13 Comparison of egg production parameters and quality between molted and non-molted hens in enriched colony cages at two different densities from 73 to 109 weeks of age. Rafael Crivellari*, Ramon Malheiro, Peter R. Ferket, and Kenneth E. Anderson, Prestige Department of Poultry Science, North Carolina State University, Raleigh, NC.

Alternative production systems have increased popularity in the egg industry to address consumer demands for the production of commercial eggs that reduce concerns over animal welfare. This experiment was conducted at the NCDA&CS, Piedmont Research Station, in conjunction with the NCLP&MT. This study consisted of 6 replicates totaling 378 hens of a single commercial egg strain, housed in an enriched colony system at 2 different densities (69 and 138 in²/hen) containing 252 and 126 hens each, respectively. Half of the hens were molted (69–72 wk) using the NCLP&MT non-anorexic molt program (NA), and the other half were maintained as non-molted (NM) flock for comparison of production and egg quality characteristics. Production criteria of feed consumption, egg production, and mortality were monitored daily and summarized by replicate every 28 d. The study was conducted from 73 through 109 wk of age as a completely randomized design. All diets were provided ad libitum, based upon the hen’s feed consumption and productivity over the previous 28-d period. In the third week of each period, the previous 24 h eggs were collected for analysis over 9 periods. For each replicate, the eggs were evaluated to determine the USDA grades and egg size distribution. The NA hens had significantly (P < 0.05) better feed consumption (g/bird/day), feed conversion (g egg/g feed), eggs per hen, hen housed and hen-day production and daily egg mass than the NM hens. The molted group also had improved egg USDA egg quality and egg size distribution with a higher percentage of Extra Large eggs (90.41 vs. 83.25). Between the 2 density treatment groups, the hens kept at 138 in²/hen had better feed consumption (g/bird/day), feed conversion (g egg/g feed), and hen housed production. There was an interaction on average egg weight (P < 0.02) and the production of Extra Large eggs (P < 0.04). The NA Molted hens demonstrated beneficial effects on egg production parameters, especially at the lower stocking density.

Key Words: molt, non-anorexic, enriched colony cage, egg quality, laying hen

14 Effect of cooled perches on efficiency of induced molt during hot weather in caged hens. Jiaying Hu1, Patricia Y. Hester1, and Heng-Wei Cheng2, 1Purdue University, West Lafayette, IN, 2Live- stock Behavior Research Unit, USDA-ARS, West Lafayette, IN.

Induced molt is a management strategy used by the egg industry to extend the life cycle of the laying hen into a second period of lay. Induced molting causes stress which could be even more detrimental to hens when done during hot weather. Our objective was to determine if use of cooled perches by caged hens during an induced molt under heat stress conditions would improve post-molt performance. Hy-Line W-36 hens (n = 288) were assigned to 1 of 3 treatments: cages with perches filled with cooled water (CP), ambient air perches (AP), or no perches (NP). At 85 wk of age, hens were fed a molt diet (71% wheat middling and 23% corn) ad libitum for 4 wk with lighting restricted to 8L:16D. Room temperature was increased to 32°C for 12 h (0600 to 1800 h) daily during the 4 wk molt. After molt, hens were fed a regular layer diet and given a 16L:8D photoperiod under normal ambient temperature up to 101 wk of age. Changes in BW were measured weekly on 2 marked birds per cage. Feed utilization was determined for 7 d during wk 1 and 3 of the molt. Number of eggs laid per cage was recorded daily. Five eggs per cage were collected weekly to measure shell quality. Data were subjected to an ANOVA with repeated measures. The 4 wk BW loss during molt, likely due to regression of the reproductive tract, was 13% (NP), 19% (AP), and 22% (CP) with CP and AP hens different from NP hens (P = 0.02). Egg production during molt was low and did not differ between treatments. The CP hens had higher feed intake during molt (P = 0.02) and better post-molt hen-day production beginning 8 wk into the second cycle (P = 0.0002 for the treatment by age interaction) than AP and NP hens. Shell quality was not affected by treatment. In conclusion, cooled perches ameliorated the stressful effect of an induced molt plus cyclic heating episodes with better feed intake during molt resulting in a more optimum BW loss and improved post-molt egg production.

Key Words: cooled perch, molt, egg production, heat stress, hen

15 Production response of laying hens provided a photoperiod during incubation. William Hannah* and Bruce Rathgeber, Dalhousie Agricultural Campus, Truro, NS, Canada.

Conventional incubation occurs in the dark but recent research has shown increased chick health as a result of applying a 12L:12D photoperiod during incubation. The suggested mechanism for the increased health of chicks administered a photoperiod during incubation is decreased stress by novel environments due to a synchronized circadian rhythm at hatch. With the chicks that have been provided light during incubation there is a concern of negative long-term production effects that would show up during the lifespan the laying hen. A total of 1,680 eggs in a completely randomized design experiment with 3 strains and 4 incubation photoperiod timing treatments were used to assess production parameters of laying hens. Barred Plymouth Rock, Lohmann Brown and Lohmann Lite hens were used for each of the 4 photoperiods treatments. The 4 treatments were incubation in the dark, 12L:12D photoperiod throughout incubation, 12L:12D photoperiod at incubation d 9 and 17 until hatch. The experimental design included 9 cages for each treatment, with 5 birds in each cage, as the experimental unit. Egg numbers, feed consumption, body weight and egg quality were all monitored throughout laying hen production. Feed and body weight measurements were made monthly using all hens in each cage. Egg quality measurements used the average of 3 eggs from each cage and included specific gravity, egg weight, egg strength, albumen height, yolk weight, shell weight and shell thickness. No significant production responses were detected to 48 wk of age for the hens. The early evidence suggests that there are no detrimental effects of a photoperiod on laying hen production parameters.

Key Words: hen, incubation, photoperiod, production

16 Effects of genetic line and incubation temperature profiles on hatchability and hatching characteristics. Albaraa Sarsour*1, Edgar O. Oviedo-Rondón1, Hernan A. Cordova1, Luis Carlos Bernal-Arango1−2, Beatriz Saldaña1−2, Ricardo Fasanaro1−4, Mariana Mesquita1−2, Michael J. Wineland2, Luke Borst2, and John Barnes6, 1Prestige Department of Poultry Science, North Carolina State University, Raleigh, NC, 2Universidad Politécnica de Madrid, Madrid, Spain, 3Politécnico Colombiano Jaime Isaza Cadavid, Medellín, Antioquia, Colombia, 4Universidade Estadual Paulista, Botucatu, Brazil.

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Incubation temperature conditions affect embryonic development and these effects may vary among genetic lines. This experiment was conducted to evaluate the effects of temperature incubation profiles on 4 genetic lines. A total of 1,000 eggs from: Cobb 500 × Cobb MX, Ross 708 × Ross, Cobb 500 × Hubbard M99, and Athens Canadian Random Breed Cross (ACRBC) were randomly distributed into 4 machines with 2 incubation temperature profiles. In 2 machines, eggshell temperatures were maintained close to 37.8°C during the whole incubation period (Standard) to simulate single stage incubation. In the other 2 machines, eggshell temperatures were low (36.9°C) for the first 3d and later close to 37.8°C until the last 3d when eggs had elevated (38.9°C) eggshell temperatures (Low-High), as it is observed in multistage machines. Eggshell temperatures were measured 4 times per day with pipe-probes attached to eggs and read with a thermometer to avoid opening machines. Hatchability and fertility were evaluated at hatch. Additionally 12 chicks per treatment combination were sampled for BW, yolk-free BW, heart, liver, proventriculus, and gizzard weights. Ceca and intestine length were also recorded. Data were analyzed as a completely randomized design with a 4 × 2 factorial arrangement of treatments with genetic lines and incubation conditions (Standard and Low-High) as main factors. The ACRBC had significantly lower hatchability and fertility ($P < 0.05$) compared with the other genetic lines. There was no effect ($P > 0.05$) of incubation temperature profiles on hatchability. The ACRBC genetic line also had lower BW ($P < 0.05$) and yolk free BW at hatch followed by the Ross × Ross genetic line. The heavier chicks at hatch came from the 2 Cobb crosses. Similar effect was observed on the gizzard and liver weights at hatch. Chicks incubated under optimum conditions (Standard) had heavier ($P < 0.05$) hearts than those from Low-High profile. It was concluded that genetic lines differed on hatchability and embryonic development, and incubation temperature profiles had an effect on heart development at hatch.

**Key Words:** hatchability, genetic line, incubation temperature profile, broiler

### 17 Assessment of the penetration of eggshells of chickens of different genetic background by different bacteria

Xujie Li*, Breagh Quigley, and Bruce Rathgeber, Dalhousie University, Truro, NS, Canada.

The transmission of pathogenic bacteria to eggs is a major concern to the poultry industry. This study evaluated the ability of 2 bacteria strains (Salmonella enteritidis and Escherichia coli) to penetrate the eggshell of 4 different breeds, Lohmann LSL-Lite, Lohmann Brown Lite, Barred Plymouth Rock, and Ross 308. Egg weight, breaking force and shell thickness measurements were taken for 16 eggs per breed. An additional 48 empty and cleaned eggshells per breed were filled with plate count agar containing 30 ppm nalidixic acid and 0.1% 2,3,5-triphenyltetrazolium chloride as the bacterial activity indicator. The shell opening was sealed with paraffin wax to prevent contamination. For each breed, all agar-filled eggs were labeled and randomly divided into 2 groups with 3 replicates (8 eggs/bacteria strain/replicate). Agar-filled eggs were submerged for 5 min in an overnight culture of nalidixic acid-resistant Salmonella enteritidis or E. coli and incubated at 37°C for 40 h. Eggs were candled and visual colonies were counted. Eggshell quality characteristics and bacterial penetration data were subjected to ANOVA using Proc Mixed of SAS. Barred Plymouth Rock (53.4 g) produced the smallest eggs compared with the other 3 breeds ($P < 0.05$).

No significant differences were found in breaking force ($P = 0.0709$) or shell thickness among breeds ($P = 0.429$). More E. coli (26 cfu/egg) penetrated the eggshells than Salmonella (18 cfu/egg) ($P = 0.05$). Bacterial penetration was highest ($P < 0.05$) for Lohmann Brown Lite (30 cfu/egg); no differences were found among Barred Plymouth Rock (23 cfu/egg), Ross 308 (19 cfu/egg), and Lohmann LSL-Lite (16 cfu/egg). These results indicated that the ability to resist bacteria penetrating through eggshells were variable among breeds and bacteria strains. Lohmann LSL-Lite eggshells had a good ability to exclude bacterial penetration.

**Key Words:** Salmonella, Escherichia coli, eggshell, chicken breed, bacterial penetration

### 18 Effects of incubation temperature profiles on organ and gastrointestinal tract development of four genetic lines of broilers

Hernan A. Cordova*, Edgar O. Oviedo-Rondón, Albarara Sarsour, Beatriz Saldaña, Luis C. Bernal-Arango, Mariana Mesquita, Ricardo Fasana, Michael J. Wineland, Luke Bors, and John Barnes, 1Prestige Department of Poultry Science, North Carolina State University, Raleigh, NC, 2Universidad Politécnica de Madrid, Madrid, Spain, 3Politécnico Colombiano Jaime Isaza Cadavid, Medellín, Antioquia, Colombia, 4Universidade Federal de Goiás, Goiânia, GO, Brazil, 5Universidade Estadual Paulista, Botucatu, SP, Brazil, 6College of Veterinary Medicine, North Carolina State University, Raleigh, NC.

Incubation conditions affect organ and gastrointestinal tract development, but these effects may differ among genetic lines. This experiment was conducted to evaluate the effects of incubation temperature profiles on organ and gastrointestinal tract development of 4 genetic lines post hatch. A total of 1,000 eggs from Cobb 500 × Cobb MX, Ross 708 × Ross, Cobb 500 × Hubbard M99, and Athens–Canadian Random Breed Cross (control) were randomly distributed into 4 machines with 2 incubation temperature profiles. In 2 machines, eggshell temperatures were maintained close to 37.8°C during the whole incubation period to simulate single stage incubation (Standard). In the other 2 machines, eggshell temperatures were low (36.9°C) for the first 3d and close to 37.8°C until the last 3d when eggs had elevated (38.9°C) eggshell temperatures, as it is observed in multistage machines (Low-High). At hatch, 960 d-old chicks were sexed, identified and placed in 80 floor pens (12 chicks/pen), males and females were reared separately. At 14, 28, 42, and 56 d, 2 birds/pen were euthanized, organs (liver, heart, spleen, proventriculus and gizzard) and breast were weighed and duodenum, jejunum, ileum and ceca length were measured. Organ weights and gut length were calculated relative to BW. Data were analyzed as randomized complete block design with a 4 × 2 factorial arrangement of genetic lines, incubation profiles and sex as main effects. No interaction effects ($P > 0.05$) were observed. There was an effect of genetic lines ($P < 0.001$) on relative breast yield at 14 and 28 d of age. Ross × Ross broilers had more breast than the Cobb crosses as well as the control. No significant effects of incubation temperature profiles ($P > 0.05$) were detected on any of the parameters measured. Although, genetic lines differed ($P < 0.001$) on organ weights and intestine length, only the control line was different from the other lines. We concluded that incubation temperature profiles did not affect organ and gastrointestinal tract development during grow-out, and genetic lines differed on breast development.

**Key Words:** genetic line, incubation temperature profile, organ, gastrointestinal tract, broiler

### 19 Withdrawn

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20 Effect of sex and feed ingredients on carcass yields of commercial broilers and Rhode Island Reds. Tatjana Fisher¹, Anthony J. Pescatore¹, Jacqueline P. Jacob¹, Austin Cantor¹, Michael J. Ford¹, and Tuoyoing Ao², ¹University of Kentucky, Lexington, KY, ²Alltech Inc., Nicholasville, KY.

The objective of this study was to assess the effects of breed [commercial broilers (BR) vs. Rhode Island Reds (RIR)], sex, and the use of alternative feed ingredients on carcass yields. A 2 x 5 factorial arrangement of breeds and dietary treatments was used with the following isocaloric (3,000 kcal of ME/kg) and isonitrogenous (20% CP) diets: (1) corn-soybean meal (CS)-based diet; (2) ~30% of CS in diet 1 replaced with field peas (P); (3) diet 2 with a dietary enzyme complex (Allzyme SSF, Alltech Inc.) added at 0.02% of diet (P+); (4) ~50% of CS in diet 1 replaced with a mix of field peas, buckwheat, and flax seed (M); (5) diet 4 with 0.02% Allzyme SSF added (M+). For each treatment, 3 replicates of 12 straight-run birds were housed in floor pens. At 42 and 96 d of age, 2 males and 2 females from each pen of BR and RIR, respectively, were weighed and processed. Average BW was 2,073 g for BR males, 2,067 g for BR females, 1,796 g for RIR males, and 1,328 g for RIR females. As a percent of BW, chilled carcass without giblets (WOG) yields were significantly (P < 0.05) higher, and percent fat pad was significantly lower for BR than for RIR. As a percent of WOG, BR had significantly greater boneless skinless breast and tender yields, and lower wing and leg quarter yields than RIR. As a percent of BW, WOG yields, and percent fat pad were significantly higher for birds fed CS, P, and P+ than for birds fed M and M+. As a percent of WOG, birds fed CS, P, and P+ had significantly higher breast yields, and lower wing and leg quarter yields than birds fed M or M+. As a percent of BW, females had similar WOG yields, but significantly higher fat pad yields than males. As a percent of WOG, females had significantly higher tender and lower leg quarter yields than males. However, sex did not affect breast or wing yields. WOG and breast yield were depressed higher tender and lower leg quarter yields than males. However, sex did not affect breast or wing yields. In conclusion, percent yields of RIR were between sexes for BR than for RIR. Inclusion of dietary enzymes did not affect breast or wing yields. WOG and breast yield were depressed higher tender and lower leg quarter yields than males. However, sex did not affect breast or wing yields. As a percent of BW, females had significantly higher WOG yields, but significantly higher fat pad yields than males. Regardless of daytime light, sexual maturation under supplemental red light was significantly delayed in an intensity dependent manner (2 \times 10^4 lux). Regardless of age, females had significantly heavier (P ≤ 0.05) at 29 and 36 doa, and from 50 to 86 doa. All birds were given the same daily feed allocation and were maintained under an 8-h photoperiod, before being photostimulated with 14L:10D at 140 doa. Birds under green daytime light were significantly heavier (P ≤ 0.05) than birds under red light from 15 to 71 doa. Regardless of daytime light treatment, birds under supplemental red light were significantly heavier (P ≤ 0.05) at 29 and 36 doa, and from 50 to 86 doa. Hens under red daytime light produced significantly more eggs than under green light at 25 (6.6% increase) and 26 (9.0% increase) weeks of age. Regardless of daytime light, sexual maturation under supplemental red light was significantly delayed in an intensity dependent manner (2 and 3 wk lag for low and high intensity, respectively). As birds under supplemental red light were also significantly heavier (P ≤ 0.05) between 25 and 30 wk of age, delayed sexual maturation translated to energy diverted to growth.

Key Words: footpad dermatitis, hock burns, sorghum, broiler

21 Sorghum inclusion levels and the addition of a serine protease on footpad dermatitis at 40 days of age. Pedro H. Ferzola², Edgar O. Oviedo-Rondón¹, Albarara Sarsour¹, and Herman A. Cordova¹, ¹Prestage Department of Poultry Science, North Carolina State University, Raleigh, NC, ²Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil.

Feed ingredients and enzyme addition might affect fecal and litter traits and consequently footpad dermatitis (FPD) incidence. One experiment was conducted to evaluate the effects of sorghum-based diets and the addition of a serine protease on FPD incidence of broilers at 40 d of age. There were 4 dietary treatments from a 2 x 2 factorial arrangement of treatments with 2 feed ingredients (corn and sorghum) and presence or absence of a serine protease (0 or 500 g/ton for 600,000 U/g), as main factors. A total of 640 Ross 708 d-old male chicks were placed in 32 pens with 20 chicks per pen raised on used litter in an open-sided house with clear curtains. Chickens were fed the 4 diets and water ad libitum. At 40 d of age, all broilers were individually evaluated for FPD, valgus, and hock burns. FPD was scored according to the method described by Al-Ali et al. (2009; Br. J. Poult. Sci). Valgus and hock burns were scored as presence or absence of the condition. Additionally, litter samples were taken from each pen to evaluate moisture in a forced air oven for 48 h. Data was analyzed as a randomized complete block design with a 2 x 2 factorial arrangement of treatments and pen location within the house as blocks. No interaction effects (P > 0.05) were observed. There was an effect of feed ingredient (P < 0.05) on FPD and hock burns. Broilers that were fed corn diets had worse FPD scores and hock burns compared with broilers that were fed sorghum diets. There was no effect of protease (P > 0.05) on any of the parameters measured. However, when the protease was added to corn diets a 3% increase in litter moisture was observed and hock burns incidence reduced compared with corn diets without the enzyme. This effect was not observed on the sorghum diets. It was concluded that broilers fed sorghum-based diets could have lower incidence of FPD and hock burns than broilers fed corn-based diets, and protease addition does not significantly reduce FPD.

Key Words: footpad dermatitis, hock burns, sorghum, broiler

22 Effects of main and supplemental light spectrum on broiler breeder growth and maturation. Adriana Rodriguez¹, Martin J. Zuidhof², Charlene Hanlon¹, Brandi Sparling¹, and Gregory Y. Bedecarrats³, ¹University of Guelph, Guelph, ON, Canada, ²University of Alberta, Edmonton, AB, Canada.

Green and red lights have been shown to stimulate early growth and sexual maturation, respectively. In boiler breeders (BB), managing body weight (BW) during the rearing of pullets is key to optimum reproduction. We developed a precision feeding (PF) system for BB that automatically allocates feed to individual birds to precisely match real-time to BW targets. However, usage of the PF system during the pullet stage needs to be extended beyond the standard 8h day. Thus, the objectives of this study were to determine whether specific wavelengths and intensity could be provided 24h as supplemental lighting at the feeder level without negatively affecting growth and reproduction, and assess the effects and interactions with 2 primary daytime barn lighting spectrum. Four identical rooms (12 pens each) were used in a 2 x 4 x 2 factorial arrangement of treatments, with 2 daytime light sources (60 red or 60 green LEDs; n = 2 rooms each), 4 supplemental light wavelengths (dark, red, blue or green; n = 12 pens each) at 2 intensities (low <2 lx, high >10 lx; n = 24 pens each). At 14 d of age (doa), 480 female Ross 708 chicks were randomly distributed across pens (n = 10 per pen). All birds were given the same daily feed allocation and were maintained under an 8-h photoperiod, before being photostimulated with 14L:10D at 140 doa. Birds under green daytime light were significantly heavier (P ≤ 0.05) than birds under red light from 15 to 71 doa. Regardless of daytime light treatment, birds under supplemental red light were significantly heavier (P ≤ 0.05) at 29 and 36 doa, and from 50 to 86 doa. Hens under red daytime light produced significantly more eggs than under green light at 25 (6.6% increase) and 26 (9.0% increase) weeks of age. Regardless of daytime light, sexual maturation under supplemental red light was significantly delayed in an intensity dependent manner (2 and 3 wk lag for low and high intensity, respectively). As birds under supplemental red light were also significantly heavier (P ≤ 0.05) between 25 and 30 wk of age, delayed sexual maturation translated to energy diverted to growth.

Key Words: light spectrum, broiler breeders, precision feeding, growth, reproduction
23  Feeding patterns in feed restricted broiler breeders. Carla D. Aranibar*1, Colin Usher2, Wayne D. Daley2, and Jeanna L. Wilson1, 1Department of Poultry Science, University of Georgia, Athens, GA, 2Georgia Tech Research Institute, Georgia Institute of Technology, Atlanta, GA.

Broiler breeders are selected for fast growth and have the potential to become overweight if fed ad libitum. The improvement in genetic selection for feed efficiency lead to the development of feed restriction programs for both males and females starting as early as 2 wk. As a result, they experience chronic hunger and exhibit abnormal behavior patterns that may indicate stress or frustration. One approach to measuring hunger is to observe how the birds spend their time during an extended 4-h period after feed is available each day and the same 4 h period on off feed days. A second objective is to determine if there are differences in pullet and cockerel feeding patterns. In this study, 2 pens (4.5 × 7.3m) of 220 pullets and 2 pens of 120 cockerels were observed. Birds were fed on a skip-a-day (SAD) feeding regimen from 3 to 21 weeks of age with feed allocation based on body weight suggested by primary breeder. Bird behavior was monitored via high definition cameras and focused on one side of 2.2 m length of feed trough (20% of feeder space) and nipple drinker (100% drinker line). Behavior scan sampling measurements (1 h every 5 min, remaining 3h every 10 min) were conducted every other week starting at 9 wk through 17 wk of age. All data was analyzed using PROC GLM in SAS, specific behaviors for each pen were used to compare male vs. female means. Feeding behaviors show significant differences based on the sex of birds in regards to time spent at the feeder (P < 0.0001) and the drinker area (P = 0.0004). Pullets have a delay in going to the drinker area and are less aggressive toward it compared with the cockerels when feed is available. On an off feed day, both pullets and cockerels exhibit behavior indicative of feeding frustration such as pecking the floor. Overall, pullets and cockerels exhibit different feeding behaviors based on their sex and feeding program.

Key Words: behavior, feeding pattern, broiler breeder pullet, cockerel

24  Benefits of a hands-on production laboratory in an undergraduate curriculum. Sara K. Orlowski* and Nicholas B. Anthony, University of Arkansas, Fayetteville, AR.

Incorporation of hands-on experience pertaining to all aspects of broiler breeder production in an undergraduate poultry science curriculum is key in helping to prepare students for careers in the poultry industry. Undergraduate students at the University of Arkansas in the Poultry Breeder Management course have the opportunity each semester to gain experience in a hands-on broiler breeder production laboratory. The class is split into small groups of 5 or 6 students, and each group is given their own broiler breeder chicks as well as a set of pullets to grow and maintain. With the chicks, students are responsible for creating a breeder feed-restriction program. Each week, students make decisions on feed allocations, lighting, and temperature to gain experience growing broiler breeders on a production curve through knowledge they have gained through class materials. Along with growing chicks on a production curve, students are responsible for bringing broiler breeder pullets into production. Students are also given various scenarios to see how different management decisions can affect breeder growth and production. Scenarios in the pullet house can include managing non-uniform flocks, providing ad libitum consumption of feed or dealing with flocks that are either above or below the production curve. Weekly meetings with each group are critical to ensure that the groups are staying on task and that they understand how the decisions they make as a grower at any point in the growth phase can affect the livability and performance of the broiler breeders produced. At the end of the semester, each group presents how their management decisions made during the class have affected breeder performance. Throughout this semester long class, students are able to gain knowledge about broiler breeder production while also gaining essential management and leadership techniques in the process through experiential learning. Classes such as the Poultry Breeder Management course could potentially help better prepare undergraduates for careers in the poultry industry and make them well qualified individuals upon graduation.

Key Words: education, experiential learning, broiler-breeder, production, management