q versus Neg or Pos Cont ($P < 0.05$). In the jejunum, the number of intraepithelial leukocytes was reduced by 150 Q versus Neg Cont ($P < 0.05$). These data demonstrate that 150 to 600 U Q/kg diet or 300 U Natuphos/kg diet are sufficient to maintain second cycle hen performance when birds are fed 0.1% nPP. Additionally, intestinal histology suggests that there are beneficial effects of adding phytase to hen diets, in terms of duodenum surface area and reduced numbers of intestinal leukocytes.

Key Words: Phytase, Laying hen, Intestine, Histology, Body composition

S67 Effect of dietary phytase level and source on second cycle commercial laying hens. II. Effects on egg production and egg quality. P. D. Bass^{*1}, C. L. Wyatt², E. A. Koutsos¹, ¹California Polytechnic State University, ²Zymetrics.

Two sources of phytase (Zymetrics Quantum and BASF Natuphos) were examined in second cycle laying hens (Hyline W36) for effects on feed intake, egg production, egg shell quality and composition, total egg weight, and yolk +

albumen weight. A completely randomized design was utilized in which hens were fed 1 of 6 diets. Diets were based on a basal diet containing 3.75% Ca and 0.1% non-phytate (nPP) with no additional phosphorus (Neg Cont), or with 150U/kg Quantum Phytase (150 Q), 300U/kg Quantum (300 Q), 600U/kg Quantum (600 Q), 300U/kg Natuphos Phytase (300 N), or 0.15% additional nPP (Pos Cont). Birds were housed in a Turbo style commercial two story house in standard size battery cages at 5 birds/cage, 3 cages/rep, 6 reps/diet. Hens were fed for a 15 week period on experimental diets. Egg production and feed intake were monitored and recorded daily. Egg analysis was conducted 4 times during the trial. In general, feed intake was not affected by dietary treatment ($P > 0.67$). After 12 wks of feeding, and for the remainder of the trial, egg production, in terms of eggs produced/bird*week, % egg production or egg mass (g of egg/bird*week) was significantly greater for birds fed 300 Q, 600 Q, 300 N or Pos Cont diets as compared to Neg Cont ($P < 0.02$). However, total egg wt, yolk + albumen weight and egg grade were not affected by diet ($P > 0.10$). Egg shell composition was generally affected by time on trial ($P < 0.01$), but not by diet ($P > 0.20$). These data demonstrate that phytase addition to the diets of second cycle laying hens resulted in increased egg production, but did not affect egg shell composition, egg grade, or absolute egg weight.

Key Words: Phytase, Laying hen, Egg production, Egg mass

S68 Comparison of methionine sources in broiler chickens under commercial conditions in Argentina and Brazil. L. Morao^{*1}, H. S. Rostagno², ¹Degussa Argentina SA, ²Federal University of Vicosa, Brasil.

A recent independent literature survey revealed a substantial difference in biological efficiency of liquid MHA-FA relative to DL-Met. Two large-scale experiments carried out under commercial conditions in Latin America are presented in order to validate these data. In Trial 1 at the largest broiler integrator in Argentina, 3,500 male and female day-old Cobb broilers were assigned to 5 dietary treatments for 43 days. Treatments comprised basal corn-soy pre starter/ starter/grower/finisher diets and 2 series each containing 2 graded levels of either DL-Met (65 parts) or liquid MHA-FA (100 parts). Trial 2 was conducted in cooperation with a Brazilian broiler integrator at the Federal University of Vicosa. A total of 1,232 male day-old ROSS 308 broilers were assigned to 7 dietary treatments comprising a basal treatment and 3 treatments with graded levels of either DL-Met or liquid MHA-FA. Three liquid MHA-FA supplementation levels were chosen: according to current practice, 50% lower and 50% higher than current feeding practice. Basal diets for both trials were adequate in all nutrients except Met + Cys. Data were analyzed using analysis of variance (ANOVA), means in Trial 1 were compared by Tukey's test, and multi-exponential regression analysis was applied in Trial 2. In Trial 1, final body weights for treatments I to V were 2.763, 2.785, 2.755, 2.919, 2.873 kg, and overall feed conversion was 2.02, 1.67, 1.65, 1.62, 1.61, respectively. There was a significant performance response to both supplemented methionine sources over the basal diet. No significant differences could be detected among the birds fed either with DL-Met (III and V) or liquid MHA-FA (II and IV) at a 65:100 ratio. In Trial 2, exponential regression revealed a relative effectiveness for weight gain of liquid MHA-FA of about 68% on a weight/weight basis relative to DL-Met. The present data agree with numerous data as well as with an extensive recent literature survey for broilers, which resulted in a recommended relative bioefficacy figure of 67.8% on a weight/weight basis for liquid MHA-FA for performance criteria in broilers.

Key Words: Broiler, Amino acids, Methionine sources, Exponential regression