

with the commercial vaccine and boosted with plant-expressed sigma C protein had 90% protection. Results were similar to our previous research with infectious bursal disease virus, which showed that the transgenic plant expressed protein can be an effective booster vaccine for chickens primed with commercial live vaccines.

**Key Words:** avian reovirus, sigma C protein, plant vaccine, oral immunization

**S-M66 Effect of avian adenovirus infection in broiler breeder progenies infected with chicken anemia and infectious bursal disease viruses.** I. Alvarado\*, P. Villegas, F. Perozo, and L. Purvis, *University of Georgia, Athens.*

A significant protection provided by maternal antibodies against avian adenovirus serotypes 8 and 11, previously associated with the inclusion body hepatitis and hydropericardium syndrome, was observed in breeder progenies after challenge at 1 and 7 days of age. At two weeks of age, in the presence of low maternal antibodies against avian adenovirus (AAV), chicken anemia virus (CAV) and infectious bursal disease virus (IBDV), birds from the same progenies were challenged with either the FAV serotype 8, a field CAV strain and/or the IBDV Edgar strain. The level of protection against clinical disease was evaluated in these progenies.

**Key Words:** avian adenovirus, CAV, IBDV

**S-M67 Sequence comparison of ORF1, E3 and fiber genes from different isolates of Turkey Hemorrhagic Enteritis Virus.** F. Pierson\*, N. Beach, X. Meng, N. Sriranganathan, R. Duncan, and C. Larsen, *Virginia-Maryland Regional College of Veterinary Medicine, Virginia Tech, Blacksburg.*

Turkey Hemorrhagic Enteritis Virus (THEV) is a *Siadenovirus* that causes disease in turkey poulters characterized by splenomegaly, depression, bloody diarrhea, and death. The purpose of this study is to determine which viral genes are involved in virulence. A previous study comparing the full-length genome sequences of a virulent field isolate and an avirulent vaccine strain revealed point mutations resulting in putative amino acid changes in seven viral gene products. Further sequencing allowed narrowing of the focus from seven genes to three: ORF1, E3, and fiber. ORF1 and E3 encode non-structural proteins that have unknown function. The fiber is the structural protein responsible for target cell adhesion. The ORF1, E3, and fiber genes were sequenced in eleven different strains of THEV: four tissue culture vaccine strains, four virulent field isolates, the VA avirulent strain (VAS), the VA Virulent strain (VVS), and a pheasant vaccine strain. PCR primers amplifying overlapping gene segments were designed based on the sequence of the VAS. After amplification, both strands of each PCR product were sequenced. Although the data reveals a high level of homology (99.9%) between all of the strains, there are several mutations found in each strain. Virulent strains can be easily differentiated from the vaccine strains based on common mutations in the ORF1 and E3 genes. The virulent field isolates differed substantially from the VVS in all three genes. It is difficult to predict which of the three candidate genes is responsible for virulence, or if it is a combination of factors. The biological mechanism responsible for intestinal lesion formation and mortality is not known, though there is strong evidence that it is immune mediated. Several mutations were found in the fiber knob, but none that clearly differentiate the virulent strains from the vaccine strains. It is possible that ORF1 and E3 are responsible for interference with host cell cycle regulation much like E1A in mammalian adenoviruses. Future studies will attempt to clarify the roles of ORF1 and E3 during infection.

**Key Words:** siadenovirus, hemorrhagic enteritis, turkey, virulence, sequence

## Monday, January 23 Nutrition II Room: B313

**S-M68 Limiting dietary amino acid response surface estimates for growing broilers.** A.C. de Leon\*<sup>1</sup>, A. Corzo<sup>1</sup>, W.B. Roush<sup>2</sup>, and M.T. Kidd<sup>1</sup>, <sup>1</sup>Mississippi State University, Mississippi State, <sup>2</sup>USDA-ARS, Mississippi State, Mississippi.

The aim of this study was to obtain a model to predict digestible Lys, TSAA and Thr levels that optimized performance of broilers from 15 to 35 d of age. Ross x Ross 308 broilers (935) were allotted to 85 floor pens at d 1. Birds were fed common diets to d 15. At d 15, dietary independent variables were digestible Lys ( $X_1$ ; 0.95, 1.05 and 1.15%), digestible TSAA ( $X_2$ ; 0.70, 0.77 and 0.84%) and digestible Thr ( $X_3$ ; 0.60, 0.66, and 0.72%), and were optimized using a 3-factor, 3-level Box-Behnken design. The design layout involved 12 design points of amino acid levels equidistant around a center point. The center point was replicated 5 times creating 17 treatments (5 study replications). One corn and soybean meal diet was used. Analyzed amino acid levels of corn and soybean meal were utilized for linear programming formulation. Diets con-

tained 3,175 kcal ME/kg and were adequate or surplus in nutrients except Lys, TSAA and Thr. Dependent variables were weight gain ( $Y_1$ ), feed intake ( $Y_2$ ), feed:gain ( $Y_3$ ), carcass weight ( $Y_4$ ), carcass yield ( $Y_5$ ), front half weight ( $Y_6$ ), front half yield ( $Y_7$ ), back half weight ( $Y_8$ ), back half yield ( $Y_9$ ), abdominal fat weight ( $Y_{10}$ ), abdominal fat percentage ( $Y_{11}$ ) and mortality ( $Y_{12}$ ). Quadratic ( $Y_2, Y_3, Y_5, Y_7, Y_{10}$  and  $Y_{11}$ ) and cross product ( $Y_6$  and  $Y_9$ ) differences ( $P=0.05$ ) were detected. Response surface methodology predicted maximal response (%) levels of dietary amino acids ( $X_1, X_2, X_3$ ) for:  $Y_2$ , 1.13, 0.93 and 0.83, respectively;  $Y_3$ , 1.07, 0.77 and 0.65, respectively;  $Y_5$ , 1.01, 0.78 and 0.68, respectively;  $Y_7$ , 1.00, 0.78 and 0.67, respectively;  $Y_{10}$ , 1.08, 0.79 and 0.66, respectively; and  $Y_{11}$ , 1.09, 0.78 and 0.66, respectively. Average recommendation of quadratic responses for digestible Lys, TSAA and Thr were 1.06, 0.81 and 0.69, % respectively. Cross-product digestible amino acid interactions for  $Y_6$  and  $Y_9$  resulted in TSAA and Thr to Lys ratios of 0.72 and 0.67, and 0.75 and 0.66, respectively. Response surface digestible

amino acid predictions and cross product digestible amino acid interaction ratios are in agreement with amino acid needs reported from dose response and factorial design experiments.

**Key Words:** response surface, Box Behnken, Lys, Met, Thr

**S-M69 Effects of a reduction of dietary crude protein on performance of commercial broilers.** E. Guaiume\*<sup>1</sup>, J. Firman<sup>1</sup>, D. Hoehler<sup>2</sup>, J. Usry<sup>3</sup>, D. Burnham<sup>3</sup>, and J. Parcell<sup>1</sup>, <sup>1</sup>University of Missouri, Columbia, <sup>2</sup>Degussa Corporation, Kennesaw, Georgia, <sup>3</sup>Ajinomoto Heartland LLC, Chicago, Illinois.

A study was performed to determine if feeding reduced dietary crude protein (CP) would affect performance in commercial broilers fed from hatch to week 7. Fourteen hundred forty straight-run Cobb 500 broiler chicks were randomly assigned to 4 treatments with 12 replicate pens containing 30 birds each. Diets were formulated to be isocaloric and to have the same minimum digestible amino acid levels. An industry standard diet served as the control (A) and the benchmark for performance. The remainder of the treatments (B, C, and D) had CP reduced in 0.5% increments with addition of crystalline amino acids to ensure that lysine, methionine, and threonine levels remained constant. Birds were weighed at 2, 4, 6, and 7 weeks of age for feed to gain calculation. At week 7, 4 birds per pen (48/trt) were sacrificed and had fat pad and carcass weighed, and carcass and meat yield determined. In the starter phase, birds fed diet D showed a slight decrease ( $P < .05$ ) on feed intake (FI) and body weight gain (BWG), whereas other treatments had no effect ( $P > .05$ ) on feed to gain (FDGN). For the grower phase, different levels of CP did not ( $P > .05$ ) affect FI. However, birds fed diet C had poorer ( $P < .05$ ) FDGN when compared to diet A and a further decrease was observed when diet D was fed. In the finisher phase, treatments had no effect ( $P > .05$ ) on performance. Due to heat stress, extreme mortality was observed from week 6 to 7 and performance data could not be analyzed, although, final body weight of surviving birds was similar. At week 7, treatments had no effect ( $P > .05$ ) on abdominal fat pad, carcass and breast meat yield. Overall, the result of this experiment suggest that a decrease of CP in the magnitude used in this study did not affect performance of broilers at 6 weeks of age and meat yield of surviving birds at 7 weeks of age.

**Key Words:** low crude protein, broilers, Cobb, performance, meat yield

**S-M70 Increasing essential amino acid level does not result in compensatory growth following infection in broiler chickens.** P. Sirimongkolkasem\* and K. Klasing, University of California, Davis.

Two experiments were conducted to investigate the effect of essential amino acid (EAA) levels on compensatory growth post infection in broiler chickens. Infection was simulated by subcutaneous injection with *S typhimurium* lipopolysaccharide (LPS) when chickens were 8 d of age (d0 of experiment). In both experiments LPS injected and uninjected birds were given 3 EAA levels resulting in a 2x3 factorial arrangement of treatments. The proportion of EAA was kept in the ideal ratio relative to lysine in all diets. Feed intake and BW were recorded on d0, 1, 4 and 7 for experiment 1 with the addition of d14 for experiment 2. In experiment 1, LPS injected and uninjected birds were fed 80% NRC, 100% NRC and 130% NRC EAA level diets. In experiment 2, 100% NRC,

120% NRC and 140% NRC EAA level were used to determine if higher EAA levels or a longer period of recovery are necessary for complete compensation to an LPS challenge. In both experiments, LPS injection resulted in a decrease in average daily gain, feed intake and feed efficiency ( $P < 0.01$ ) on d0–1. The decrease in feed intake due to LPS injection persisted until day 4. In experiment 1, increasing EAA levels resulted in significant improvements in live performance throughout the experiment (d0–7). LPS injection resulted in a higher feed efficiency only in chicks fed 80 and 100% EAA on d1–4. LPS injection resulted in a decrease in average daily gain only in birds fed 130% EAA on d1–4. LPS injection did not affect average daily gain on d4–7. In experiment 2, no interaction between LPS injection and EAA levels was found in any of the parameters measured. Throughout the experiment (d0–14), average daily gain and feed efficiency increased as EAA level increased from 100% to 120%. Further improvement was not observed when EAA level was increased to 140% in any parameter measured. These results indicate that LPS challenged birds did not respond to the highest level of EAA better than controls. Thus dietary EAA level is not a factor limiting compensatory growth following LPS challenge.

**Key Words:** broiler, essential amino acid, compensatory growth, lipopolysaccharide, Infection

**S-M71 The effect of source of vitamin E on growth performance and vitamin E excretion in broilers.** D. Lauzon\*<sup>1</sup>, S. Johnston<sup>1</sup>, L. Southern<sup>1</sup>, Z. Xu<sup>1</sup>, and B. Cousins<sup>2</sup>, <sup>1</sup>Louisiana State University Agricultural Center, Baton Rouge, <sup>2</sup>BASF Corporation, Florham Park, New Jersey.

A total of 330 male Ross x Ross broilers were used in 2 experiments to determine the effect of various sources of vitamin E on growth performance and fecal vitamin E concentrations. Chicks were pretested from d 0 to 7 posthatching on a corn-soybean meal (C-SBM) diet without vitamin E supplementation, and the experiments lasted from 7 to 19 d posthatching. Each treatment was replicated with a minimum of 5 pens of 5 chicks each. Initial and final BW were 155 and 684 g in Experiment 1 and 155 and 691 g in Experiment 2. In Experiment 1, the dietary treatments were the C-SBM diet with varying levels (0, 30, 100, or 300 ppm) of supplemental vitamin E adsorbed to either verxite or to silica. In Experiment 2, the dietary treatments were the 0 and 30 ppm vitamin E adsorbed to verxite or to silica. Daily gain and feed intake and gain:feed were not affected ( $P > 0.10$ ) by vitamin E source in either trial. The mean fecal vitamin E concentration at 7 d posthatching was 14.3 ppm (DM basis). At both 100 and 300 ppm supplemental vitamin E, an average of 94% and 44% of vitamin E intake from verxite and silica, respectively, was excreted in the feces, but at 30 ppm vitamin E, 49 and 45% of vitamin E intake was excreted in the feces (vitamin E source,  $P < 0.01$ ; and source x level interaction,  $P < 0.08$ ). In Experiment 2, 52 and 43% of vitamin E intake from verxite and silica was excreted in the feces (source,  $P < 0.02$ ). Based on the results of these experiments, verxite should not be used as a carrier for vitamin E.

**Key Words:** broiler, vitamin E, verxite, silica, excrete

**S-M72 Cellular and humoral immune response in birds fed different levels of Arginine and Vitamin E.** S. Abdukalykova\* and C. Ruiz-Feria, McGill University, St-Ane de Bellevue, QC, Canada.

The objective of this experiment was to determine the combined effects of vitamin E (VE) and Arginine (Arg) on humoral and cellular immunity of broilers. One d-old chicks were used. Feed (22.5% CP, 3150 Kcal/kg EM, and 1.2% Arg) and water were provided *ad libitum*. A 2x3 factorial arrangement of treatments was used with 2 levels of Arg: normal (NARG) and high Arg (HARG, 0.3% Arg in the drinking water); and 3 levels of VE (40, 80, 400 IU/kg feed). The humoral immunity was measured as antibody responses to an i.p. injection of sheep red blood cells (10% SRBC) by agglutination assay in serum. Cell-mediated immune response was assessed by cutaneous basophil hypersensitivity (difference in foot-web skin thickness after and before injection, mm) to phytohemagglutinin (PHA)-P at d 17 and PHA-M at d 40. At 4 d the antibody titers ( $\log_2$ ) to SRBC were higher in HARG ( $4 \pm 0.18$ ) than in NARG birds ( $3.22 \pm 0.18$ ;  $P = 0.01$ ) and in VE-80 ( $4.66 \pm 0.22$ ) than in VE-40 and VE-400 birds ( $3.33$  and  $2.83 \pm 0.23$ , respectively;  $P < 0.001$ ). At 8 and 16 d antibody titers against SRBC were not different between HARG and NARG birds, but the VE-80 group maintained higher antibody titers ( $6.37 \pm 0.25$ ) than VE-40 and VE-80 ( $4.75$  and  $4.87 \pm 0.25$ , respectively;  $P < 0.001$ ). After the first injection with PHA-P at 17-d HARG showed a higher response ( $0.641 \pm 0.05$ ) than NARG ( $0.463 \pm 0.05$ ) birds ( $P < 0.018$ ) whereas VE levels did not have a significant effect. When the same birds were injected with PHA-M at d 40 Arg levels did not have an effect whereas VE-400 had a lower response ( $1.7 \pm 0.08$ ) as compared with VE-40 and VE-80 ( $2.2$  and  $2.4 \pm 0.08$ , respectively;  $P < 0.001$ ). However, when birds injected with PHA-M at d 40 without previous PHA exposure HARG birds had a stronger response ( $1.9 \pm 0.08$ ) than NARG birds ( $1.5 \pm 0.07$ ;  $P < 0.001$ ) and VE-400 showed a lower response ( $1.5 \pm 0.09$ ) than VE-40 and VE-80 birds ( $1.7$  and  $1.9 \pm 0.09$ , respectively;  $P < 0.05$ ). Our results indicate that high levels of Arg and VE may have a complimentary effect on immune response, with Arg accelerating the response and VE helping to maintain antibody production.

**Key Words:** arginine, vitamin E, cell-mediated immune system, cutaneous basophil hypersensitivity, phytohemagglutinin

**S-M73 Growth performance of salmonella-challenged broilers fed normal and high threonine (THR) diets supplemented with egg immunoglobulins (IgY).** D. Bohorquez\*, R. Plunke, E. Oviedo-Rondon, and P. Ferket, *North Carolina State University, Raleigh.*

The adverse effects of salmonella colonization on the growth performance of broilers maybe reduced by dietary supplementation of THR and/or IgY from hens hyperimmunized with salmonella antigens (CAMAS, Inc. Le Center, MN). Male Ross 308 broilers were randomly assigned to 32 litter floor pens in a curtain-sided house, or 32 cages in a total confinement house (25 birds/pen or cage). All the birds were orally inoculated at 3 d of age with  $10^6$  cfu of a mixed culture of salmonella (*S. enterica subsp. enterica* serotypes Tyhimurium, Heilderburg, Newport, and Kentucky). All birds were assigned to 4 dietary treatments consisting of a 2 X 2 factorial of 2 levels of THR (64% and 75% or lysine) and two levels of liquid egg containing salmonella-specific IgY (0 and .54%). Body weights (BW), feed/gain (FCR), and % mortality rate were determined at 14, 28, and 42 d. Birds raised in the litter house had greater BW (2736 g vs 2668 g,  $p < .05$ ) and lower FCR (1.841 vs 1.935,  $p < .05$ ) than those raised in the cage house; however, there was a signifi-

cant house X treatment effect on growth performance and mortality rate. In the litter house, only dietary IgY increased BW by 4% at 14 d ( $p < .05$ ). Treatment effects were more evident in the cage house. There was a significant THR X IgY effect on 14 d FCR. Among low THR birds, IgY reduced 14 d FCR (1.517 vs 1.352,  $P < .010$ ), whereas IgY had a marginal effect among the high THR birds (1.470 vs 1.455). However, IgY adversely affected 42 d BW (2697 g vs 2639 g) and FCR (1.890 vs 1.981), likely because of dietary moisture dilution effects. A highly significant THR X IgY effect ( $p < .005$ ) was observed on mortality rate through to 42 d. IgY significantly reduced mortality rate of birds fed the low THR diets (20.1% vs 9.21%), but not among birds fed the high THR diets (8.13% vs 14.7%). Dietary supplementation of IgY during the starter phase of salmonella-challenged broilers positively affected growth performance and livability, but this effect was quenched by high dietary THR inclusion.

**Key Words:** broilers, *Salmonella*, growth performance, threonine, immunoglobulins

**S-M74 The effect of corticosterone-induced stress on amino acid digestibility in broiler chickens.** W.S. Virden\*<sup>1</sup>, C.D. Zumwalt<sup>1</sup>, D. Hoehler<sup>2</sup>, M.S. Lilburn<sup>3</sup>, and M.T. Kidd<sup>1</sup>, <sup>1</sup>Mississippi State University, Mississippi State, <sup>2</sup>Degussa Corporation, Kennesaw, Georgia, <sup>3</sup>Ohio State University, Columbus.

Broilers exposed to long term stressors must acclimate to the stress, causing a hormonal cascade, eventually resulting in the release of corticosterone (CS). If CS levels remain elevated, several consequences can occur, the most notable being the catabolism of skeletal protein through CS-induced gluconeogenesis. Research has demonstrated that controlled stress can be induced in broilers through administration of dietary CS. In this research two experiments (Exp) were conducted to establish amino acid (AA) digestibility coefficients (DC) for broilers given CS-induced stress using the apparent ileal digestibility assay. For Exp 1, 192 Ross x Ross 708 male broilers were placed into 16 floor pens (12 birds/pen). For Exp 2, 120 Ross x Ross 308 male broilers were placed into 10 floor pens (12 birds/pen). Pens contained nipple drinkers, pen feeders, and soft-wood shavings. Both Exp were completely randomized designs using pen as the experimental unit (Exp 1: 2 treatments, 8 replications; Exp 2: 2 treatments, 5 replications). In both Exp, chicks were given a common starter diet from d 1 to 20. From d 21 to 30, broilers were given treatment 1: a control diet, or treatment 2: control + 15 mg of CS/kg of diet dissolved in soybean oil. Both diets were based on corn (65.07 %) and soybean meal (26.36 %), and contained an indigestible marker (chromic oxide 0.3 %). Diets were formulated to contain 3175 kcal ME, 18.5 % CP, 0.79 % digestible TSAA, and 1.00 % digestible Lys. On d 30, the ileal contents were removed from 3 birds/pen, pooled, dried, and analyzed for AA content. Amino acid DC were calculated using the following equation:  $DC = 100 - (\text{dietary marker } \% \times \text{ileal AA } \%) / (\text{ileal marker } \% \times \text{dietary AA } \%) \times 100$ . Apparent ileal DC for Met, Cys, TSAA, Lys, Thr, and Ile were 89.7, 66.8, 83.2, 85.1, 67.7, and 77.2%, respectively, on average for the two Exp. Amino acid digestibility did not differ ( $P > 0.05$ ) between treatments in either Exp. Based on this research, future research should be directed at establishing DC for other nutrients in stressed broilers, or the effect of different nutrients on the stress response.

**Key Words:** stress, corticosterone, digestibility, amino acids, broilers

**S-M75 The performance of layers fed Azolla (*Azolla pinnata*) meal in diets.** O.A. Alalade\*<sup>1</sup>, E.A. Iyayi<sup>1</sup>, and T.O. Alalade<sup>2</sup>, <sup>1</sup>University of Ibadan, Ibadan, Oyo, Nigeria, <sup>2</sup>Federal University of Technology, Akure, Ondo, Nigeria.

With the present trend of rising prices of animal feedstuffs all over the world, recently, considerable attention has been placed on the application of non-conventional feedstuffs to animal nutrition in developing countries. Nutritional studies were carried out to evaluate the potential of Azolla meal (AZM) as a feed resource in diets of layers. Particular reference was given to egg production and quality; and nutrient retention. In a completely randomized design, Sixty 20 weeks old brown Nera point of lay birds were assigned to each of 4 dietary treatments with 5 replicates, each having 3 birds per replicate in a cage system. Four isonitrogenous diets containing 0, 5, 10 and 15% AZM were formulated from a basal diet containing 17.5% crude protein and 2522kcal/kg ME. Adjusting the levels of soybean meal and wheat bran equalized crude protein. Calcium and phosphorus levels increased while metabolisable energy decreased with levels of AZM in diets. Results

showed significant ( $p < 0.05$ ) improvements in eggshell thickness, shell weight, yolk color and average weight of egg by 6.8, 5.1, 695.0 and 36.0 percent respectively as the level of AZM increased to 10%. These improvements tend to decrease (except for yolk color and shell weight) as the level increased to 15%. In addition, 48.1% and 50.0% reduction in yolk and plasma total cholesterol respectively were achieved on 10% AZM inclusion in diet. Feed intake was similar across the treatments and was found to decrease with increasing levels of AZM in diets. Hen-day productions (HDP)( $p < 0.05$ ) were 88.0%, 85.3%, 80.7% and 79.9% while average weight of egg were 52.9g, 53.5g, 54.8g and 53.8g ( $p < 0.05$ ) on 0, 5, 10 and 15% AZM in diets respectively. HDP was best on control diet while cost per kg egg was lowest on 10% AZM. Egg shape index decreased with increasing levels of AZM in diets. Coefficient of digestibility of nutrients did not differ significantly among treatments. Evidently, AZM as an unconventional feed resource has a potential as a feedstuff for layers.

**Key Words:** Azolla meal, layers, egg quality, hen-day production, cholesterol

## Monday, January 23 Environment & Management II Room: B314

**S-M76 Daylength effects on production traits of modern broilers.** K. Schwan-Lardner\*<sup>1</sup>, H.L. Classen<sup>1</sup>, and B.I. Fancher<sup>2</sup>, <sup>1</sup>University of Saskatchewan, Saskatoon, Canada, <sup>2</sup>Aviagen, Inc., Huntsville, Alabama.

It is of interest to understand the effect of daylength on modern broiler chickens selected for increased growth, breast meat yield and improved health. A Randomized Complete Block Design was used to study the effect of daylength on production parameters of two strains (Ross x Ross 308, Ross x Ross 708) of broilers. Two experiments each utilized 8 rooms and 4464 birds to provide 2 replications of 14L:10D, 17L:7D, 20L:4D and 23L:1D photoperiods initiated at 7d of age. Each sex and genotype subclass was randomly assigned to 3 pens per room. Birds were weighed at 0, 7, 31, and 38d of age, and feed consumption calculated for those time periods. Genotype and sex affected most production characteristics but interactions between these characteristics and lighting were minor. Therefore, only overall lighting effects are presented. Data are presented in order of 14L:10D, 17L:7D, 20L:4D and 23L:1D photoperiods. Daylength resulted in a quadratic effect on body weight at 31 (1.640, 1.700, 1.731, and 1.712 kg) and 38 (2.195, 2.259, 2.293 and 2.254 kg) d of age. The relationship between daylength and feed intake was also quadratic (7-31d: 2.265, 2.390, 2.490, 2.454 kg per bird; 7-38d: 3.321, 3.477, 3.630, 3.565 kg respectively). As daylength increased, feed:gain ratio increased to 20L: 4D but no differences were noted between the 20L:4D and 23L:1D photoperiods (7-31d: 1.540, 1.559, 1.592, 1.587; 7-38d: 1.644, 1.665, 1.714, 1.713). Mortality increased linearly with photoperiod length (7-31d: 2.58, 2.59, 3.10 and 3.58%; 7-38d: 3.46, 3.26, 4.77, 5.35%). Carcass and meat yield parameters were affected by daylength and of particular significance was a linear increase in breast meat yield with increasing daylength (% of live weight: 31d: 17.2, 17.6, 18.0 and 18.2; 38d: 18.6, 19.1, 19.5, and 20.0). In conclusion, daylength affects production parameters, and the resulting relationships indicate that modeling may be useful in selecting an optimal photoperiod length.

**Key Words:** broiler, photoperiod, performance, meat yield, lighting

**S-M77 The nitric oxide level in ceca of stressed broilers.** M. Putsakum\*<sup>1</sup>, Y. Vizzier-Thaxton<sup>1</sup>, J.P. Thaxton<sup>1</sup>, S. Anderson<sup>1</sup>, and H. Olowanju<sup>2</sup>, <sup>1</sup>Mississippi State University, Starkville, <sup>2</sup>USDA/ARS, Mississippi State, Starkville.

This study determined the nitric oxide content of the ceca of stressed broilers. Two hundred and forty day-old chicks were randomly assigned to two groups of 120 birds. Each group was then assigned randomly to floor pens. Birds received feed and water ad libitum. The temperature range throughout the study was between 60 and 90F with 17 h of light per day. One group of bird received physiological saline via a mini osmotic pump implanted on the back between wings and the other group had ACTH administered via a mini osmotic pump. The pumps administered 8 IU ACTH/kg BW/day for 7 days. At the day before pump insertion (day 0), day 4 and day 7 after pump insertion, two birds per pen were euthanized and cecal pouches were collected. The cecal contents were diluted and analyzed for nitric oxide as nitrite by using Griess reagent. Nitric oxide was significantly decreased ( $P < .05$ ) in stressed birds (ACTH) when compared with non-stressed birds (saline) both in day 4 and day 7 after pump insertion. Whereas nitric oxide in stressed birds was not significantly different between day 4 and day 7 after pump insertion.

**Key Words:** nitric oxide, cecum, stress, broiler

**S-M78 Paw burns in broiler chickens are negatively affected by high protein and all vegetable diets.** M. Nagaraj\*<sup>1</sup>, S.F. Bilgili, J.B. Hess, and F. Biguzzi, Auburn University, Auburn, Alabama.

The incidence and severity of dermatitis that occur on the footpads of broiler chickens is of great concern to the broiler industry, both from product quality and animal welfare standpoints. A total of 1600 birds were raised in floor pens on a 2x2x2 arrangement of protein level [PL; high (HP) or low (LP)], protein source [PS; all vegetable (V) or vegetable