
Three (6.3, 9.5 and 12.6 birds/m²) stocking densities and 2 dietary protein levels (19 and 18%) for only d41–75 phase were arranged to meat-type Korean native chicken (KNC) to evaluate the growth performance. A total of 720 KNC were employed into 24 floor pens (3 × 2 × 4 replicates) bled with rice husk. The feeding trial started at d10 and finished at d75 of age for 65 d. Body weight gain (BWG), feed intake (FI) and feed conversion ratio (FCR) were measured at d40, d60 and d75. Apparent nutrient utilisabilities (%) were measured with birds at d75 using total collection method. BWG was highest (P < 0.001) with 6.3 birds/m² along with higher FI and efficient FCR. Highest density (12.6/m²) resulted the lowest BWG and lower (P < 0.001) FI than medium density (9.5/m²). Impact of density became severe as the age of KNC is older, with more magnitude of the impact during d61–75 phase. FCR was poorer (P = 0.026) by bird at 9.5/m² density than birds at other 2 densities. The difference in FCR among densities, however, was remarkably significant during 60 to 75d and that affected whole period FCR. There were no significant differences in BWG, FI and FCR between 19 and 18% dietary protein levels. Both crude protein and total carbohydrate utilisabilities were higher (P = 0.016) with birds at 6.3/m² density than birds at the other 2 densities. The both nutrients utilisabilities were lowest at 12.6/m² density with 18% protein diet whereas were lowest at 9.5/m² density with 19% protein diet. This study showed that increasing stocking density adversely affected BWG, FI and FCR of KNC. This result suggested the high stocking density may induce space competition among birds and resulting lower feed intake of the birds, especially with more severity during d61–75 when their body weight became heavier. This study also indicated the 12.6 birds/m² density is not appropriate for finishing stage KNC although it fits the chicken welfare guideline. This study also suggested 18% protein level would be sufficient for the bird at finishing stage.

Key Words: Korean native chicken, stocking density, protein level, performance


The effect of incubation temperature profiles was evaluated on bone development, gait scores, and leg problems in turkeys of 3 strains. Three sire lines were mated to the same female line of turkeys to produce the female breeder parent line for the XL, Converto (CO), and grademaker (GM) (Hybrid Turkeys, Kitchener, Ontario). Fertilized eggs were delivered to NC State University and incubated using 3 temperature profiles called elevated, normal, and reduced. Egg moisture loss and eggshell conductance were determined. At hatching all poulters were weighed, identified with necktags, and 12 poulters per treatment were selected to determine residual yolk and bone traits. The remaining poulters were raised in floor pens under the same husbandry conditions. Gait scores and prevalence of valgus/varus deformities (VV), crooked toes, and twisted legs were evaluated at 6 wk, and bone traits assessed only in toms. Data was analyzed as a 3x3 factorial design. Eggshell conductance and water loss were different (P < 0.001) among the 3 strains. Eggs lost more moisture as incubation temperatures increased, but only poult from the elevated incubation temperature profile had more residual yolk. XL poulters were heavier than the GM, but also had more residual yolk, and consequently no differences on BW without yolk were observed. No differences (P ≥ 0.05) among strains were observed on bone development at hatch, but significant differences on bone length were observed at 6 wk. Almost 28% of poult coming out from the elevated incubation temperature profile had splayed legs at hatching. Incubation temperatures also influenced (P < 0.05) femur and shank relative weights at hatch, and lengths of femurs, tibias, and shanks at hatch and 6 wk. In addition, gait scores and VV were affected (P < 0.05) by incubation temperature, but did not differ among strains. Toms from the reduced temperature profile were lighter and had more locomotion problems and VV. Significant interactions were only observed in bone relative weights at 6 wk of age. Suboptimal incubation temperature profiles impact bone development and leg health in turkeys of these 3 strains.

Key Words: incubation temperature, strains, turkey, bone

132 Efficacy of feed additives to reduce the biological effect of naturally occurring mycotoxins fed to turkey hen poults reared to 6 weeks of age. J. L. Grimes1, M. D. Koci1, C. R. Stark1, T. F. Middleton2, P. K. Nighot1, and J. E. Nixon*, 1North Carolina State University, Raleigh, 2Ag ProVision, LLC, Kenansville, NC.

Turkey hen poulters were fed rations to 6 wk of age with or without naturally occurring mycotoxins; corn with aflatoxin (AF), wheat with deoxynivalenol (DON), and barley with zearalenone (ZEA). The “without” ration contained no AF, 1 ppm DON and 0.5 ppm ZEA. The mycotoxin ration contained 250 ppb AF, 2 ppm DON and 0.6 ppm ZEA. Within each ration treatment, there were 4 sub-treatments: the control ration plus 1 of 3 feed additives: Biomin BioFix (2 lb/ton), Kemin Kallsil (4 lb/ton), and Nutriad UNIKE (3 lb/ton). Variables measured included BW, feed intake (FI), feed conversion (FC), liver lipid, liver histology, blood serum metabolites, immune response to new castle disease and sheep red blood cell (SRBC) vaccination (3 d) and relative organ weights; heart, spleen, kidney, liver, gizzard, pancreas, Bursa of Fabricius. The data were analyzed using GLM of SAS with means separated using LSD (P < 0.05). The mycotoxin rations reduced poult BW (2.08 vs 2.31 ± 0.02 kg), reduced FI (3.11 vs 3.39 ± 0.004 kg/bd) and increased poult feed conversion (1.51 vs 1.47 ± 0.01). Feeding the poult the mycotoxin feed resulted in decreased relative liver and heart wt and increased relative liver lipid, spleen, gizzard, pancreas and kidney wt. Relative bursa wt was not affected. Serum albumin, amino acid transferase, and titers to SRBC were reduced due to feeding the mycotoxin ration. The feed additives had little effect in the rations with the lower amounts of mycotoxins (‘without’ rations). In the mycotoxin rations, the birds fed the additives had no change in BW, reduced FI and improved FC compared with the birds fed the mycotoxin feed without any feed additive. The only observed physiological effect of feeding the additives was to lessen the increase in relative kidney wt for the birds fed the mycotoxin feed. Feeding turkey poulters naturally occurring mycotoxins at levels used in this study resulted in reduced performance.
The feed additives used in this study did alleviate the effect of dietary mycotoxins to some degree.

**Key Words:** turkey, mycotoxin, aflatoxin, deoxynivalenol, fed additive

133 Turkey hen performance when fed diets containing a commercial control diet with antibiotic-free (ABF) or ABF containing Actigen diets. R. M. Hulet* and T. L. Cravener, The Pennsylvania State University, University Park.

Commercial turkey hens are in need of efficient and effective diets to feed antibiotic free diets (ABF). The objective of this study was to evaluate growth efficiency and performance of hen turkeys (Hybrid Converter) fed a commercial control diet (Control) containing antibiotics (Stafac 3 g/ton 0 to 6 wks of age and 10g/ton from 6 to 12 wks of age) compared with hens fed either an ABF diet or an ABF diet supplemented with Actigen (ABF+Actigen; 400 g/ton 0 to 6 wks of age and 200 g/ton from 6 to 12 weeks of age). One thousand and 92 hens were randomized into 12 brooding pens with 91 pullets per pen (11 birds/m²) for the first 14 d and then housed at a density of 5.5 birds/m² until 84 d of age. All birds were started on nipple drinker, feeder flats, and hanging feeders to 6 weeks of age when they were supplied with adult bell drinkers and larger hanging feeders. Feed and body weight were measured at 0, 14, 42, 70, and 84 d of age. No significant difference was found in body weight, feed conversion, or mortality in any period. Body weight at 84 d for the Control, ABF, and ABF+Actigen birds averaged 7.54, 7.50, and 7.52 kg, respectively. Feed conversion at 84 d was 2.0435, 2.0407, and 2.0408, respectively for the Control, ABF, and ABF+Actigen fed birds. Percent cumulative mortality (14 - 84 d) was 6.8, 2.2, and 3.1% for the Control, ABF, and ABF+Actigen treatments. With no disease or environmental challenges and under commercial densities and conditions, turkey hens can perform equally well when fed ABF or ABF-Actigen supplemented diets with hen fed commercial Control diets.

**Key Words:** turkey hens, antibiotic-free diet, Actigen

143 Effects of natural beta-acids from hops on Campylobacter and Salmonella in vitro. N. A. Krueger*1, J. A. Byrd1, M. D. Flythe2, R. C. Anderson3, and D. J. Nisbet1, 1USDA-ARS-SPARC- Food and Feed Safety Research Unit, College Station, TX, 2USDA-ARS, Lexington, KY.

Campylobacter and Salmonella are important foodborne pathogens that may colonize the gut of food producing animals. The objective of this experiment was to evaluate the effects of a hops β-acid solution at reducing C. jejuni and S. Typhimurium in a mixed population of market-age broiler ceca bacteria. Freshly collected ceca contents collected from 20 market age broilers were pooled together in Mueller-Hinton (MH, C. jejuni) or Tryptic Soy Broth (TSB, S. Typhimurium) resulting in a ratio of 8 mL buffer to 1 g cecal contents. Each cecal broth mixture was inoculated with approximately 10⁴ colony forming units (cfu) of an overnight grown C. jejuni (in MH) or S. Typhimurium (in TSB) culture. Nine mL volumes of the cecal broth mixture were added in triplicate to screw top tubes previously loaded with 1 mL MH, TSB, or Hops extract solution to achieve a 0, 62.5 ppm Hops (H1) or 125 ppm Hops (H2) and were incubated anaerobically at 40°C. After 0, 3, and 6 h incubation; 1 mL from each sample wasserially diluted and plated to Campy-Cefex or XLT4 agar for quantification of C. jejuni and S. Typhimurium. Log₁₀ transformations of C. jejuni and S. Typhimurium cfu determined at each sampling time were subjected to a general ANOVA. Tubes containing C. jejuni initially contained 5.63 ± 0.07 (SD), 4.01 ± 0.32, and 3.71 ± 0.58 log₁₀ cfu mL⁻¹ (control, H1 and H2). Concentrations of C. jejuni in control tubes did not differ (P > 0.05) over time while H1 reduced C. jejuni concentrations by more than 2.8 log₁₀ cfu mL⁻¹ by 3 h to below our limit of detection mL by 6 h incubation. Additionally, H2 reduced C. jejuni concentrations by more than 3.7 log₁₀ cfu mL⁻¹ by 3 h and remained below our limit of detection through 6 h. Results for tubes containing S. Typhimurium initially contained 5.00 ± 0.14, 3.62 ± 0.12, and 2.83 ± 0.30 log₁₀ cfu mL⁻¹ (control, H1 and H2). Concentrations of S. Typhimurium did not differ over time for each of the 3 treatments. Results of the present demonstrate that hops-β acids added to broiler cecal contents can effectively reduce C. jejuni but not S. Typhimurium concentrations in vitro.

**Key Words:** Campylobacter, Salmonella, natural beta-acids, food safety

153 Behavioral aspects of the breeder chicken. S. M. Sullivan* and N.B. Anthony, University of Arkansas, Fayetteville.

Behavioral patterns for animals develop early in life. Environmental conditions play a significant role in development of social hierarchies. Some aggression is necessary. However, when female chickens are fearful they tend to remain on slatted areas. If they do leave the slatted areas they are often repeatedly mated by several males. This can result in injury or death. Behaviorists contend that years of cage rearing and artificial insemination of elite populations without selection for behavior traits has caused a failure for males to perform enough courtship behaviors and a failure for females to properly respond by coothing. Many of the factors that affect rate of mating are; dominance, ratio of male to females, specific breed differences, space, accessibility of males to females, how tolerant individual males are to other males, individual differences in libido, learned behaviors and conditioned responses. Recorded were 26 different behaviors. These behaviors were then combined into 3 aggressive categories and 1 non-aggressive category. More aggression occurs at 20% production than the 50% production P = 0.0004. There were differences between male lines P = 0.03 There are differences between time periods P = 0.0001. There were no differences of individual aggressive behaviors for production periods except for circling (perhaps a precursor to waltzing). Fertility of lines A x White Rock started high and remained high, lines A x A and White Rock x White Rock started high, dropped significantly, and then returned. Mortality of males was the highest for A males crossed on White Rock females. Interestingly, there were no mortalities for males crossed on the A female line. The female affect on male aggression is quite evident. There are differences due to hen effects among all lines. Best fertility at 20% production in lines crossed with each other and lines crosses with White Rock males. There appears to be minimal differences between commercial broiler lines crossed on White Rock lines. However, some individual aggressive behaviors were approaching significance.

**Key Words:** broiler breeder behavior, broiler aggression, female breeder aggression, poultry behavior, animal aggression

163 Effect of genetic cross, broiler breeder weight management, and incubation profile on jejunum mucosa development and growth performance of broiler progeny. N. E. Bohórquez*1, D. V. Bohórquez2, R. D. Malhieros3, M. J. Wine4, and P. R. Ferkel5, 1North Carolina State University, Raleigh, 2Duke University, Durham, NC.

Feed and weight management, breed crosses of broiler breeders and incubation conditions impact enteric development and early growth performance. To test this hypothesis, eggs from full-fed and restricted-fed parent (P) and great-parent (GP) genetic crosses were incubated to simulate single and multi-stage incubation profiles. The morphological development of intestinal mucosa (histomorphometrics) and post-hatch
growth performance were then evaluated. The experiment was $3 \times 2$ factorial with 3 genetic lines (L1 = P cross, restricted-fed; L2 = male-line GP cross restricted-fed; and L3 = male-line GP cross full-fed) and 2 incubation profiles (36.5–39°C, LH and 37.5°C, SS). At hatching, chicks from each treatment were assigned to 8 replicate battery cages (10 chicks/cage). Chicks had feed and water ad libitum. Body weight (BW), feed intake (FI), and Feed/Gain (FCR) were determined at 4, 7, 14, and 21 d (d). Jejunum sections were collected from 8 chicks per treatment at 19d of incubation (E19), hatching, 4, and 21d. Histology slides (1/chick) were prepared, morphology of mucosa was evaluated on 10 villi/chick and villi surface area (VSA) was calculated. There were no significant breederXincubation interaction effects on enteric development or growth. VSA was 15% and 18% greater ($P < 0.0001$) in L2 at E19 and 4d compared with L1. BW of L2 and L3 was 7% greater ($P < 0.05$) at 7d and 14d than L1, but there were no differences on FCR. Compared with SS, LH incubation reduced VSA by 28%, 19% and 9% at E19, 4d, and 21d ($P < 0.0001$), and reduced BW by 8%, 10% and 7% at 4, 7, 14 and 21 d. Early enteric development (e.g., VSA) affects subsequent growth of broilers. Genetic cross and feed management may affect enteric development and growth performance. Regardless of genetic cross, high temperature during late-term incubation adversely affects enteric development and early growth performance.

Key Words: incubation, villi, broiler, body weight, histomorphometrics


The growth potential of village chickens in Nigeria was evaluated by comparing their growth performance under intensive and semi-intensive system of management. Preliminary investigation by the author revealed that 86.75% of village chickens are kept under semi-scavenging system of management in Ibadan south west local government of Nigeria whereby birds are provided with small amount of grains and by-products to supplement their scavenging. Fifty-two chicks, 8 weeks old were collected from villages in Ibadan south west local government and individually raised in cages. Hatch mates of caged-raised chicks ($n = 56$) remained with the farmers and were raised under semi-scavenging conditions. Off-farm made growers mash (18%CP) was fed for chicks raised under intensive condition and birds were treated against common diseases and parasites. Data were collected on feed intake, weight gain and feed efficiency. Village and system of management significantly ($P < 0.05$) influences growth rates. The values for birds under intensive conditions were significantly ($P < 0.05$) higher than for birds under semi-scavenging conditions for feed intake, weight gain and feed efficiency. Correlation coefficients of growth traits measured between intensive and semi-scavenging conditions were low ($r = 0.16–0.49$; $P < 0.05$) which could be as a result of the effect of environment and its interaction on genotype. It is concluded that growth potential of village chicken can be subjected to 3 differing incubation temperature profiles. M. J. Wineland,* D. T. Ort, K. M. Mann, E. O. Oviedo, V. L. Christensen, J. L. Grimes, F. W. Edens, and C. M. Ashwell, North Carolina State University, Raleigh.


Embryos entering the plateau stage of oxygen consumption are in a dilemma; they must continue to grow and mature their organ systems but do it with reduced oxygen availability. Energy metabolism must change for the embryo during this latter period of incubation as a result. Additionally different genetic backgrounds may influence how the embryo adapts for survival during the plateau stage of oxygen consumption. Three sire lines were mated to the same female line of turkeys to produce the female breeder parent line for the XL, Converter (CV), and grade-maker (GM). All eggs were obtained from Hybrid Turkeys (Kitchener, Ontario). Fertilized eggs were delivered to Raleigh, NC and incubated using 3 different temperature profiles (elevated, normal and reduced). At hatching all pouls were weighed and identified by neckbands. The pouls were grown to 6 wks of age and treated similarly. The hypothesis is that embryos of differing growth potential developing within eggs of the same shell properties will respond differently during embryonic and post hatch growth to different temperature profiles. The normal and reduced temperature profile was similar for relative embryo growth but the embryos subjected to the elevated temperature profile reduced its rate of growth as it entered the plateau of oxygen consumption. Since the embryos for all 3 genetics developed within the same egg the embryonic growth curves were similar except at d 26 when GM was significantly greater than XL and CV. At hatch there was no significant difference between genetics. The 6 week body weights were different from each other by genetics as expected for the males but in the females the XL and CV were significantly greater than the GM. When examining the 3 temperature profiles, 6 week body weights were not significantly different between the elevated and normal profile with these 2 being significantly greater than the pouls from the reduced temperature profile for both male and female.

Key Words: incubation, embryo, post hatch growth, embryonic growth

139 Effects of broiler breeder flock age and heating broiler hatching eggs during 11 days of storage on hatchability. O. Elibol, M. Guclu, S. Ozlu, R. Shiranjang, and J. Brake, North Carolina State University, Raleigh, University of Ankara, Ankara, Turkey.

This study investigated the effect of heating hatching eggs during extended storage and broiler breeder flock age on fertile hatchability. In Experiment 1 hatching eggs were obtained from Ross 344 male x Ross 308 female broiler breeders at 29, 36, and 60 wk of age. Freshly collected eggs were stored for 1 d in a hatchery egg storage room at 18°C and 75% RH in paper egg flats. The eggs were then transferred to plastic setter trays and either remained in the storage room (Control) or were subjected to a heat treatment regimen of 26°C for 2 h, 37.8°C for 3 h, and 26°C for 2 h during storage before being returned to the storage room. A part of the eggs were heated when transferred to setter trays (Heat 1–11d) and stored for 10 d more. Another group of eggs was heated after 5 d of storage (Heat 5–11d) and then stored 6 d more before incubation. The process was repeated for Experiment 2 with eggs that came from broiler breeder flocks at 28, 38, and 53 wk of age and eggs were heated only after 5 d of storage (Heat 5–11d). Control eggs stored for 11 d were co-incubated in each experiment. Thus, there were eggs from younger (28 and 29 wk), prime (36 and 38 wk), and older (53 and 60 wk) broiler breeder flocks studied in each of the 2 experiments. All eggs were incubated together in a single incubator and hatcher in each experiment. A tray of 150 eggs constituted a replicate and 7 or 10 replicate trays (1050 or 1500 eggs in total) were set per heating treatment in Experiments 1 and 2, respectively. Fertile hatchability was reduced in the older flock eggs. Heating eggs during 11 d of storage
(Heat 1–11d or 5–11d) significantly increased fertile hatchability (85.8 versus 90.7 and 92.1% in Exp. 1, 82.8 versus 87.5% in Exp. 2) only in eggs from younger broiler breeder flocks. This was probably due to the fact that fresh eggs from prime and older flocks have been found to contain embryos at the gastrula stage of development while eggs from younger flocks have many embryos at the pregastrula stage, which were obviously positively affected by the heating during storage.

Key Words: egg storage incubation, flock age, hatchability

140 Effects of treating broiler breeder hatching eggs with removable coatings at four storage times on hatchability performance. J. A. Santos*, J. M. Mauldin1, R. J. Buhr2, D. R. Jones2, and S. E. Aggrey1, 1University of Georgia, Athens, 2USDA-ARS, Athens, GA.

After treating hatching eggs with various removable coatings several formulations exhibited better hatchability than non-coated controls when eggs were stored for 1 or 21 d. The current study was designed to determine the interaction of 3 formulas with 4 storage times that approximate conditions seen in the poultry industry. The 4 egg coating groups were formulas 1 and 2, formula 2 sanitized, and untreated controls and the 4 storage times (1 d, 1 wk, 2 wk, and 3 wk) analyzed in a 4 X 4 factorial experimental design. Eggs were collected from a commercial broiler breeder farm beginning at 38 wk age. The flock had exceptional fertility and hatchability for several weeks. Eggs were stored overnight and coated the next morning. Coatings were applied by heating formulas to 350°C and spray-coating eggs in a modified commercial hatching egg-sanitizing machine. Coating removal involved passing eggs through the egg sanitizer with heated water spray (46 to 490°C). After drying, eggs were placed in incubation. Evaluation of hatchability performance was measured by percentages for hatchability of fertiles (HOF %). The 1 d and 1 wk storage times had the best HOF percentage (93%) and were not significantly different. The 2 wk storage time values for HOF dropped significantly to 88% with another significant drop observed for 3 wk storage time, 72% HOF. Coating treatments also exhibited significant differences in HOF. The untreated control group had the lowest HOF, 83% and was significantly different from Formula 2 sanitized at 88%. Formulas 1 and 2 had intermediate (87%) and non-significant values between Control and Formula 2 sanitized. Previous experiment with egg coating and storage time revealed that differences in hatchability performance were greater in moderately performing flocks than in high performance flocks. Coating formulas appear to offer beneficial effects in maintaining hatchability to parts of the broiler industry where storage time is an issue.

Key Words: hatching eggs, egg coating, hatch of fertile, egg storage

141 Selection for high feather pecking leads to reduced variance in gene expression at multiple loci. A. L. Hughes*1 and A. J. Buitenhuis2, 1University of South Carolina, Columbia, 2Aarhus University, Tjele, Denmark.

Changes in gene expression in response to selection were studied by comparing microarray expression profiles among a population of domestic chickens selected for high feather pecking (FP) with a control population and a population selected for low FP. Although no transcripts showed significant differences among populations with respect to mean expression scores, multiple transcripts showed reduced variance in expression scores in the high FP population in comparison to control and low FP populations. The reduction in variance in the high FP population generally involved transcripts whose expression scores had a negatively skewed distribution in the control population but not in the high FP population. Certain of these transcripts corresponded to genes whose expression was significantly associated with either severe feather pecking (SFP) or gentle feather pecking (GFP). However, the patterns of gene expression associated with SFP and GFP were quite distinct, supporting the hypothesis that very distinct underlying neural mechanisms underlie these 2 behaviors.

Key Words: feather-pecking, gene expression, microarray, selection

142 Broiler preference for light color. R. Rierson,* M. Barrios, N. Graham, C. Hancock, C. M. Rude, and R. S. Beyer, Kansas State University, Manhattan.

Little research has been done regarding broilers preference for lighting. This experiment was conducted using pens that were 5 × 12 ft in area. Forty broiler Cobb 500 Chicks were grown on the floor on fresh litter to 21 d of age. Incandescent house lighting was used throughout the duration of the trial, and all pens were given ad libitum access to feed and water. Small, 16 × 16 sq. in. wooden boxes were constructed and provided constant access for the birds. The boxes had a single opening with a full bottom, top, and 3 sides. Holes were drilled in the top and 25 W incandescent light bulbs were positioned inside. Boxes were put into the pens and were used as feeders throughout the duration of the trial. This provided a constant option for the birds to acclimate to the box feeding method. Light trials were conducted weekly. A runway 10 ft long and 5.3 ft wide was built and boxes were placed together at one end. On test day, blue, green, red, and white light bulbs were placed in the individual box feeders. Light intensities were measured and adjusted so that all were equal. Chicks were taken off of feed for 3 h and then placed on the runway in pairs, and then were allowed to choose which light color they preferred during feeding. A choice was officially recorded the moment the bird attempted to obtain feed. Four replications occurred resulting in 160 total runs. If a bird did not make a choice within 5 min it was recorded as undecided. On average wk 1–3, birds preference for white light was 53.1%, red was 26.3%, blue was 5.0%, green was 10.0%, and 5.6% of birds were undecided. As birds aged they had an increasing preference for white light and a decreasing preference for red light. In wk 1, 43.1% of birds preferred white and 30.0% preferred red. By wk 3, 64.4% of birds showed preference for white light and only 20.6% showed a preference for red light. The data concluded that chicks have a preference for specific light colors and these preferences are subject to change as age increases.

Key Words: preference, light, light color, broiler preference, feed

143 Distance between feeders and waterers affect body weight and bone breaking strength in young broilers. E. A. Cruz-Hernandez1, G. Casco-Montenegro1, A. Pro-Martinez2, and C. A. Ruiz-Feria*, 1Texas A&M University, College Station, 2Colegio de Postgraduados, Montecillos, Mexico State, Mexico.

Increased physical activity may improve leg strength and walking ability. The aim of this study was to measure effects of increasing distances between feeders and waterers on body weight (g), tibia breaking strength (kg·m²/s²) and tibia ash (% of dry weight) in broiler chickens. One d-old broiler chicks (n = 90) were wing banded and housed in a floor pen and brooded using current industry practices. All birds received water and feed (NRC, 1994) on an ad libitum basis. At d 5, the chicks were randomly assigned to one of 3 treatments consisting of different distances between waterers and feeders: 1 m (1M), 3.3 m (3M), or 6.6 m (6M). At d 21 all birds were weighed, and 10 birds per treatment were killed and the tibiae collected and stripped from flesh to test breaking strength (BS) followed by total tibia ash. Data was analyzed as a one-way ANOVA (SigmaStat). Birds in the treatment 6M were lighter (P < 0.01; 686 ±
17) than birds in the 1M (744 ± 17) and 3M (786 ± 17) treatments, with no difference between birds in the 3M and 6M groups. Tibia breaking strength was also lower \((P < 0.05)\) in 6M birds (120.2 ± 7.4) compared with birds in the 1M (148.6 ± 7.4) and 3M (164.1 ± 7.4) treatments, with no difference between birds in the 3M and 6M groups. Also, birds in the 3M group tended to be heavier and had a stronger tibia than birds in the 1M treatment. Tibia ash was not different among treatments. This results show that feeder and water separation may have important effects on growth performance and bone integrity. Further studies are required to see if the differences persist at older ages

Key Words: broilers, bone, walking


Utilization of solid side wall barns in the broiler industry to reduce heating costs as well as create a more uniform environment has, unfortunately, increased electricity costs. The University of Arkansas installed energy efficient lighting after an energy audit determined the fastest way to reduce energy cost was through lighting (Phil Watkins, AEP). A demonstration is underway to evaluate and then implement energy efficient lighting in tunnel ventilated poultry barns. The objective of this demonstration is to assess alternative, energy-efficient lighting systems. Lighting sources at the focus of this demonstration are; cold cathode, dimmable compact fluorescent, and Light Emitting Diode (LED). Nineteen Demonstration farms have been selected to represent different bird slaughter weights and bird management styles. Two farms have been fitted with 2 sub-meters each to measure only electric used for lighting. One meter measures kilowatt hours (KwH) for a barn with all incandescent lighting while the second meter measures KwH for a barn with LED and compact fluorescent lighting. All farms were provided either 23 or 26 W non-dimmable compact fluorescent lamps for brood lights. Preliminary findings indicate an energy savings of 1783 KwH after one flock, per house, when comparing the PS LED to the incandescent. A difference of 1265 KwH was discovered when comparing the Nex Gen Led with the incandescent. At an average of 10 cents per KwH the savings are $178 and $126 respectively per house. It has also been indicated that flock performance has not been jeopardized with the dimmable compact fluorescent nor for any of the LEDs. However, farms retrofitted with the 2700 Kelvin 8 W cold cathode may need to adjust their lighting management to maintain flock weight gain. Results will be shown at time of presentation.

Key Words: LED lighting, energy savings, poultry lighting, fluorescent lighting, tunnel ventilated poultry houses