S-M75 The performance of layers fed Azolla (*Azolla pinnata*) meal in diets. O.A. Alalade*[1], E.A. Iyayi[1], and T.O. Alalade[2], [1]*University of Ibadan*, *Ibadan, Oyo, Nigeria*, [2]*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. Schwean-Lardner*[1], H.L. Classen[1], and B.I. Fancher[2], [1]*University of Saskatchewan*, *Saskatoon, Canada*, [2]*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*[1], Y. Vizzier-Thaxton[1], J.P. Thaxton[1], S. Anderson[1], and H. Olowanju[2], [1]*Mississippi State University*, *Starkville*, [2]*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*, 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

plus animal (V+A)], and sex [S; male (M) and female (F)] using a four stage feeding program (50 birds per pen; 4 pens of M and F per treatment). Body weight (BW), feed conversion (FC) and mortality was measured on Days 14, 28, 42 and 53. The feet were scored on all birds on Days 28, 42, and 53 and the severity was recorded as: none (no ulcerating lesion), mild (lesions of <1.5 cm), and severe (lesions of >1.5cm). A sub-sample of birds (10 birds per pen) was processed on Day 53 to evaluate carcass yields.

No differences (P>0.05) were detected in mortality between the treatments throughout the course of the study. A significant PL*PS interaction at 42 d of age indicated best BW and lowest FC for birds reared on HP and V diets. At 53 d of age, BW was significant for PS (V>V+A) and S (M>F). Chilled carcass yields did not differ between the treatments. However, birds reared on V diets showed lower abdominal fat levels (2.28%) compared to those reared on V+A (2.57%). As expected, F had higher abdominal fat yields than M. Paw burns were significantly affected (P<0.05) by protein level, protein source and sex. Incidence and severity of paw burns increased with age. At 28 d of age lesions were mild in severity and varied significantly in incidence by PS (30% for V vs. 41% for V+A). At 53 d of age, a significant PL*PS interaction was detected for severe lesions, where birds reared on LP and V+A diets showed the lowest incidence compared to other treatments. Incidence of paw burns was higher for M (62%) than F (55%). Severe lesions increased two-fold by PL (20% for HP vs. 10% for LP) and by S (21% for M vs. 10% for F) and tripled by PS (23% for V vs. 8% for V+A) treatments. Feeding programs should be recognized as a significant contributor to paw burns in poultry.

Key Words: broiler, paw quality, paw burns, high protein diets, vegetable diets

S-M79 Evaluation of a perinatal nutritional supplement on broiler performance. S. Henderson*, J. Vicente, C. Pixley, G. Tellez, and B. Hargis, *University of Arkansas*, *Fayetteville*.

Chicks are commonly held for up to 72 hours from the time of actual hatch to placement under commercial industry practices. Delaying access to feed and water has been documented to increase susceptibility to disease pathogens and weight loss, leading to poor starting flocks with reduced weight gains. Our objective was to evaluate the effect of a commercially available perinatal nutritional supplement (EarlyBird, IVS/Wynco) on broiler performance when feeding was delayed for 24-h. Three experiments were conducted to compare the use of EarlyBird (EB) to no supplementation (NS) in chick boxes when holding chicks for 24-h. Broilers were obtained from a commercial hatchery, neck tagged, individually weighed, and randomly placed in boxes of 100 chicks. In all experiments, treated chicks received 2 g/chick of EB. Following 24-h holding, at room temperature and ambient light, the chicks were individually weighed and placed into pens of 30 chicks/pen and weighed at 7-d of age. In the first experiment, treatment with EB was compared to NS. After 24-h holding, chicks treated with EB lost 3.42 g/chick (p<0.05) less than NS group. At 7-d of age EB-treated chicks gained 7.43g more than NS. In exp. 2, treatments were; no holding period (NH), EB in chick box, NS, EB in chick box + top dress (TD) feed with EB or TD only. Following the holding period, the EB chicks lost 1.48 g/chick (p<0.05) less than NS. At day 7, EB+ TD group gained (p<0.05) 7.57g or 8.59g more than the EB in chick box only and NS, respectively. Treatment groups in exp. 3 were identical to exp. 2. EB group lost 1.99g as compared to the NS which lost 3.98g (p<0.05) after the 24-hr holding period. At 7 days, EB+TD groups averaged 9.27g heavier than NS (p<0.05). The results indicate that the dependence of chicks on residual yolk sac during the first few days post hatch limits the genetic potential of growth of modern broilers. Therefore, it is apparent that early feeding can not only impact the general well being of the chick but also can have significant effects on early growth.

Key Words: perinatal nutrition, chick supplement, holding, performance

S-M80 Evaluation of nipple drinkers and the Lott System for determining appropriate water flow for broilers. J.M. Cornelison*, A.G. Hancock, A.G. Williams, L.B. Davis, and S.E. Watkins, *University of Arkansas*, *Fayetteville*.

Two trials were conducted to evaluate broiler performance using different drinker systems managed according to manufacturers operating procedures and to determine if the Lott flow formula is an appropriate method for all drinker types. Seven drinkers were evaluated during the two trials. These include: VAL-CO®, Ziggity® Max3, CHORE-TIME® RELIA-FLOW™, Plasson® Nipple Drinker Line, Cumberland® Nipple Drinking System, Roxell SparkNipple® and Roxell SparkCup®. Each of these lines were compared to a Val-Roaster drinker which was maintained according to Lott flow recommendations. For both trials the average body weight, feed consumption, and livability were determined on Days 7, 21, 35, 42. In trial one water usage was also calculated. In both trials, static flow was measured on each drinker type to serve as a comparison between the different drinkers. In trial two a 250 gram litter sample was collected on Days 1 and 42 to determine litter moisture. No statistical differences were observed for body weight or feed conversion among the various drinker systems at any age. However, significant statistical differences were observed for litter moisture across treatments. There were no significant correlations between drinker static flow and broiler performance. However, drinker management proved to be vital for maximum broiler performance.

Key Words: nipple drinker, static flow, Lott flow, drinker management, broiler performance

S-M81 Effect of five different nipple drinker systems on broiler performance. R.M. Hulet*, T.L. Cravener, and E.F. Wheeler, *The Pennsylvania State University*, *University Park*.

Nipple drinkers have been credited with reduction of litter moisture and ammonia levels in the broiler house and subsequent improvement of broiler health. Currently, many different drinkers with varying levels of water flow are available. Two trials, Spring (SP) and Summer (SU), were conducted with nipple drinkers with different flow rates. Five different drinkers (A, B, C, D, and E) were tested for flow rate and randomly assigned to 48 pens with 9 (system B and C) and 10 (system A, D, and E) replicate pens for drinker systems. Three nipples per three-foot line were placed into each pen with 36 Cobb 500 chicks (0.07 m2/bird). Birds were reared to 42 days of age with feed intake (FI), body weight (BW), and feed conversion (FC) recorded for every feed change and at completion of the project. Weekly twenty-four hour FI and water use (WU) data were collected for each pen. The five nipple systems used

were: Choretime, Lubing, Plasson, Val, and Ziggety. Higher average maximum temperatures for the SU (32 C) versus the SP (28 C) trial, made the trials significantly different (SD) and therefore were analyzed separately. While no SD were found in BW (kg) during the SP trial, drinker D significantly reduced 42d BW (2.32) in comparison to the A (2.44), B (2.42), C (2.41), and E (2.44) systems. No SD in overall FC or percent mortality were found between treatments for either the SP or SU trial. During the SP and SU trials, no SD in twenty-four hour FI was found between drinker systems for weeks 1, 3 and 4. During week 2 for the SP trial, nipple system B and D had less FI than nipple system A. During week 5 for the SU trial, nipple system D had less FI than A, B, and E. Twenty-hour WU was less for birds on system D for weeks 2, 3, and 4 in both SP and SU trials, and also in week 5 for the SU trial, than for birds on system A, B, C, and E. Broiler growth and performance was not related to measured flow rate of the drinkers for SP and SU trials.

Key Words: nipple drinker, flow rate, broiler, growth, water use

S-M82 Effect of antioxidants (Vitamin C, Vitamin E, and Selenium) and feeding programs during the production period on broiler breeder fertility and hatchability. J. Brake*, H. Romero-Sanchez, P. Plumstead, N. Leksrisompong, and M. Wineland, *North Carolina State University*, *Raleigh*.

Two experiments were conducted to evaluate an antioxidant additive package and two sources of selenium on broiler breeder fertility and hatchability. From 0 to 21 wk all broiler breeders received the same starter and growing diets in a blackout rearing facility. Birds were photostimulated at 21 wk of age when they were moved into the production facility. At 21 wk birds were placed in 12 pens which were randomly assigned to either a High or Normal antioxidant content diet, in Experiment 1. In Experiment 2, a 2x2 factorial design evaluated the interaction between males with the largest comb (LC) and smallest comb (SC) height with either organic selenium (selenomethionine (SeMe)) or inorganic selenium (sodium selenite (NaSe)), in a 16 pens facility. All males were weighed individually at 4, 8, 12, 16, 20, 24, 26, 28, 32, 40, 48, 56, and 64 wk of age. Percentage fertility and embryo mortality were evaluated on either a weekly or biweekly basis.

In Experiment 1, the High antioxidant level significantly increased fertility on an overall basis. After 38 wk of age, there was a dramatic decrease in fertility that was less pronounced for the High antioxidant group. However, after the male feed allocation was increased at 54 wk of age the differences due to antioxidant level tended to disappear. In Experiment 2, the LC group showed a consistently higher BW. The LC males receiving NaSe exhibited a significantly lower fertility during early production that was related to a significantly heavier BW, suggesting that early maturing males (LC) were slightly underfed after photostimulation and that SeMe had a â•œnutrient sparingâ•• effect that allowed them to maintain high fertility even when they did not gain BW in a consistent manner. However, during the late production period NaSe elicited better fertility and hatchability.

Key Words: antioxidant, selenium, broiler breeder, feed program, energy requirement

S-M83 The behavior of laying hens on an alfalfa crumble molt diet. C. Dunkley*[1], J. McReynolds[3], K. Dunkley[1], W. Kim[1], T. Friend[2], L. Kubena[3], D. Nisbet[3], and S. Ricke[1], [1]*Texas A&M University*, *College Station*, [2]*Texas A&M University*, *College Station*, [3]*USDA, ARS, Food and Feed Safety Research Unit*, *College Station, Texas*.

The induction of molt by way of feed deprivation has been continually frowned upon by animal welfare advocates on grounds that it is cruel and inhumane. With this in mind we conducted a study to evaluate the behavior of laying hens on an alfalfa molt diet (ALC) during a 9 day molt and compared them to the behavior of full- fed (FF) and feed withdrawal (FW) hens. We allowed the hens to acclimate in the houses in two- tier battery cages for two weeks after which they were administered the diet or removed the feed in the case of the FW hens. The hens were kept in three individual rooms so that their behavior would not be influenced by the other treatments. The rooms were fitted with cameras which were connected to a Digital Multiplexer Recorder. The hens were evaluated for a number of behaviors including; non-nutritive pecking, feeder, drink, walk, preening, head-movement, aggression, standing and sitting. From day 7 through 9, the ALC hens spent significantly ($P \leq 0.05$) less time performing non-nutritive activity than the FW hens, the time spent was not different significantly from the FF hens. The ALC hens spent 50.59% of their time in nonnutritive activity while the FW hens spent 73.22% of their time involved in the activity. No aggression was observed in the ALC and FF treatments. The ALC hens spent an equivalent amount of time preening as the FW hens (16.71 and 16.4% respectively on day 7). The FW hens began shedding feathers on day 8 of the molt while the ALC hens initiated shedding on day 10.

Key Words: molting, welfare, behavior, laying hens

Monday, January 23
Processing & Products II
Room: B315

S-M84 Psychrotrophic bacteria and yeasts on broiler carcasses washed with electrolyzed oxidizing water or chlorinated water using an inside-outside bird washer. A. Hinton Jr*, J. Northcutt, D. Smith, M. Musgrove, and K. Ingram, *Russell Research Center*, *Athens, Georgia*.

Research was conducted to determine the effect of acidic, electrolyzed oxidizing (EO) water and chlorinated water on the populations of psychrotrophic bacteria and yeasts on processed broiler carcasses. Carcasses were sprayed for 5 sec at 80 psi with tap water, chlorinated water, or EO water in an inside-outside bird washer (IOBW). Washed carcasses were then stored at 4°C for 0, 3, 7, or 14 d, and the microbial flora of the carcasses was sampled using the whole-carcass-rinse (WCR) procedure. Populations of psychrotrophic bacteria and yeasts in the carcass rinsates were enumerated on microbiological agar media. Results indicated that immediately after spraying the carcasses, significantly fewer psychrotrophs and yeasts were recovered from carcasses sprayed with chlorinated water or EO water than from carcasses sprayed with tap water and that significantly fewer yeasts were recovered from carcasses sprayed with EO water than from carcasses sprayed with chlo-