Nutrition III

90 Creep compliance of chicken nuggets at different frying temperatures. T. Yalamanchili*, P. Takhar, and C. Z. Alvarado, Texas A&M University, College Station, Texas Tech University, Lubbock.

The texture of chicken nuggets is a very important attribute to consumers. However, there is little data indicating textural properties of chicken nuggets during frying utilizing creep compliance. Therefore, the objective of this is to measure the textural properties of chicken nuggets in terms of creep compliance. The chicken nuggets were commercially prepared using a predust, batter, and breader and par fried at 350°F or 375°F for 26 to 30 sec. Following freezing, the chicken nuggets were then fried at 350°F or 375°F for 0, 1, 2 or 4 min. Following frying, a cylindrical portion from the nugget was separated followed by separation of the crust (breading) and the core (meat). The creep compliance (μm²/N) was measured using Dynamic Mechanical Analysis at a stress of 0.01 Mpa and temperatures of 30°C, 110°C and 190°C. The sample was held by the equipment at isothermal conditions for 1 min, displaced for 2 min and allowed to recover for 1 min. The data were analyzed by ANOVA in a 2 (frying temperatures) x 2 (portions-crust or core) x 4 (testing temperatures) x 3 (trial) factorial design. No significant difference was observed between the nuggets fried at 350°F and 375°F at all the testing conditions (P ≥ 0.05). Though the creep compliance was not significantly different for frying times 1, 2, and 4 min, the creep compliance values decreased with frying time for all treatments as well as both the crust and core. This indicates that the chicken nuggets were becoming harder as the frying time increased. This may be attributed to loss of moisture from the sample as it was being fried. Therefore, the texture of the chicken nugget does change with cooking time but not the cooking temperatures used in this study.

Key Words: chicken nuggets, frying, creep compliance, texture

91 How to obtain government approval for field research. S. L. Christian* and P. A. Curtis, Auburn University, Auburn, AL.

Over the course of a researcher’s career, going out into the field to obtain significant data is a common necessity. Sometimes to go into the field certain qualifications and clearances must be met. In the case of the poultry industry this usually means approval from government agencies such as the United States Department of Agriculture or the Food and Drug Administration. The purpose of this presentation is to lay out some guidelines to help young researchers gain government approval primarily focusing on the USDA and FDA. Points of concern include knowing whom to contact, setting up meetings, presenting ideas with specific goals clearly stated, writing up a protocol, addressing time lines, providing past research that supports the current study, and preparing for research. Addressing these points makes it easier for the agency to understand the research to be conducted and reasoning behind its purpose. The key is to be respectful of the contact’s time, being somewhat aggressive but also courteous. By following these guidelines, researchers will be better equipped to handle questions and concerns from government agencies therefore speeding up the process of gaining approval to begin work in the field.

Key Words: government approval, field research, USDA, FDA

92 Toxicity and tolerance level of tribasic manganese chloride for broiler chickens. R. Poureslami* and A. B. Batal, University of Georgia, Athens.

Manganese is a micro-ingredient which is required for chicken growth and survival. This mineral is involved in different metabolic pathways both as an essential part of metalloenzymes and as an enzyme activating source. Several commercial sources of Mn including organic and inorganic sources have been developed as feed supplements. The objective of the present study was to investigate the toxicity and tolerance levels of a new Mn source for broiler chickens, tribasic manganese chloride [Mn2(OH)3Cl]. At hatch, Cobb 500 male broiler chickens were obtained from a local hatchery and were fed a commercial starter diet for 4 d. At d 5, after any overnight fast the chicks were randomly divided into 8 dietary treatments in 7 replicate pens of 4 chicks each. Tribasic manganese chloride was supplemented into a commercial corn-SBM starter diet at 7 graded levels; 0, 1400, 2100, 2800, 3500, 4200 and 4900 ppm Mn and manganese-sulfate was added at one level (4200 ppm Mn). At 20 d of age, birds and feeders were weighed, 2 birds per pen were killed by cervical dislocation and blood was collected into EDTA anticoagulants glass tubes for hematological analysis. Left foot from each bird was removed and assayed for foot ash. There were no significant effects of supplemental Mn on feed intake and foot ash however, feed intake decreased numerically as the level of Mn supplementation increased. High dietary concentrations of supplemental Mn from Mn-sulfate (4200 ppm) resulted in reduced (P ≤ 0.05) body weight gain and feed:gain. Hematocrit (%) and whole blood hemoglobin concentration (g/dl) were not significantly affected by dietary Mn supplementation up to 4900 ppm. In summary, the toxicity estimate of Mn based on reductions in weight gain and feed:gain was 4900 ppm for tribasic manganese chloride and 4200 ppm for Mn-sulfate. Further studies will be carried out to verify the results and to gain more insight into the mechanisms through which excess levels of Mn supplementation induces toxicity in broilers.

Key Words: broiler, toxicity, manganese source, hemoglobin, hematocrit

93 Mineral content of excreta and eggs from laying hens fed bioplex or inorganic minerals. A. E. Sefton* and S. Leeson, Alltech, Inc., Guelph, ON, Canada, University of Guelph, Guelph, ON, Canada.

Low levels of supplemental trace minerals in the Bioplex form have been shown to support performance in layer comparable to that of traditional levels of inorganic trace minerals. Mineral excretion is reduced and a reduction in pollution potential is seen. Further work demonstrated that low levels of supplemental trace minerals reduced egg mottling. The current study using 72, 36 week old Lohmann layers, fed either traditional inorganic minerals or low levels of Bioplex supplemental minerals (Mn 100 ppm vs. 12.6 ppm; Zn 60 ppm vs. 14 ppm; Fe 25 ppm vs. 3.6 ppm; Cu 5 vs. 0.6 ppm for inorganic vs. Bioplex respectively). Diets were fed ad lib. for 46 d, and all eggs were collected for the last 2 d, egg weight, shell deformation, mottling, and albumen height were measured. A composite of 6 eggs from d 46 were collected and shells, albumen and yolk were separated and analyzed. A 24 h excreta sample from each treatment was assayed. Egg production, egg weight, eggshell deformation, mottling score and albumen height were not affected by diet (P > 0.05). Mottling was shown to correlate with shell deformation. Mineral analysis of eggs were not different between treatment groups, although eggs from Bioplex fed hens had numerically less than half the level of zinc than from hens eggs fed inorganic supplemental minerals. Excreta from hens fed Bioplex supplemented diets compared with that from hens fed inorganic mineral diets had significantly less (P < 0.01) zinc and manganese. Excreta copper levels did not differ between diets.
This study confirms previous work that showed that low levels of Bioplex supplemental trace minerals when compared with traditional levels of inorganic minerals did not influence bird performance while lowering the level of zinc and manganese excretion. In future studies it would be of interest to further investigate the effect of Bioplex on shell zinc levels.

Key Words: trace minerals, shell quality, layers, Bioplex

94 Effect of dietary copper source and level on broiler performance. E. A. Koutsos1, E. A. Koutsos1, J. L. McNaughton2, and J. I. Cohen1, 1Miconutrients, Atlanta, GA, 2AHPharma, Inc., Salisbury, MD.

The purpose of this trial was to determine the optimal level of each of 3 copper sources on economically relevant production parameters in broiler chicks. A total of 13 treatments were used including: Basal diet w/ no additional copper, or Basal diet plus supplemental copper in the form of trisbacic copper chloride (TBCC), copper proteinate (CuP) or copper amino acid complex (CuAA) at added levels of 25, 50, 75 or 100 ppm. No anti-coccidial or other medication was provided. Diets were each randomly assigned to 10 replicate floor pens per treatment, containing 72 Ross 708 broilers per pen (0.70–0.80 ft2 per bird). Birds were reared on used litter, on a 23:1 light cycle. Body weight (BW), feed intake and mortality were measured during the trial, and breast muscle yields determined at d56. Linear regression and breakpoint analysis was used for each copper source to predict the optimal level of copper from that source for maximal performance. There was no difference in mortality due to copper source or level (P > 0.05 for each). BW responses were variable due to copper source and age of birds. Requirements for maximal BW to d56 were 100 ppm or greater of CuP and TBCC and 75 ppm of CuAA. FCR were also variable due to copper source and age of birds. FCR was optimized at levels of 100 ppm or greater of CuP and TBCC and 75 ppm of CuAA. TBCC and CuAA had more efficient use of feed than those fed CuP through d56 (P < 0.05 for each). Breast muscle yields at d56 were optimized when chicks were fed 100 ppm or greater of TBCC or CuAA or 75 ppm of CuP (P < 0.05 for CuP). No significant differences were noted for breast muscle weight between CuP and TBCC or CuP and CuAA at all levels of copper.

Key Words: copper, inorganic, organic, chelate, copper

95 Hazara rock phosphate as a source of phosphorus for broiler chickens. M. Tahir1, A. B Lughmani2, N. Ahmed3, and G. M. Pesti2, 1Agricultural University, Peshawar, Khyber Pakhtunkhiwa, Pakistan, 2University of Georgia, Athens, GA.

The effects of replacing Dicalcium Phosphate (DCP) with Hazara rock phosphate (HRP) in relation to their fluorine (F) content was investigated on the growth performance of broiler chickens. Broiler chicks of the same weight were allocated into 5 treatments with 5 replicates of 10 chicks each. The HRP (having 3% F) was incorporated into a standard ration of corn-soybean meal by replacing 0, 25%, 50%, 75% and 100% of DCP. Thus the F contents of the diets were 0, 166, 332, 498 and 664 mg/kg, respectively. Placement of HRP (25%) in the diet increased average body weight gain (BWG) significantly while 100% HRP in the diet decreased (P < 0.05) BWG (BWG = 1128.6 + 2.6848 RP â€“ 0.0368 RP2). Replacing 25% of DCP with the HRP did not influence feed consumption (FC), however, increasing the level of HRP caused a decline in FC (FC = 2044 + 0.7885 RP â€“ 0.0369 RP2). The effect of RP was not pronounced (significant at P < 0.05) until 75% HRP was fed. Live BW was increased by 25% and 50% HRP. Higher levels of HRP did not cause significant differences in live BW. Replacing DCP with the HRP up to 50% showed significant increases in the relative weight of carcasses up to 75% HRP. Increasing the level of HRP in the diet did not affect Ca accumulation in the tibia. However, increasing HRP in the diet gradually decreased phosphorus accumulation in the tibia. Tibia P was lowest (P < 0.05) with 75% and 100% HRP in the diet. Serum Ca was increased by substituting HRP for DCP (linear effect). Increasing HRP in the diets simultaneously decreased the P content of the plasma. Plasma P was lowest (P < 0.05) when DCP was replaced by 100% HRP, suggesting poor P availability from HRP. In conclusion, this study demonstrated that 25-50% replacement of DCP with HRP (having F contents of 166 to 332 mg/kg) could be used safely without affecting the growth performance of broiler chickens.

Key Words: rock phosphate, DCP, fluorine, phosphorus, broiler growth


Thevetia peruviana oil is not popular presently because little research has been published regarding the potential health benefits and its uses in industrial applications. An experiment was conducted to investigate the effects of dietary levels of Thevetia peruviana oil on the egg quality and flavor. Thevetia peruviana oil was included at 1.5% (Diet B) and 3% (Diet C), palm oil was included at 1.5% (Diet D) and 3% (Diet E) in a complete diet for Isa Brown hen (n = 80). The control Diet A had no Thevetia peruviana oil and the study was carried out for 10 weeks in a completely randomized design model. Single egg was taken from each cage for assessment of egg quality. The albumen viscosity was measured with a Technical Services and Supplies Haugh Unit device, while lipid oxidation assessment was done by the measurement of thiobarbituric acid reactive substances (TBARS) in yolk. The sensory assessment was done using triangle testing according to the British Standard 5292. The tests were done when the eggs were 10 and 24 d old. Ten trained assessors given 3 min boiled eggs arranged as a triad and told that 2 of the samples were identical, while 1 was different were requested to identify the odd one. Minimum number of correct replies to establish a difference at a significant level of 0.05 was determined from a statistical table of values. The results showed that differences in egg laying and the physical properties of eggs (weight, portion of yolk and albumin) were not statistically significant (P < 0.05). Viscosity decreased significantly after 21 d of storage. The albumen height measurement gave a similar pattern of results. TBA values were relatively low, not significantly different (P < 0.05) and not likely to produce rancid odor. Trained assessors were unable to differentiate between eggs from Thevetia peruviana oil and palm oil after 10 d storage. Thevetia peruviana oil had slight, but positive effect on egg quality and storage characteristics.

Key Words: Thevetia peruviana oil, lipid oxidation, albumen viscosity, egg quality, egg flavor

97 Cassava Leaf Meal Inclusion in Palm Kernel Meal Diet Could Improve Egg Yolk Color in Post-Molted Native Laying Hens. A. Adrizal1, S. Fakhri1, R. Murni1, Y. Yatno1, T. Maranata1, S. Asby1, Y. Yusrizal1, and R. Angello1, 1Faculty of Animal Husbandry, University of Jambi, Jambi, Indonesia, 2Department of Animal and Avian Sciences, College Park.
98 Effect of nutritional and environmental challenge on broiler performance and gut microflora changes. E. T. Moran1, G. R. Siragusa1, E. E. M. Pierson2, J. A. Benson1, J. C. Remus2, and M. Hruby2, 1Danisco, Waukesha, WI, 2Danisco Animal Nutrition, St. Louis, MO, 3Auburn University, Auburn, AL.

Environmental and nutritional challenges can significantly affect broiler performance and economics of poultry meat production. Possible negative changes in gut microflora associated with these challenges may accentuate further performance responses observed in broilers today. A combination of Avizyme 1502 containing (minimum per kg diet) α-amylase (300 α), xylanase (400 u) and protease (4000 u) and Phyzyme XP TPT (500 FTU phytagase) were supplemented at 2 levels (x and half x) to corn-soy based formulations in male Ross 708 (Aviagen) broilers reared to 42 d at 2 densities (15 and 30 birds/4,18 sq. m.). Essential nutrient requirements (1994. NRC) were assured with the positive control (PC) formulations from 0 to 3 and 3–6 weeks, respectively. Energy and further nutrients were the same within dietary treatments. A randomized block design was used in a 3 × 2 factorial arrangement (protein profiles × sex). Each treatment was represented by 8 replicate pens of 25 birds each. Males had an overall

Key Words: palm kernel meal, native hen, cassava leaf meal, feed conversion, egg yolk

99 Assessment of the digestible arginine:lysine ratio of 28 to 42 day of age male broilers under an increasing temperature regimen. P. B. Tillman1, L. Meija2, A. Corzo2, and R. B. Shirley2, 1Poultry Technical Nutrition Services LLC, Buford, GA, 2Mississippi State University, Mississippi State, 3Ajinomoto Heartland LLC, Chicago, IL.

A trial was conducted to evaluate the dArg:dLys ratio of male Ross 708 broilers between d28 and d42. Chicks were randomly distributed into 96 floor pens and fed crumbled starter (d1 - d14) and pelleted grower (d15 - d27) diets, which met all nutrient requirements. At d28, pens were equalized in bird number (12 birds/pen; 0.09 m²/bird), and a pelleted control and 7 pelleted experimental diets were fed to d42. Diets were based on Corn, Soybean Meal, Corn DDGS (6%) and PRO PLUS (2.5%). The control diet was formulated with minimum digestible essential amino acid ratios (dTSAA: 77, dThr:68, dVal:78, dLe:68, dTrp:16.5 and dArg:105) set relative to a 1.00% dLys. Treatment diets were formulated with dEAA ratios set 0.5 points higher (except dArg:dLys) than the control diet, relative to a 0.95% dLys. A low and high treatment diet was formulated to produce dArg:dLys ratios of 100 and 130, using added L-Arg, with other ingredients held constant. The low and high diets were blended to produce 5 intermediate treatments, set 5 ratio points apart. A standard declining temperature regimen was followed from d0 to d27 at which time a constant (average = 79°F, 26°C) to increasing temperature regimen was used until d42. The goal was to emulate heat experienced during the summer when raising high-lean genotype broilers in close-sided houses during the latter phases. Birds were processed at d42 and no significant treatment effects, linear or quadratic trends were noted for bodyweight gain, feed intake, or weight or yield of carcass, fat pad, or breast. Both dArg intake and dArg intake / bodyweight showed a linear trend with increasing ratio. Although no linear or quadratic trends were noted for feed utilization, the 100, 125 and 130 ratio were significantly different than the control. Under the conditions of this trial, the ratio of dArg:dLys appears to be no higher than 105 for broilers d28 to d42.

Key Words: arginine, summer, heat, broiler, amino acid

100 An economic evaluation of feeding programs with different amino acid densities for Cobb × Cobb 500 male and female broilers. D. Taschetto1, S. L. Vieira*1, A. Favero1, J. E. P. Martinez1, M. Mayorga1, and J. A. Meira1, 1Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil, 2Novus International, Sao Paulo, SP, Brazil.

One thousand and 2 hundred Cobb × Cobb 500 one-d-old chicks, 600 from each sex, were used in a trial with the objective of evaluating the return over the feeding investment during a grow out period and throughout processing to commercial cuts. Corn-soybean meal diets were formulated with energy and nutrient levels suggested by a group of nutritionists representative of the Brazilian broiler industry. A 4 phases feeding program was used: 1 to 7, 8 to 21, 22 to 35 and 36 to 40 d of age. Diets were formulated using the ideal protein concept with minimum ratios between AA and Lys as follow: SAA: 75%, Thr: 65%; Val: 75% (1 to 21 d) and 78% (22 to 40 d); Ile: 65% (1 to 21 d) and 67% (22 to 40 d); Arg: 105%; Trp: 19%. The suggested diet (Medium) was used as a reference (22.5, 21.4, 20.3, 19.5% CP and 1.25, 1.19, 1.09, 1.05% dLys respectively in the phases from 1 to 20 d) to formulate the High and Low protein diets, respectively with increases and decreases of 12% in dLys. Energy and further nutrients were the same within the dietary treatments. A randomized block design was used in a 3 × 2 factorial arrangement (protein profiles × sex). Each treatment was represented by 8 replicate pens of 25 birds each. Males had an overall
better live performance than females \( (P < 0.05) \), whereas percentage yields of carcass and breast meat were higher for females \( (P < 0.05) \). There were no interaction between sex and diet \( (P > 0.05) \). The Medium diet was sufficient to maximize body weight at the end of the study, whereas the stepwise improvements in feed conversion (FC) followed to the High diet \( (P < 0.05) \). There were no differences in carcass yields for the diets \( (P > 0.05) \). Using ingredient costs and meat market prices from Brazil in January 2009, the best economic return were obtained with the Low diet, followed by the Medium and then the High diet.

**Key Words:** broiler, cobb, amino acid, protein