Effects of dietary protein concentration on performance and health in Pekin ducks during aflatoxicosis. Xi Chen*1, Rhonda Murdoch2, Dan J. Shafer3, and Todd J. Applegate1, 1Purdue University, West Lafayette, IN, 2Maple Leaf Farms, Leesburg, IN.

A 14-d trial was conducted to determine the effect of dietary protein concentration on performance and health in Pekin ducks during aflatoxicosis. The 4 dietary treatments were arranged in a 2 × 2 factorial with 2 CP concentration (20 and 24% on analyzed basis) with or without 0.20 mg/kg AFB1 (0.21 mg/kg analyzed). Each diet was fed to 6 replicate cages per diet (6 ducks per cage) from 0 to 14 d of age. The AFB1 reduced BW gain, feed intake, and breast muscle weight by 33 to 43% (main effect P ≤ 0.0001), while high CP diet improved BW gain by 18% and breast muscle weight by 40% (main effect P ≤ 0.004). High CP diet also increased feed efficiency of the ducks by 10% (main effect P = 0.021), but there was no significant interaction of AFB1 and CP observed for any performance measures. In addition, AFB1 reduced serum glucose, albumin, total protein, globulin, and calcium concentration (Pindicate that 0.2 mg AFB1/kg diet significantly impairs growth, breast muscle yield, and major serum biochemistry measures in Pekin ducks from hatch to 14 d, while higher dietary CP can significantly improve performance of the ducks regardless of aflatoxin contamination level, primarily due to improved feed efficiency.

Key Words: aflatoxin B1, crude protein, Pekin duck, performance

Evaluation of AME of by-products from the soybean oil and biodiesel industries and their different blends. Liliane Bor-satti*1, Sergio Luiz Vieira1, Edgar Orlando Oviedo-Rondón2, Francieli Rohden1, and Henrique Cemini1, 1Universidade Federal do Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil, 2North Carolina University, Raleigh, NC.

Fats and oils are important feedstuffs for broiler chicken diets as high energy ingredients. The increasing availability of by-products from refined soybean oil and biodiesel industries makes them a potential source of energy in poultry diets. Two studies were conducted to determine AME of these by-products and their combinations. At total of 390 21-d-old male broilers were distributed in a completely randomized design in a 4 × 3 factorial arrangement of 4 fat sources and 3 levels of their inclusion plus the basal diet without fat. Dietary treatments (13) with 6 replicates of 5 broilers each were used: Blend 1 had 85% acidulated soybean soapstock (ASS), 15% lecithin (LEC) and 5% glycerin (GLY); blend 2 contained 80% ASS, 15% GLY and 5% LEC; blend 3 had 75% ASS, 20% GLY and 5% LEC; and blend 4 included 70% ASS, 25% GLY and 5% LEC. Each fat source was added to a common basal mash diet at 2, 4 or 6%.

The highest free glycerol blood content was observed with blend 1 (7,366 kcal/kg) or blend 4 (7,540 kcal/kg). In conclusion the treatments showed the highest AME value (8,460 kcal/kg) when compared with blend 1 (7,366 kcal/kg), however, these were not different from blend 3 (7,516 kcal/kg) or blend 4 (7,540 kcal/kg). In conclusion the treatments showing the highest AME value were the blend of 85% ASS, 15% GLY and 5% LEC in the first experiment and for the second experiment the blend 2 (80% ASS, 15% GLY and 5% LEC). Therefore, these blends can be used as energy sources in broilers diets.

Key Words: metabolizable energy, combination of fat, soybean oil, broiler

Plasmatic free glycerol and triglycerides in broilers fed combinations of soybean oil industry by-products. Liliane Bor-satti*1, Sergio Luiz Vieira1, Edgar Orlando Oviedo-Rondón2, Francieli Rohden1, and Henrique Cemini1, 1Universidade Federal do Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil, 2North Carolina University, Raleigh, NC.

Currently with the increasing availability of crude glycerin and co-products of refined soybean oil in the world market, there is a trend for their utilization. Plasmatic free glycerol and triglycerides have been used as metabolic indicators of fat utilization in animals. A study was conducted to determine the plasmatic free glycerol and triglycerides in mixtures of soybean oil by-products. A total of 390 21-d-old male broilers were distributed in a completely randomized design in a 4 × 3 factorial arrangement of 4 fat sources and 3 levels of their inclusion plus the basal diet without fat. Dietary treatments (13) with 6 replicates of 5 broilers each were used: Blend 1 had 85% acidulated soybean soapstock (ASS), 10% Glycerin (GLY) and 5% Lecithin (LEC); blend 2 contained 80% ASS, 15% GLY and 5% LEC; blend 3 had 75% ASS, 20% GLY and 5% LEC; and blend 4 included 70% ASS, 25% GLY, and 5% LEC. Each fat source was added to a common basal mash diet at 2, 4 or 6%.

Three chickens per replications were used for blood collection using heparinized tubes. Free glycerol and triglyceride content were assessed in plasma. Differences due to treatments (P < 0.05) were for free glycerol and triglyceride. Average triglyceride level of blend 1 (78.52 mg/dL) was the highest when compared with all other treatments. Blend 2, 3 and 4 had 59.91, 66.01 and 67.70 mg of triglyceride/dL, respectively. The highest free glycerol blood content was observed with blend 1 (14.40 mmol/mL). Blend 2 and 4 did not differ on free glycerol (11.72 and 11.81 mmol/mL, respectively) and blend 3 had the lowest concentration (10.95 mmol/mL). It can be concluded that the blend 2 showed the lowest amount of plasmatic triglycerides. The largest amount of free glycerol 1 blend demonstrated that dietary glycerol was not completely metabolized and can be excreted by the birds generating energy losses.

Key Words: soybean fat, triglyceride, free glycerol, broiler

Effects of dietary apparent metabolizable energy and amino acid density on male Cobb MX × Cobb 500 broilers from 15 to 32 days of age. Kathryn J. Meloche* and William A. Dozier III, Department of Poultry Science, Auburn University, Auburn, AL.

The cost of poultry diets is strongly influenced by specifications for dietary energy and amino acid (AA) density. Although Cobb MX ×
Cobb 500 broilers represent a significant amount of the market share worldwide for broilers intended for a fast-food market (<2.5 kg), their energy needs are not well defined. Responses to dietary energy may also be affected by the AA specifications of a diet. An experiment was conducted to evaluate 4 apparent metabolizable energy (AMEa) concentrations and 2 dietary AA densities in male Cobb MX × Cobb 500 broilers from 15 to 32 d of age. One thousand six hundred broiler chicks were randomly distributed into 64 floor pens (25 per pen; 0.09 m² per bird). All birds received a common starter diet from placement to 14 d of age and were randomly assigned to 1 of 8 dietary treatments thereafter.

Dietary treatments were provided as a 4 × 2 factorial arrangement with AMEa (3,000; 3,065; 3,130; and 3,195 kcal/kg) and AA density (92 and 100% of breeder recommendations) as the main factors. Each of the 8 treatments was represented by 8 replicate pens. At 33 d of age, 12 birds per pen were randomly selected for processing. No differences due to dietary AMEa or AA density were observed for BW gain, feed intake, or mortality. An AMEa × AA interaction was observed for feed conversion ratio (P = 0.009). Increa...
lowest DSFL inclusions (0, 33 or 66) but not at 100%. A significant interaction for FI (0–21 d) was similar to BW. The FCR was significantly reduced with increasing inclusion levels of DSFL (0 = 33 > 66 = 100). There was a significant interaction for AME and NR, but it was difficult to interpret. Similar observations were observed for G/F. In a second study the dietary preference of 4 M starter diets with 0, 33, 66 or 100% DSFL were compared with a M 5% fish meal (FM) starter diet. The test and FM diets were fed to 6 cages of 5 male Ross 308 broilers from 0 to 20 d and weekly FI determined. The statistical design was based on ANOVA for 4 diet comparisons. Diets with 33, 66 or 100% DSFL were preferred (~60% of feed consumed) compared with the FM diet. With a 0% DSFL diet, this preference was reduced to 40–50% compared with FM; with DSFL preference increasing with age. Both studies suggest that DSFL produced from municipal waste was an acceptable ingredient for production of broilers and is preferred to a diet containing FM.

Key Words: dried soldier fly larvae, feed form, protein, broiler, preference

221 Withdrawn.

222 Influence of body weight at hatching and inclusion of oat hulls in the diet on growth performance and digestive tract traits of brown-egg laying pullets from 0 to 16 wk of age. Sara M. Rodado1, Beatriz Saldaña1, Pilar Guzmán1, Husham A. Mandalawi2, Raúl Rodríguez2, Lourdes Cáamarai, and Gonzalo G. Mateos1, 1Departamento de Producción Agraria, Universidad Politécnica de Madrid, Madrid, Spain, 2Ibérica de Tecnología Avícola (Ibertec) S.A.U, Valladolid, Spain.

The influence of pre-incubated weight of eggs (EW) laid by 24 wk-old brown layer breeders and the inclusion (wt:wt) of 3% oat hulls (OH) in the diet on growth performance and gastrointestinal tract (GIT) traits were studied in pullets reared under stressful conditions from hatching to 16 wk of age. The initial BW of the pullets resulting from these eggs was of 29.9 and 38.2 g for the 2 extreme groups. The stress applied consisted in using a prolonged (8 h) transport time from the hatchery to the experimental facility, reducing barn temperature at night from placement to 7 d of age, and late beak trimming of the pullets (18 d). Growth performance, pullet uniformity, and GIT traits were measured by period (0 to 5 wk, 5 to 10 wk, and 10 to 16 wk of age) and cumulatively. Data were analyzed as a completely randomized design with treatments organized as a 7 × 2 factorial, with 7 groups of pullets that differed on pre-hatched EW (47 to 54 g with 1 g difference between groups) and 2 levels of OH inclusion (0 vs. 3%). Effects of EW on the variables studied were partitioned into linear and quadratic components. The stress conditions applied affected pullet growth, with BW at 5 wk of age that were as an average 27% lower than recommended by the genetic company (269 g vs. 367 g). Neither initial EW nor OH inclusion affected any of the variables studied. In summary, EW of young breeders did not affect growth performance, BW uniformity, or GIT traits of the resulting pullets from 0 to 16 wk of age. Eggs bigger than 47 g laid by young breeders can produce high quality pullets. Pullets fed diets with 3% OH performed equally to pullets fed the control diet, suggesting that the amount of fiber can be increased during the rearing period of brown egg pullets.

Key Words: gastrointestinal tract trait, egg weight, fiber inclusion, pullet breeder


This study aimed to evaluate the effect of selenium sources fed to breeders muscle Se status and growth performances of their progeny. The breeders were divided into 3 groups differing by the dietary Se source as followed: sodium selenite (SS), selenized-yeast (SY) and hydroxy-selenomethionine or HMSeBA (SO). Each breeders group provided 290 day-old chicks. At d 0, 30 chicks per group were selected to measure muscle Se content and the 260 remaining chicks were distributed into 13 replicates pens of 20 chicks for 21 d. Broilers from the 3 groups received the same standard breeders diet to observe only the effect of breeders Se nutrition. On D12 and 21, growth performances were measured and one chick per pen was selected to measure breast muscle Se content. The breeders Se source had no effect on the body weight at hatch, body weight gain or feed intake during the entire experimental period (P > 0.05). However, feed conversion ratio (FCR) of broilers issued from breeders fed with SO showed significantly improvement between D0 to 12 and D0 to 21 comparatively to SS (P < 0.05). Muscle Se content of day-old broiler chicks was higher for SO group compared with other treatments and higher for SY group compared with SS (P < 0.05). At 12 and 21 d of experiment, the muscle Se content was similar between each group and was decreased compared with hatch level (P < 0.05). In addition, muscle Se content of broiler at one-day-old appeared to be significantly related to FCR for the periods: D0 to 12 and D0 to 21 (P < 0.001). These results showed the higher ability of HMSeBA compared with other Se source in breeders’ diet to improve chicks’ muscle Se content at hatch which is related to FCR improvement during 0–21 d period of growth.

Key Words: selenium, hydroxy-selenomethionine, broiler breeder, progeny

224 Feeding ingredients with variable starch digestion rate affect the expression of hepatic fat and glycogen metabolism genes in broiler breeder pullets. Aman Deep*, Andrew G. Van Kessel, and Henry L. Classen, University of Saskatchewan, Saskatoon, Canada.

Broiler breeders are often fed every 48 h during the rearing period to maintain optimum body weight. However, this practice is expected to promote postprandial nutrient storage and reutilization which is not energetically efficient and may contribute to metabolic stress. Previous research has demonstrated that feeding a pea- (slowly digested starch) in contrast to a wheat-based diet (rapidly digested starch) to broiler breeder pullets reduces maximum liver weight, and fat and glycogen content achieved over the period of 48 h post-feeding. The present study used liver samples from the same birds and examined the effect of pea- and wheat-based diets on relative abundance of genes encoding for synthesis, lysis and export of hepatic fat [malic enzyme (ME), acetyl-CoA carboxylase (ACC), VLDL-apolipoprotein (APOVLDL) and glycogen (glycogen synthase (GS), glycogen phosphorylase (GP))] using quantitative PCR. Ross 308 broiler breeders (384) were randomly assigned to 24 pens and fed a common starter ration on an ad-libitum basis from 24 pens and fed a common starter ration on an ad-libitum basis from 20, 24, 26, 28, 32, 36, 40 and 44 h after feeding, snap frozen in liquid nitrogen and stored at −80°C for gene expression analysis. Data were analyzed as a factorial arrangement (2 diets, 15 times) and the level of significance was fixed at P ≤ 0.05 unless otherwise stated. The relative expressions of ME, ACC, APOVLDL, and GP were affected by time after feeding and reduced by feeding the pea-based diet over the period of 48 h. A trend for increased expression of GS (P = 0.08) was noted in
pea fed birds. Interactions demonstrated that the expression of ME was higher for birds fed pea up to 16 h post-feeding, whereas, the expression of GP was primarily higher after 12 h post-feeding. Overall, feeding a pea-based diet results in a reduced degree of nutrient storage and reutilization in the feed restricted broiler breeder pullets.

Key Words: pea, wheat, glycogen, fat, slowly digested starch

225 Effect of particle size, inclusion level, and addition of a protease on sorghum digestibility. Albaraa H. Sarsour*, Edgar O. Oviedo-Rondón1, Fabiana G. Luiggi3, Thays Quadros2, Yulieth D. Rodriguez-Sanchez2, and Liliane Borsatti4, 1Prestage Department of Poultry Science, North Carolina State University, Raleigh, NC, 2Universidade Estadual Paulista, Jaboticabal, SP, Brazil, 3Universidade Estadual Paulista, Botucatu, SP, Brazil, 4Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil, 5Universidad Nacional de Colombia, Bogotá, Cundinamarca, Colombia.

Sorghum is used worldwide, but its digestibility and energy value could be enhanced by optimum grinding and protease addition. One experiment was conducted to evaluate the effects of sorghum inclusion levels, particle size and protease on chicken energy utilization, dry matter (DM) and protein digestibility. Eighteen treatments were obtained from a 4 × 2 × 2 factorial arrangement of treatments (16) with 4 inclusion levels of sorghum (25, 50, 75, and 100% replacement of corn), 2 particle sizes (400 or 800µm) and protease (0 or 500 g/ton for 600,000 U/g), as main factors, plus 2 control treatments with 100% corn as grain source at 800 µm with and without protease. A total of 720 Ross 308 day-old male chicks were placed in 144 Petersime battery cages with 5 chicks per cage. Excreta collection was conducted at 19 and 20 d of age to calculate AMEn and digestibilities. Data were analyzed as a RCBD with a 4 × 2 × 2 factorial arrangement of treatments with effects nested within sorghum inclusion with 8 replicates per treatment. Three-way interaction effects ($P < 0.05$) on DM digestibility, AME, AMEn and coefficient of AMEn were observed. Broilers fed diets with a 50% inclusion level, 800µm particle size and the addition of protease had the best AME and AMEn. Broilers fed diets with 25% sorghum at 400µm had the best DM digestibility. This was only different from those fed higher sorghum inclusion levels ground at 400µm without enzyme, and 75% inclusion at 800µm and 100% sorghum at 400µm with enzyme. There were 2-way interaction effects ($P < 0.001$) of sorghum inclusion and particle size on protein digestibility and coefficient of AME. Feeding broilers 800µm sorghum at 50 and 100% inclusion increased protein digestibility and AME similar to values observed in chickens fed corn diets, while the finer particle size decreased these values. The protease improved ($P < 0.05$) DM digestibility and coefficients of AME and AMEn for all diets. In conclusion, the optimum inclusion level of sorghum was up to 50%, and coarse grinding while adding a protease improved energy utilization and digestibility.

Key Words: sorghum, digestibility, protease, AME