M57  Hatchability of broiler breeder eggs following eggshell sanitization by repeated treatment with a combination of ultraviolet light and hydrogen peroxide.  J. Wells, C. Coufal, A. Kiss, H. Parker, and C. McDaniel, Mississippi State University, Mississippi State, Texas A & M University, College Station.

Exposing eggs multiple times to ultraviolet light (UV) and 3% hydrogen peroxide ($\text{H}_2\text{O}_2$) results in a greater reduction of eggshell bacteria compared to eggs treated only once with this combination. However, it is unknown if this repetitive treatment will have any effect on hatchability. Therefore, the objective of this experiment was to determine if hatchability would be affected by reducing eggshell bacteria with repeated use of UV and $\text{H}_2\text{O}_2$. A total of 2,208 eggs from 47 wk old broiler breeders were collected from a commercial house and transported to the lab. Half of these eggs were treated and the other half served as controls. The treated eggs were misted with $\text{H}_2\text{O}_2$ and then exposed to 2 min of UV. This procedure was repeated a total of 6 times. Thirty-six eggs per treatment were used for bacterial enumeration. The remaining eggs were weighed and placed in 8 separate incubators (4 control and 4 treated). At 18 d of incubation, the eggs were weighed to determine egg moisture loss and placed in hatching baskets. At hatch, bacterial counts in the incubator air and chick weights were determined. Also, meconium samples were obtained from 10 randomly selected chicks from each incubator to determine the presence of intestinal bacteria. All chicks from each incubator were placed into a corresponding grow out pen, one pen for each incubator. Hatch residue analysis was performed on unhatched eggs. At 5 d post hatch, yolk sacs from 20 chicks per room were removed, weighed, and yolk sac material was plated for presence of bacteria. A 4 log reduction in eggshell bacteria was observed for eggs treated with UV and $\text{H}_2\text{O}_2$ compared to control eggs. There were no differences in hatchability, hatch residue, chick weight, residual yolk weight, egg moisture loss, or bacterial presence in meconium, residual yolks, or incubator air samples between control and treated groups. In conclusion, multiple applications of UV and $\text{H}_2\text{O}_2$ effectively reduced bacteria on the eggshell with no effects on the hatchability of broiler breeder eggs.

Key Words: ultraviolet light, hydrogen peroxide, hatchability, egg sanitization, broiler breeder


Broiler breeder producers are faced with the challenge of producing rapid growing broilers while attempting to control body weight in the parent stock. One of the more difficult tasks when raising broiler breeder cockerels is controlling weight gain in the rearing house without inflicting excess stress. This is a period of time for the young male when many portions of their reproductive system are in the formative stages and, if neglected, can have life long effect on their reproductive performance. The objective of this study was to raise males under various management programs which produced the recommended target body weight of 3.060 Kg for males at 12, 15, 18, 21 and 24 weeks of age. Males were placed at three week intervals so that all males were light stimulated at the same time but at different ages. All males were reared in the same light controlled house at the University of Arkansas research farm. Males were light stimulated and testes development, complete semen analysis, fertility and mating activity and behavior being recorded for each group of males. Results show that the growth of the testes accelerated in all treatments between six and three weeks prior to lighting regardless of their age. At lighting there was no significant difference in testes weight (1.44g, 1.36g, 0.77g, 0.70 and 1.09g respectively), testes weight as a percent of body weight (0.0429%, 0.04481%, 0.0229%, 0.0208% and 0.0294% respectively), or body weight. Rearing broiler breeder males to sexual maturity at younger ages has the potential to reduce stress levels caused by feed restriction during the rearing phase, reduce production costs of the males, and potentially better utilize rearing facilities by producers and integrators.

Key Words: broiler breeder, testes, lighting, mating behavior, sperm production

M59  Effect of two feeding to peak programs on two strains of broiler breeders.  N. Lekrsrisompong and J. Brake, North Carolina State University, Department of Poultry Science, Raleigh.

A study was conducted to examine how two female feed increase programs from photostimulation to peak egg production affected the reproductive performance and mortality of Ross 308SF or Ross 708SF broiler breeder females. Pullets were reared with a single feeding program to 21 wk of age and then assigned to two feed increase programs (slow or fast) from photostimulation to peak egg production. The flock was moved to the laying house and photostimulated at 21 wk of age when Ross 344 males were added to create 16 pens with 60 females each in a 2 x 2 design. Egg production and mortality were determined on a daily basis while percentage fertility and fertile hatchability were evaluated on a weekly basis from sets of 90 eggs per replicate pen. BW was determined on a regular basis. The slow feed increase program significantly decreased female mortality and percentage floor eggs but did not affect male mortality. Males mixed with 308 females exhibited lower mortality than males mixed with 708 females. The 708 females exhibited better fertile hatchability than 308 females due to fewer late dead embryos. There were no differences in egg production, fertility, or fertile hatchability due to the main effects of feed increase program or strain and there were no interactions for any variable measured. It was concluded that a slow feed increase from photostimulation to peak production was beneficial for broiler breeder females irrespective of strain.

Key Words: broiler breeders, feed program, mortality, egg production, fertile hatchability

M60  Broiler performance of progeny produced from breeders fed low dietary crude protein levels.  S. M. Whipple, D. E. Yoho, K. J. Wilson, and R. K. Bramwell, University of Arkansas, Fayetteville, Georges Inc., Springdale, AR.

Dietary crude protein levels in Broiler Breeder diets have been evaluated by researchers and commercial producers with respect to breeder performance. There is ample evidence that lower dietary protein levels
can improve egg production in addition to lowering feed cost. In addition, there is speculation that dietary intake by parent stock can affect progeny performance, but the results have varied and are inconsistent. The objective of the current study was to rear broilers produced by breeders fed varying levels of dietary crude protein to determine if sire and dam dietary crude protein would affect progeny performance. Parent stock broiler breeders were fed diets containing either (15.5% CP; T1; 14.5% or 13.5% CP; T2 and T3, respectively) at onset of egg production and for the remainder of the production cycle. At 30, 40, and 50 weeks of age, a total of 60 birds per pen with a total of 3 pens of each treatment were hatched and placed in replicate broiler pens with all birds fed the same diet on industry produced broiler feed program. Body weight was obtained weekly for each group and final feed conversion obtained for each group after the 38 day growout period. At the conclusion of the growout period, a random sample of 10 male and 10 female were selected and processed to determine process weight, and part yield, being wings, fillet, tenders, legs, rack, and fat, for each treatment group. Weights at processing were not significantly different between treatments (1,819g T1, 1,832g T2, and 1,849g T3). Analysis of the parts at processing also revealed no significant difference between treatments. Results of this experiment indicate that altering the dietary crude protein levels in parent stock breeders did not affect progeny broiler performance.

Key Words: broiler growth, broiler performance, parental dietary intake

M61 Feeding low crude protein levels and their effect on broiler breeder hatching egg production. D. E. Yoho*SC1, J. R. Moyle1, R. S. Harper1, S. M. Whipple1, C. N. Coon1, K. J. Wilson2, and R. K. Bramwell1, 1University of Arkansas, Fayetteville, 2Georges, Inc., Springdale, AR.

Managing Broiler Breeders for optimum production is a constant challenge for commercial producers. Feed management programs are critically important factors that affect desired results regardless of the formulated diet. In the past, crude protein levels in Broiler Breeder diets have been manipulated with mixed results depending upon the conditions in which they were implemented. However, there is ample evidence that lower dietary protein levels can improve egg production in addition to lowering feed cost. The objective of the current study was to feed a control diet (15.5% CP; T1) and two lower protein diets (14.5% and 13.5% CP; T2 and T3, respectively) at onset of egg production and measure reproductive parameters such as: hen body weight, egg production, egg weight, egg shape, and eggshell thickness. 500 female and 100 male commercial strain broiler breeders were raised separately from eight weeks to 21 weeks of age on the same diet and were fed according to industry standards. At 21 weeks of age, hens were randomly assigned to one of the three treatment groups with three males and 25 females randomly placed in pens with six replicate pens per group. Hens were fed an identical ration until egg production reached five percent for an entire treatment group, at which time the treatment group was placed on either a T1, T2, or T3 CP diet and fed daily allotments to meet industry recommendations. All groups peaked in the same week at 81.1, 81.4, and 78.4 %, respectively. There was no significant difference in egg weights, but T3 hens produced more eggs per hen housed (149.3, 149.7, and 153.4 for T1, T2 and T3 groups, respectively) through 60 weeks of age. In this study, results indicate that lowering dietary crude protein improved egg production while lowering overall feed costs.

Key Words: broiler breeder, protein, egg production

M62 Evaluating the effects of in-house composting on litter in commercial broiler houses. K. J. Barker*SC1, M. T. Kidd1, J. L. Purswell2, J. D. Davis1, C. D. Coufal3, C. D. McDaniel1, and A. S. Kiess1, 1Mississippi State University, Mississippi State, 2USDA, Mississippi State, MS, 3Texas A&M University, College Station.

In-house composting of litter between flocks may be an effective method to reduce pathogens and improve the quality of the environment in which new chicks are placed. In this study, different methods of in-house composting were tested in a commercial setting to determine the effects each would have on litter composition. Three composting treatments and one uncomposted treatment were applied to two commercial broiler houses containing litter that was used over multiple flock grow-out cycles. Each composting treatment involved windrowing with either the addition of water, turning, or leaving the windrow undisturbed for 8 d. Two commercial broiler houses were each divided into sixteen 20 x 20 ft. plots with each treatment being applied to four plots per house. Litter from each plot was analyzed for moisture content, pH, ammonia, and bacteria counts over a 17 d period, with d 17 representing 7 d after chick placement. The results indicated that moisture content was significantly lower in uncomposted litter when compared to all composting treatments. All treatments showed decreases in pH from d 0 to d 17. Ammonia levels significantly decreased from d 10 to d 17. Composted litter with no added water or turning resulted in a significant decrease in anaerobic counts on d 17 compared to the uncomposted litter. In conclusion, in-house composting may be beneficial for newly placed chicks by changing the litter environment as well as reducing the population of pathogenic anaerobes that are detrimental to bird health and production.

Key Words: ammonia, anaerobe, composting, in-house, windrow

M63 Spatial variation of manure nutrients in commercial high-rise laying-hen houses. S. A. Roberts*SC, R. J. Swestka, H. Li, and H. Xin, Iowa State University, Ames.

Poultry manure is a valuable source of nutrients for crop production when properly managed. Before manure can be sold or land-applied, the nutrient contents must be accurately assessed. The objective of this field study was to determine how many manure samples must be collected for a typical high-rise laying-hen house to accurately determine the nutrient contents of the manure while minimizing labor and analyses costs. A novel manure-sampling probe was developed and used for sample collection. Eighteen samples were collected at 9 locations evenly spaced in 6 high-rise laying-hen houses, each containing approximately 70,000 hens, on a farm in central Iowa. There were 108 total samples collected. Each barn had 5 cage rows and, thus, 5 manure piles. Collection was performed in the fall immediately before yearly manure removal. Samples were stored at −20°C before freeze-drying and grinding thorough a 1 mm screen. Samples were then analyzed for dry matter and total Kjeldahl N contents. Results are reported for N content on a dry-matter basis. Data were analyzed by comparing different sampling scenarios to the value obtained when all 18 manure samples in each barn were considered. Results showed that duplicate samples at a location were not necessary; hence the 2 samples per location were averaged to yield 9 values per barn. Six scenarios were considered: 2 sets of 3 samples diagonally along the length of the barn, 2 sets of 3 samples along the length or width of the middle pile, 1 set of 4 samples—one at each corner of the barn, and one sample collected at the center of the barn. The scenario with the lowest difference from the 9-sample average (reference), consistently for all 6 barns, was considered the best sampling method. Results revealed that...
collecting 3 samples along the width from the 2 outside and the middle manure pile provided the least difference as compared to the reference value. Collecting only 3 samples vs. 18 would greatly save costs associated with both sample-collecting labor and laboratory analyses of the samples. Further research is planned to evaluate the number of samples necessary for larger barns with more manure piles.

**Key Words:** laying hen, manure nutrients, nitrogen

### Nutrition III

**M64** Identification of an inflammatory compound for chicks in soybean meal–II. D. M. Anderson*1, H. Y. Hsiao1, and N. M. Dale2, 1ChemGen Corp., Gaithersburg, MD, 2University of Georgia, Athens.

Previous studies have shown that β-galactomannan (β–mannan) in soybean meal (SBM) stimulates an innate immune response in chickens. SBM is the primary source of β–mannans in most commercial feeds. Plasma levels of the acute phase protein AGP (β–1 acid glycoprotein) were used to reflect the degree of innate immune response. Studies were conducted to verify (1) the relationship between β–mannan content in diets and degree of immune response and (2) the dosage effect of β–mannanase enzyme (Hemicell®, ChemGen Corp.) on the reduction of immune stress. Mixed sex broiler chicks were reared to 14 days of age in battery brooder units and plasma AGP levels were determined. The test diets contained 19.0% isolated soy protein (ISP), 25.4% soy protein concentrate (SPC) or 34.0% SBM. The mannan content in these diets was also determined. As soy products become more refined, the plasma AGP levels were significantly reduced (i.e., less immune response). A linear relationship was calculated between AGP levels and mannan content in testing diets.

In the same study, three doses of β–mannanase (60, 100, 150 million units per ton feeds) were applied on SPC diets and SBM diets. In SBM diets, β–mannanase addition significantly reduced circulating AGP levels in birds. In the relatively low mannan SPC diets, enzymatic hydrolysis of β–mannan consistently, but not significantly, reduced AGP in chicks. It is concluded that normal broiler diet formulations can stimulate an innate immune response, and that β–mannan in SBM appears to be a causative agent. Plant derived β–mannan can thus be considered to be a PAMP (pathogen associated molecular pattern) analog for poultry, engendering a metabolically expensive over–stimulation of the innate immune system. Feeding β–mannanase can result in the reduction of immune stress in chicks.

**Key Words:** β–mannanase, soybean meal, α-1 acid glycoprotein, β-galactomannan, chickens

**M65** Effect of diet formulation on a total or digestible amino acid basis and amino acid concentration on broiler performance and carcass yield. M. de Beer*1, T. J. Applegate2, K. A. Walter1, and D. Burnham1, 1Aviagen, Inc, Huntsville, AL, 2Purdue University, West Lafayette, IN.

Two experiments were conducted to determine the effects of diet formulation on a total (TOT) or digestible (DIG) amino acid (AA) basis and AA concentration on broiler performance and carcass yield. The first experiment determined the standardized ileal AA digestibility (SIAAD) and AMEn of a corn DDGS and a poultry product meal (PBM). The standardized Lys digestibility was 62.5 and 45.6% for the DDGS and PBM, respectively; whereas the AMEn was 2792 and 2537 kcal/kg, respectively. A subsequent broiler grow-out experiment was conducted with diets formulated using determined SIAAD and AMEn values for DDGS and PBM and average values for corn and SBM from previous experiments. The grow-out study was designed as a 2 x 2 factorial contrasting 0 vs. 10% DDGS, TOT vs. DIG, and 100% vs. 90% of 2007 Aviagen amino acid recommendations for Ross x 708 broiler chicks. Each diet was fed to 9 male and 9 female pens containing 20 birds/pen from 0 to 13, 13 to 26, 26 to 42, and 42 to 56 d of age. During each phase, dietary inclusion of PBM was fixed across diets at 3.5, 4.5, 5.5, and 6.5%, respectively. Formulation on a DIG basis vs. a TOT basis increased BW by 56 and 61 g and reduced FCR by 0.03 at both 42 and 56 d of age. Similarly, formulation to 100 vs. 90% increased 42 and 56 d BW by 53 and 43 g and reduced FCR by 0.04 and 0.03 at 42 and 56 d, respectively. Additionally, formulation on a DIG vs. TOT basis increased total white meat yield by 0.33 and 0.41%-units and lowered abdominal fat by 0.18 and 0.10%-units at 42 and 56 d of age, respectively. Likewise, formulation to 100 vs. 90% increased total white meat yields by 0.60 and 0.72 %-units and lowered abdominal fat by 0.22 and 0.24 %-units at 42 and 56 d of age, respectively. Despite potential increases in diet cost by formulating on a DIG vs. TOT AA basis or with a higher AA concentration, FCR and carcass yield differences improve broiler profitability.

**Key Words:** amino acid, broiler, digestibility

**M66** Effect of amino acid formulation and dietary probiotic supplementation on egg production and characteristics of laying hens. T. J. Applegate*1, E. Onyango2, R. Angel3, and W. Powers4, 1Purdue University, West Lafayette, IN, 2East Tennessee State University, Johnson City, 3University of Maryland, College Park, 4Michigan State University, East Lansing.

An experiment was conducted to determine whether probiotic supplementation could alleviate a marginal amino acid deficiency in Hyline 36 laying hens from 33 to 44 wk of age. A 2 by 4 factorial experiment with or without a commercial probiotic (1.4 kg /1000 kg) and 4 levels of amino acids (an amino acid adequate diet fed ad libitum (AAL); or an amino acid adequate (A90), marginal (M90) or deficient (D90) diet fed at 90 g/hen/d). Each dietary regimen was fed to 24 cages containing 2 birds per cage (780 cm2/hen). Dietary CP concentration was analyzed to be 17.4, 16.6, and 15.5% for the adequate, marginal, and deficient diets, respectively. Egg characteristics (yolk, albumen, or shell proportions and yolk or albumen solids) were not affected by diet (P > 0.05). Probiotic supplementation did not improve nor hinder egg production or egg mass despite consuming 10, 4, 7, 6.5, and 7.5 mg of Lys, Met, TSAA, Thr, and Leu less per hen per d, respectively. Probiotic supplementation reduced feed intake-to-egg mass ratio by 2.4% and 3.4% from 33 to 36 and 41 to 44 wk, respectively. Numbers of eggs laid, egg weight (g/egg) and egg mass (kg/feeding period) were maximized when the AAL and A90 were fed vs the M90 or D90 diets. Total eggs laid and egg mass were greatest when at least 14.4 g CP, 804 mg Lys, 382 mg Met, 601 mg TSAA, 502