M68 Effects of phytase on phosphorus utilization in broiler chicks depend on dose rate and dietary formulation Alyson Gautier<sup>1,3</sup>, Carrie Walk<sup>2</sup>, Ryan Dilger<sup>1</sup> 1University of Illinois; 2AB Vista

The effects of microbial phytase dose rate on bone mineralization, tissue P content and apparent digestibility in broilers fed diets with varying phytase matrices applied were evaluated. Ross 308 male broiler chicks (240 in total) were housed in battery cages from d 2 to 23 post-hatch. At 2 d of age, chicks were provided 1 of 6 experimental diets arranged as a 2 x 3 factorial with 2 levels of phytase (0 or 1,500 FTU/kg; Quantum Blue, AB Vista, UK) and 3 phytase matrices (no matrix, phytase applied over the top; 500 FTU/kg matrix of 0.15% available P (avP) and 0.16% Ca; and 1500 FTU/kg matrix of 0.21% avP and 0.23% Ca). Experimental diets were fed in mash form to 5 birds per pen, with 8 replicate pens treatment. At 23 d of age, all chicks were euthanized for collection of muscle, spleen, and liver tissues, whole tibia, as well as ileal digesta and excreta. Data were subjected to ANOVA, with the model including phytase dose, phytase matrix, and their interaction. Concentrations of P in muscle and liver were not affected by treatment (P > 0.05), but the addition of phytase increased (P < 0.05) P concentrations in spleen from 11.6 to 12.1 g/kg. Phosphorus content of dried, defatted tibias was influenced by the phytase matrix (P < 0.05), with birds fed the diets with no applied matrix exhibiting the highest P concentrations. Interactive effects (P < 0.01) were observed for apparent ileal digestibility (AID) and total tract (ATTD) digestibility of P, where phytase addition improved AID and ATTD in diets containing the 500 or 1500 FTU/kg matrix. Similarly, an interactive effect (P < 0.01) was observed for ATTD of Ca, where phytase addition resulted in a decrease in ATTD of Ca in birds fed diets with no matrix applied, but increased ATTD in birds fed the 500 or 1500 FTU/kg matrix. In contrast, only a main effect (P < 0.01) of phytase matrix was observed for AID of Ca, with the birds fed the 500 FTU/kg matrix having the lowest AID of Ca compared to birds fed diets with no matrix or 1500 FTU/kg matrix applied. In conclusion, a high dose (1500 FTU/kg) of microbial phytase resulted in increased concentrations of P in the spleen, while tibia P and apparent digestibility responses depended on the mineral matrix applied to the diet.

Key Words: broiler, bone ash, tissue, phytase

M69 Maintenance energy requirements in modern broilers fed exogenous enzymes Justina Caldas Cueva<sup>1</sup>, Katie Hilton, Niran Boosinschai, Garrett Mullenix, Judith England, Craig Coon University of Arkansas

Maintenance energy requirement is the biggest component of the energy necessities for poultry (40 - 65%). Exogenous enzymes have been shown to decrease heat production (HP) in broilers. HP biggest component is maintenance energy suggesting enzymes are the reducing maintenance needs. The present study determined the maintenance needs of modern broilers with and without enzymes. Two trials with 100 and 360 Cobb male broilers were conducted with feeding levels (10 – 50% trial 1; 16 – 22 d, and 30 – 100% trial 2; 16 – 27d). In trial 2 a negative control (NC) and NC + Enz (multi-enzyme composite; glucanase + xylanase + protease + phytase) were studied. The light program was 18 h light: 6 h dark and the temperature 27 °C - 22 °C. The retained energy RE (kcal) was evaluated as protein gain g * 5.66 kcal.g + fat gain * 9.35 kcal/g. Linear regression (RE kcal/kg<sup>0.70</sup> by ME intake kcal/kg<sup>0.67</sup>), and logarithmic model (HP kcal/kg<sup>0.67</sup> = a * e<sup>b (ME kcal/kg)</sup>) were fitted. MEm was determined as MEI at zero retention and NEm was determined from the logarithmic equation (a). The MEm requirement was 152 ± 8 kcal/kg<sup>0.67</sup>(R², 0.91) and 128 ± 6 kcal/kg<sup>0.67</sup>(R², 0.98) for trial 1 and 2 (only NC) respectively (P<0.01). The NEm was 97.2 ± 8 kcal/kg<sup>0.67</sup>(R², 0.87) and 97.9 ± 6 kcal/kg<sup>0.67</sup>(R², 0.95) for trial 1 and 2 (only NC) respectively (P<0.01). The NC + Enz produced a lower MEm of 8.5 kcal/kg<sup>0.67</sup> which represents 6.6% of the maintenance energy requirement (P<0.01). When this value was expressed as kg of feed intake the energy savings ranged from 75 kcal at ad libitum intake to 236 kcal at maintenance intake. The MEm for broilers at 22 °C in trial 2 (128 kcal/kg<sup>0.67</sup>) is in close agreement with other researchers (112 kcal/kg<sup>0.67</sup> Sakomura, 2004). The MEm in trial 1 (152) resembles the requirement of broilers housed in cooler T (158 kcal/kg; 13°C, Sakomura, 2004) suggesting the birds were needing extra maintenance energy to stay warm because of the low range of feeding levels compared to trial 2. To the author’s knowledge, this is the first work to evaluate maintenance energy by linear regression with a multi-enzyme composite. Further investigation is needed to understand the mechanisms by which enzymes are decreasing the maintenance energy requirement for broilers.

Key Words: Maintenance, Energy, Enzymes, Broilers

Metabolism & Nutrition II

M70 The effect of exogenous tannase on dietary energy, nutrient availability, gastrointestinal tract development and performance when different field bean cultivars are fed to chicks Jalil Abdullah<sup>1</sup>, S Rose<sup>1</sup>, A Mackenzie<sup>1</sup>, M Mirza<sup>1</sup>, S Llanas-Moya<sup>2</sup>, V Pirozglovi<sup>1</sup> 1Harper Adams University; 2Kerry Ingredients & Flavours

The feeding quality of field beans (Vicia faba) is variable and may be affected by the chemical composition of this raw material, particularly the level of tannins (Ravindran & Blair, 1992). An experiment was designed to investigate effects of an exogenous Aspergillus niger derived tannase (Kerry Ingredients and Flavours) on the four diets in which the main protein source was either soybean meal (SBM) or one of three field bean cultivars with differing hydrolysable tannins content on dietary apparent metabolisable energy (AMEn), dry matter (DMR) and nitrogen (NR) retention, and fat digestibility (FD) coefficients, gastrointestinal tract development and performance of broilers (from 13 to 21 d of age). One hundred and forty four (144) male Ross 308 chicks were allocated in a randomised block design to one of the nine replicate cages (2 birds per cage) and eight experimental diets arranged in a 2x4 factorial design (enzyme x diet). Tannase was supplemented at 3400 TU/kg feed. Wheat-based diets were formulated with 30% SBM or equivalent level of field beans from cultivars Maris Beads (MB), Sultana (S), and Wizard (W) as the main protein source. The hydrolysable tannins content of the field beans cultivars was 3.5, 7.3 and 12.3 (g/kg DM) for MB, S, and W, respectively. Enzyme-supplementation improved DMR (P<0.05), AMEn, FD and NR (P<0.001). Feeding tannase reduced (P<0.001) ileal digesta viscosity and improved (P<0.001) feed conversion (FCR). Birds fed tannase had reduced (P<0.05) size of the pancreas. Overall, compared to SBM, field bean diets had higher ME and DMR (P<0.001), but reduced (P<0.001) NR. Birds fed SBM had higher (P<0.05) feed intake, and weight gain (P<0.001), although birds fed Sul- tan based diet had poorer FCR (P<0.001). Tannase reduced (P<0.05) the size of the proventriculus and gizzard of birds fed field bean diets but not in SBM. Birds fed SBM had reduced (P<0.05) size of the pancreas compared to birds fed field beans. The data from the present study shows that tannase improves feeding value of all diets independent of their tannin contents. However, the results on gastrointestinal tract development suggest that further research on dietary tannin contents and tannase inclusion rates is warranted.

Key Words: tannase, field beans, AME, chicks, growth performance

M71 Phase one laying hens performance of Hy-line Brown laying fed fed soybean and soybean free diets using caged and cage free rearing system Morouj Al-Ajeeli<sup>1</sup>, Yasser Jameel, Mohammed Hashim, Hector Leyva-Jimenez, Christopher Bailey Arkansas

Table egg quality is a major consumer concern in the U.S. The objective of this study was to evaluate soybean and soybean-free diets fed to Hy-Line Brown Commercial Layers based on egg production and quality param-
eters. A total of 246 layers 20 wks old were divided into 2 groups (120 hens) housed individually in wire cages and (126 hens) housed in a cage free rearing system. The cage system consisted of 6 replicates/treatment of 10 birds/ replicate, and the cage free system consisted of 3 replicates/treatment of 21 birds/ replicate. Diets were formulated based on the nutrient requirements suggested by the management guide for those hens. Feed and water were offered ad libitum, and the hens were checked twice daily. All methods were approved by the TAMU Animal Care and Use Committee. Feed consumption was accessed every 2 wks and body weight was recorded every 28 d during the experiment for both facilities. Eggs were collected daily and egg weight (g) was recorded weekly. Egg quality data was collected at 2 wk intervals during the study to evaluate albumen height (mm), shell thickness, eggshell strength, and Haugh unit. For both facilities, results indicated that egg weight was greater in hens fed the soybean meal diet (53.5, 50.5 g cage and cage free respectively) than soybean free diet (51.1, 47.8 g cage and cage free respectively) after only 2 wks of feeding (P < 0.05). For egg production, there was no significant difference between diets in cages system. However, in the cage-free system, hens fed the soybean diet produced significantly more eggs (P < 0.05) beginning at 26 wks of age. Feed conversion ratio (g egg/g feed) was significantly better (P < 0.05) in the cage system for hens fed the soybean diet beginning at 22 wks of age, and cage free system beginning at 25 wks of age. For egg quality parameters, dietary treatments had no effect for either rearing systems. In conclusion, the soybean free diet can be a substitute diet to typical soybean diet with no impact on egg quality characteristics although it may influence egg weight and feed conversion ratio.

Key Words: brown eggs, egg production, egg quality, soybean diet, housing system

M72 Comparison of three phytases in broiler chickens Joshua Jendza1, Peter Ader2, Pengcheng Xue1, Sunday Acedodon1, Olayiwo Adeola1 1BASF Corp.; 2BASF SE, ‘Purdue University’; ‘University of Kentucky’

Growth performance response of male broiler chickens to 3 phytases were compared in a 42-d study. Birds were assigned to 96 pens in a randomized complete block design with 25 birds/pen, 8 pens/treatment, and 12 treatments. Treatments consisted of a positive control (PC), a negative control (NC) with P, Ca, and N reduced by 1.6, 1.2, and 18 g/kg, respectively, the NC + 4 levels of phytase A (phyA; 250, 500, 750, 1,000 FTU/kg), 3 levels of phytase B (phyB; 250, 500, 750 FTU/kg), and 3 levels of phytase C (phyC; 500, 750, 1,000 FYT/kg). Performance and tibia ash were determined at d 21 and 42, and digesta was collected on d 21. Data were analyzed as a randomized complete block design. The NC reduced (P < 0.05) all measures of performance and digestibility relative to the PC except for d 42 percent tibia ash. All 3 enzymes linearly improved (P < 0.01) BW gain, tibia ash weight, FL, and G:F, as well as linearly (P < 0.01) and quadratically (P < 0.05) improved the AID of P. Maximum improvement in 42-d BW, ADG, G:F, and tibia ash were similar across phytases. Tibia ash for birds fed 1,000 FTU phyA was second only to birds fed the PC at d 21 (960 vs 1,020 mg/bone) and d 42 (3,020 vs 3,180 mg/bone). The AID of P in birds fed phyB and phyC is best described as quadratic (peaking at 62.6 and 60.4%, respectively), but phyA increased to a plateau of 63.9% according to the mechanistic growth model. Whereas AID of energy in birds fed phyA and phyB is best described as quadratic (peaking at 75.8 and 75.3%, respectively), it was linear and only reached 74.4% at 1,000 FYT/kg in birds fed phyC. The inclusion of phyA, phyB, and phyC increased AID of Met by up to 53, 3.4, and 3.8%-points, respectively, and Met + Cys digestibility by 8.8, 5.9, and 6.1%-points, respectively. In conclusion, all 3 phytases were capable of improving performance, digestibility, and bone ash of broilers fed a P and Ca deficient diet, but there are substantial differences in the shape of the dose response curves for each enzyme.

Key Words: ash, broilers, digestibility, performance, phytase

M73 Development of a new standard protocol for evaluating phytase potential in broiler chicks Joshua Jendza1, Dieter Feuerstein2, Fengrui Zhang3, Olayiwo Adeola1 1BASF Corp.; 2BASF SE; 3Purdue University

A trial was conducted to examine possible interaction between age of broiler chicks at first exposure to P-deficient diets and the severity of P deficiency, with the goal of developing a new standard protocol for demonstrating the potential of a novel phytase. A total of 384 male 5-d old chicks were assigned to 48 battery cages based on a randomized complete block design. Treatments consisted of a 2 x 3 factorial arrangement of non-phytate P (1.5 or 1.3 g/kg) and age at first exposure to P-deficient diet (5, 6, or 7 d post-hatching). Prior to feeding P-deficient diets, all chicks consumed a common pre-starter diet containing 7.7, 5.1, and 10.0 g/kg P, non-phytate P (nPP), and Ca, respectively. Chicks were provided their respective P-deficient diets for 7 d, over which time gain and FI were monitored, and then euthanized for tibia ash. Performance, mortality, and tibia ash were analyzed as a 2 x 3 factorial, with mortality being analyzed as a poisson distribution using a generalized linear model. As expected, the main effect of age was for BW, gain, FI, and tibia ash increase as the age of the birds increased from 5 to 7 d post-hatching (linear; P < 0.01). Birds fed the lowest nPP diet grew slower (350 vs 373 g/d; P = 0.04), tended to be less efficient in their feed utilization (G:F of 686 vs 728 g/kg; P = 0.06), and had lower final tibia ash (282 vs 307 mg/bone; P = 0.04). The only significant interaction between age of broiler chicks at first exposure to P-deficient diets and the severity of P deficiency was seen for mortality (P = 0.01). Generally, mortality decreased the older the chicks were when started on the P-deficient diet, but (somewhat paradoxically) the effect was less pronounced in chicks fed a diet containing 1.5 g/kg nPP than in chicks fed the 1.3 g/kg nPP diet (P < 0.05). An ideal phytase evaluation model will supply as little intrinsically digestible P as possible without increasing mortality. Based on these results, it was decided that feeding a diet with 1.3 g/kg nPP for 7 d starting at d 7 post-hatching would be optimal.

Key Words: Ash, Broilers, Mortality, Phosphorus

M74 Validation of a new standard protocol for evaluating phytase potential in broiler chicks Joshua Jendza1, Peter Ader2, Dieter Feuerstein2, Fengrui Zhang3, Olayiwo Adeola1 1BASF Corp.; 2BASF SE; 3Purdue University

The objective of this trial was to evaluate a novel phytase (NPE). Male broilers were assigned to 96 battery cages (8 birds/cage) and 12 treatments based on BW in a randomized complete block design on d 7. Treatments consisted of the NC (no supplemental inorganic P (IP), NC + 0.5, 0.9, 1.3, 1.7, and 2.1 g/kg IP from mono-calcium phosphate (MCP), and NC + 250, 500, 750, 1,000, 1,500, and 2,000 FTU/kg from NPE were fed for 14 d. Excreta was collected by cage on d 19 to 21. On d 21 birds and remaining feed were weighed for performance evaluation and 5 birds/cage were euthanized for ileal digesta and tibia collection. Contrasts and regressions were used to characterize the response to supplemental IP from MCP and phytase. Both MCP and NPE resulted in linear improvements in gain, feed intake, and tibia ash (P < 0.01), but only NPE resulted in a linear improve in feed efficiency (P < 0.01). Birds fed the NC + 2,000 FTU were 46 g heavier at d 21, and grew 8% faster than birds fed the P-adequate NC + 2.1 g IP from MCP diet (581 vs 536 g/d). The phytase fed birds also picked up 3.7 points of feed efficiency over the MCP supplemented birds (0.772 vs 0.735) at their highest respective doses. Supplemental MCP improved Ca and P retention, and AID of P (P < 0.01) but not Ca (P < 0.10). Supplemental NPE improved AID and retention of Ca and P (P < 0.01). Goodness-of-fit tests determined bird performance and mineral retention responses to phytase were best characterized by a non-linear plateau model, whereas the response to MCP was best characterized by a linear model. This makes a single FTU to IP from MCP conversion factor impossible, but still allows for the calculation of conversion equations. Based on these equations it was determined that 547, 741, and 743 FTU/kg of NPE were able to replace the 2.1 g IP from MCP for gain, feed intake, and feed efficiency, respectively. Apparent retention in response...
to supplemental phytase plateaued at 0.866 and 0.620 for P and Ca, respectively, and AID plateaued at 0.841 and 0.730, respectively. Birds fed the highest level of supplemental MCP are predicted to have retained 2.06 g P/d, which equates to approximately 1,700 FTU/kg from NPE. Higher doses of NPE were able to achieve performance greater than the NC + 2.1 g IP from MCP.

**Key Words:** Ash, Broilers, Digestibility, Phosphorus, Retention

### M75 Effect of exogenous xylanase, amylase and protease as single or combined activities on growth performance of broilers fed corn/soybean meal-based diets

Ahmed Amerah1, Luis Romero1, Velmurugu Ravindran1, 2Danisco Animal Nutrition, DuPont Industrial Biosciences; 2Massey University

The aim of the present experiment was to examine the effect of exogenous xylanase (X), amylase (A) and protease (P) as single or combined activities (XAP) on the performance of broilers fed corn/soybean meal-based diets. A nutritionally adequate, positive control (PC) diet was formulated. The negative control (NC) diet was formulated to be lower in metabolizable energy (~86 kcal/kg diet) and amino acids compared to PC. The other 4 treatments were based on the NC and they were either supplemented with X, A, P or a combination of X, A and P (to provide 2000 U of X, 200 U of A, and 4000 U of P/kg diet). All diets contained phytase (1000 FTU/kg) which contributed 0.15% AsP and 0.13% Ca. Each diet was fed ad libitum to 10 pens of 20 male broilers (Ross 308). Data were subjected to one-way ANOVA and means were separated by Student’s test. In the starter period (1-21d), both X and XAP improved (P<0.05) weight gain (WG) and FCR compared to NC. In the finisher phase (21-42d), only XAP improved FCR compared to NC (1.63 vs 1.71, respectively). Over the entire period (1-42d), WG was not influenced (P>0.05) by dietary treatment. Both, X and XAP had lower (P<0.05) FCR compared to NC (1.54 and 1.51 vs 1.57, respectively). However, birds fed diet supplemented with XAP had better (P<0.05) FCR compared to birds fed single activities. In conclusion, a combination of X, A and P improved broiler performance compared to birds fed diets supplemented with a single enzyme activity.

**Key Words:** broiler, individual enzymes, multienzyme product

### M76 Effect of commercial exogenous proteases and carbohydrases on nitrogen and standardized ileal amino acid digestibility of canola meal, sunflower meal, and meat and bone meal in broilers fed semi-purified diets

Ahmed Amerah1, Luis Romero1, Velmurugu Ravindran1, 2Danisco Animal Nutrition, DuPont Industrial Biosciences; 2Massey University

Three simultaneous trials were conducted to evaluate the effect of different commercial exogenous enzymes on nitrogen (N) and standardized ileal amino acid digestibility (SIAAD) of canola meal (CM), sunflower meal (SFM), and meat and bone meal (MBM) in broilers fed semi-purified diets. 416, 25d old broiler chicks (Ross 308) were allocated on weight basis to 104 cages. Experimental diets were fed from 25 to 34d. Ileal digesta was subjected to one-way ANOVA and means were separated by Student's t-test. In Exp.1 the 6 dietary treatments were: control CM (CCM); CM + protease A (PA; expressed in Bacillus subtilis); CM + protease B (PB; expressed in Bacillus licheniformis); CM + xylanase X (XA; expressed in Trichoderma longibrachiatum); CM + xylanase B (XB; expressed in Trichoderma longibrachiatum); CM + a combination of XA, amylase and PA (XAM; amylase expressed in Bacillus licheniformis). In Exp.2 the 3 dietary treatments were: control SFM (CSFM); SFM + XAP, SFM + XB. In Exp.3 the 3 dietary treatments were: control MBM (CMBM); MBM + PA; MBM + PB. Protein-free diet was used to determine the endogenous AA losses for the calculation of true digestibility values. In Exp.1 XAP and PA improved (P<0.05) N digestibility compared to CCM and PB. XAP and PA tended (P<0.06) to improve SIAAD of His and Lys compared to CCM and PB treatments. In Exp.2 XAP improved (P<0.05) N and SIAAD digestibility of Lys and Cys compared to CSFM and XB. XAP tended (P=0.06) to improve SIAAD of Met compared to XB. In Exp.3 PA improved (P<0.05) N and SIAAD digestibility of Val, Iso, Leu, Tyr and Phe compared to CMBM and PB. Both PA and PB improved (P<0.05) SIAAD digestibility of His and Lys compared to CMBM. PA improved (P<0.05) SIAAD digestibility of Thr and Ser compared to CMBM. In conclusion, the response of N digestibility and SIAAD of CM, SFM and MBM varied depending on enzyme product. Enzymes combination may be required to improve nutrient digestibility of some vegetable proteins.

**Key Words:** Broilers, Digestibility, Protease, Carbohydrase, Vegetable proteins

### M77 Effects of a novel xylanase enzyme on broiler performance and intestinal viscosity

Roger Davin1, Fenglan Yan1, Jonny Lyon1, Mercedes Vázquez-Ahón2, University of Missouri; 2Novus International Inc.; 1Verenium Corporation

A floor pen trial was conducted to evaluate response of a thermostable xylanase (Cibenza® Xylavarse™, Novus International Inc.) in broilers fed wheat soy based diets. A three-phase feeding program was used: starter (0-22 d), grower (22-35 d), and finisher (35-44 d) phases. Diets were in pellet form except starter diets, which were crumbled. The study consisted of 9 dietary treatments including a positive control (PC) and two negative control treatments with 100 kcal/kg less ME, NC and NC30%. All control diets used wheat as the sole cereal grain except NC30% which contained 30% wheat. Xylanase was added to NC at 0, 250, 500, 750, 1000 U/kg and to NC30% at 0, 500, and 1000 U/kg. Each treatment had 8 replicate pens of 22 male broilers. Body weight, feed intake, FCR, and mortality were determined at 22, 35, and 42 d. On d 21 and 43 two birds per pen were killed to measure the weight of proventriculus, gizzard, small intestine and cecum contents, and pancreas. Small intestine digesta was analyzed for viscosity. Carcass parameters were obtained on d 44 from five birds per pen. Data were analyzed with one way ANOVA and orthogonal polynomial contrasts were used to test the linear and quadratic effects of xylanase in NC diets, a P-value ≤ 0.05 was considered significantly different. Body weight was not affected by treatment throughout the trial except on d 21 which xylanase showed a quadratic response; greatest value was reached by NC30% 1000 U/kg (1.154 kg). Reduction of ME by 100 kcal/kg increased FCR by 5.7 points on d 35 and by 4.9 points on d 42; this increase was counteracted by xylanase at 500 and 750 U/g (1.56 vs. 1.53 and 1.52 on d 35; 1.71 vs. 1.66 and 1.65 on d 42). Xylanase reduced FCR in a quadratic manner on d 35 and 42; no differences were detected on NC30% diets. Broilers fed 100 kcal/kg less ME consumed 148 g (2.6%) more feed throughout the experiment; xylanase at 500, 750 and 1000 U/kg decreased overall feed intake by 276, 220 and 223 g (4.90, 3.89 and 3.94%, respectively). Xylanase effect on gut weights and carcass parameters was inconsistent. All xylanase levels reduced digesta viscosity on d 21 and 42 in both NC and NC30% diets. In summary, xylanase supplementation reduced digesta viscosity and moderate levels of xylanase (500-750 U/kg) improved FCR in broilers fed wheat based diets.

**Key Words:** broiler, growth performance, viscosity, wheat, xylanase

### M78 Effects of functional oils on performance parameters of broiler chickens under two different ambient temperatures

Joan Torrent1, Ernesto Ávila González2, Carlos López Coello2, José Arceneconal1, 1Oligo Basics USA LLC; 2Dep. of Medicina y Zootecnia de Aves, FMVZ-UNAM; 3Universidad Michoacana de San Nicolás de Hidalgo

The effects of supplementing a commercial mixture of functional oils (Essential, Oligo Basics USA LLC, Wilmington, DE; active ingredients: cashew nut shell oil and castor oil), on performance and carcass parameters were evaluated in broiler chickens under two different ambient temperatures. A total of 2,240 mixed sex one-day old chickens, with an average initial weight of 45 g, were sorted by weight, randomized among 28 floor pens with 90 chickens per pen, and assigned to one of four dietary treatments in a 2 x 2 factorial design with two ambient temperatures (moderate or high) and two levels of Essential supplementation (0 or 1.5 kg/ton).

**Key Words:** essential fatty acids, performance parameters, broiler chickens, Essential Oils
Ambient temperatures and humidities averaged 21.4 ± 3.2°C and 81.2 ±10.4%, and 24.1 ± 5.0°C and 72.8 ± 10.4% for the moderate and high ambient temperature, respectively. Neither ambient temperature nor Essential affected intake. However, Essential supplementation increased live weight at d 42 (2.593 vs 2.553 kg; P < 0.01). Feed conversion was not significantly affected by ambient temperature, but tended to be better for the birds supplemented with Essential when it was not corrected for mortality (P = 0.07). However, when the FCR was corrected for mortality and weight (2.5 kg), birds supplemented with Essential were more efficient (1.565 vs 1.598; P = 0.03). Mortality was increased by high ambient temperatures (P < 0.01), but was not affected by Essential. Both high ambient temperature and Essential increased carcass yield (P < 0.01). Breast yield, both in weight and percentage, was increased by Essential supplementation (P < 0.01) and by an ambient temperature by Essential supplementation interaction (P < 0.01). Whereas, high ambient temperatures decreased breast yield when Essential was not supplemented, breast yield was not decreased in birds supplemented with Essential. Whereas leg + thigh yields were not affected by Essential, high ambient temperatures increased both their weights and percentage (P < 0.01). Neither ambient temperature nor Essential affected the pigmentation of the birds. In conclusion, whereas Essential supplementation improved weight gains, feed gain ratios and carcass characteristics, high ambient temperatures decreased breast and increased leg + thigh yields when Essential was not supplemented.

Key Words: Functional oils, carcass characteristics, ambient temperature

M80 Effects of four dietary oils on cholesterol and fatty acid composition of egg yolk in layers Adesibig Aboogula*, Richard Omidiwura, Ademola Oyeyemi, Estuace Iayi, Solomon Adelani University of Ilbad

Dietary cholesterol has elicited the most public interest as it relates with coronary heart disease. Thus, humans have been paying more attention to health, thereby reducing consumption of cholesterol enriched food. Egg is considered as one of the major sources of human dietary cholesterol. However, an alternative way to reduce the potential cholesterolemic effect of eggs is to modify the fatty acid composition of the yolk. The effect of palm oil (PO), soyabean oil (SO), sesame seed oil (SSO) and fish oil (FO) supplementation in the diets of layers on egg yolk fatty acid, cholesterol, egg production and egg quality parameters was evaluated in a 42-day feeding trial. One hundred and five Isa Brown laying hens of 34 weeks of age were randomly distributed into seven groups of five replicates and three birds per replicate in a completely randomized design. Seven corn-soyabean basal diets (BD) were formulated: BD+No oil (T1), BD+1.5% PO (T2), BD+1.5% SO (T3), BD+1.5% SSO (T4), BD+1.5% FO (T5), BD+0.75% SO+0.75% FO (T6) and BD+0.75% SSO+0.75% FO (T7). Five eggs were randomly sampled at day 42 from each replicate to assay for the cholesterol, fatty acid profile of egg yolk and egg quality assessment. Results showed that there were no significant (P>0.05) differences observed in production performance, egg cholesterol and egg quality parameters except for yolk height, albumen height, yolk index, egg shape index, haugh unit, and yolk colour. There were no significant differences (P>0.05) observed in total cholesterol, high density lipoprotein and low density lipoprotein levels of egg yolk across the treatments. However, diets had effect (P<0.05) on TAG (triacylglycerol) and VLDL (very low density lipoprotein) of the egg yolk. The highest TAG (603.78 mg/dl) and VLDL values (120.76 mg/dl) were recorded in eggs of hens on T3 (1.5% sesame seed oil) and was similar to those on T1 (1.5% soyabean oil), T4 (1.5% fish oil) and T5 (0.75% soyabean oil + 0.75% fish oil). However, results revealed a significant (P<0.05) variations on eggs’ summation of polyunsaturated fatty acid (PUFA). In conclusion, it is suggested that dietary oils used in this study could be included in layers’ diets to produce designer eggs low in cholesterol and high in PUFA especially omega-3 fatty acids.

Key Words: Dietary oils, Egg cholesterol, Egg fatty acid profile, Egg quality parameters

Environment Management I

M81 Performance of warm regions’ laying chickens under prolonged natural heating conditions Essam El-Gendy* Cairo University

The negative impact of natural heating conditions on the performance of local chickens in warm regions is always minimal, but it becomes pronounced when heating waves extend for long time. The objective of this study was to monitor egg production of different native genetic groups under prolonged natural heating conditions during the summer in Egypt. The genetic groups were normally-feathered line CE1 and naked-neck line CE3 and both are selected 11 generations for 6-wk BW, the normally-feathered genetic control line CE2 and the naked-neck genetic control line CE4 and Sinai Bedouin fowl. Lines CE1, CE2, CE3 and CE4 have been derived from a native population that naturally orientates the humid warm environment, whereas Sinai Bedouin fowl adapt the dry desert environment. The performance of laying hens and egg characteristics were obtained for 18 days starting one month post maturation. During the experimental period, the upper ambient temperature ranged 33-37°C with an average of 35.2°C, the lowest temperature ranged 23-27°C with an average of 24.3°C and the average temperature/day was 29.8°C. The maximum humidity ranged 69-100%RH with an average of 86.2%RH, the minimum humidity ranged 11-43%RH with an average of 21.6%RH, and the average humidity/day was 57%RH. The selected lines CE1and

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