
The effect of stocking pressure on BW, feed intake, frequency of feeding, and uniformity of 156 Ross 308 broiler breeders fed from a precision feeding (PF) system was studied. A regression design was used, with different levels of stocking pressure: n = 24, 34, 44, and 54 birds per PF station. At hatch, pullets were randomly assigned to 4 different pens, and fed industry standard starter (0 to 21) and grower (22 to 56 d of age) diets. Birds were trained to use the PF system starting at d 0 by providing feed around the station, and essentially leaving a ‘trail of crumbs’ leading to the PF station. By 9 d of age, 100% of chicks had learned to eat from the PF stations. Birds were fed restricted starting at 16 d of age. Target BW increased at hourly intervals. Birds that met or exceeded the target BW were ejected; birds that were under the target body weight were allowed to eat for 2.5 min. Individual BW and feed intake were recorded at each visit to the station from 16 d of age. Birds were weighed manually weekly to validate PF station BW targets. Birds that did not eat for 48 h were placed in a remedial pen at a much lower density until feeding behavior resumed. The coefficient of variation (CV) of the flock at the start of feed restriction was 15.2, 15.4, 14.1, and 19.5% in order of increasing stocking pressure, and 3.3, 2.4, 7.4 and 7.0%, respectively, at 8 wk of age. For each increase of 1 bird, regression analysis predicted an increase of 0.71% of birds requiring the remedial intervention ($R^2 = 0.88; P = 0.04$), and 0.72% increase in training bird days was required ($R^2 = 0.95; P = 0.016$). On d 36, CV increased at a rate of 0.38% for every additional bird per station ($P = 0.35$). Visits to the PF stations averaged 62.4, 40.4, 31.6 and 24.5 visits/bird/d in order of increasing stocking pressure. Surprisingly, mortality decreased at the rate of 0.17% for each additional bird in the pen ($R^2 = 0.92; P = 0.03$). Higher stocking pressure posed challenges for young PF pullets.

**Key Words:** precision feeding, broiler breeders, feed intake, uniformity

2 **Effect of precision feeding on broiler breeder uniformity and efficiency.** P. R. O. Cameirao*, S. H. Hadinia, T. E. Gilmet, and M. J. Zuidhof, Agricultural, Food and Nutritional Sciences, University of Alberta, Edmonton, AB, Canada.

Precision broiler breeder feeding system (PF) is a new technology that feeds birds based on their individual BW relative to a target BW. Hence, PF allows birds to consume several small meals throughout the day, which is expected to reduce competition for feed and increase flock uniformity. We hypothesized that PF may reduce perceived hunger, and subsequently reduce water intake. Two experiments were conducted to determine the effect of PF on flock uniformity, water intake, and efficiency. In trial 1, 630 Ross 308 broiler breeder pullets were placed in 14 pens (45 per pen) and fed with a conventional skip-a-day (SKIP) or PF system, from 10 to 23 wk of age. Weekly, individual BW and feed intake were measured, and BW CV and cumulative FCR were calculated. Water consumption was measured on 3 pens per treatment. Trial 2 was nested within the PF treatment. Nine birds per PF pen were assigned to 1 of 5 treatments: Low (Ross 708 target BW), Low flush (Low, with higher peripubertal growth rate), Standard (Ross 308 target), Standard Flush, and Frog (BW targets increased in large steps every 3 wk). BW targets of the first 4 treatments were updated hourly. At every visit, BW was recorded by the PF system. In trial 2, CV was calculated weekly using median BW of each bird on a day. In trial 1, the CV of PF birds decreased significantly ($P < 0.05$), reaching 9% by 23 wk of age compared with the 13% in the SKIP treatment. At 23 wk, FCR was higher in the SKIP treatment compared with PF (4.16 vs 4.00, respectively; $P < 0.05$). There was no effect on water consumption at any age ($P > 0.05$), suggesting no difference in perception of hunger in PF and SKIP treatments. In trial 2, CV was lowest in the Standard treatment ($CV = 5.96\%$, compared with standard flush, $CV = 7.14\%$; $P = 0.04$) and did not differ from Low, low flush and frog treatments (6.43%, 6.35% and 6.52% respectively). Within the Standard treatment, CV was lowest in wk 22 (2.91%; $P < 0.01$). In conclusion, the precision fed birds were more uniform and efficient.

**Key Words:** precision, feeding, water, uniformity, breeders

3 **Impact of early feeding program on broiler breeder pullet behavior, body weight, and egg production.** Carla D. Aranibar*, Claudia S. Dunkley*, Adam J. Davis1, A. Bruce Webster1, Collin Usher2, Wayne I. Daley2, Woo K. Kim1, and Jeanna L. Wilson1, University of Georgia, Athens, GA, 2Georgia Institute of Technology, Atlanta, GA.

Broiler breeders are commonly feed restricted using some variation of skip-a-day (SAD) feeding to prevent excessive body weight gains and poor flock uniformity that results in low egg production and hatchability. While these feeding programs have improved flock performance in the past, the level of feed restriction has increased with genetic selection for feed efficiency. This project examined pullets that were offered a high fiber diet of soybean hulls (alternate day feeding; ATD) on the off day of a traditional SAD feeding program in comparison to the standard SAD program. The 2 dietary feeding methods each with 3 replicate pens of 210 pullets were tested. A sample of pullets was weighed weekly to adjust feed intake and maintain body weights at those suggested by the primary breeder. Feed allocations for the ATD pullets were reduced from 20 to 20 wk to compensate for an improvement in gains in these pullets. Body weights at 20 wk were not different with SAD averaging 1836 g vs. 1851 g for ATD. Bird behavior was monitored via high definition video cameras from 1 h before and until 1 h after the photoperiod began and ended, respectively, each day. The use of a gross motion analysis tool indicated differences in movement between the 2 dietary feeding methods that may help explain the difference in gain. At 22 wk of age, pullets were moved to lay cages and fed on a daily basis. Egg production through 32 wk was significantly improved in the SAD fed pullets compared with the ATD treatment (49% total egg production) when compared with the SAD fed (44% total egg production; $P = 0.006$) as pullets. Overall, ADF females had greater weight gain on a similar feed allocation, and were more productive hens, which suggests improved bird wellbeing.

**Key Words:** broiler breeder pullets, skip-a-day, body weight, behavior, egg production

4 **Effect of feed intake at 6 weeks of age on subsequent body weight and reproductive performance of broiler breeder females.** Y. M. Lin*, A. C. Fahrenheitholz, and J. Brake, North Carolina State University, Raleigh, NC.

Previous research compared sigmoid and linear feeding programs for Ross 308 broiler breeder females to 21 wk of age. Female BW at 4, 6, 8, 10, and 12 wk of age was increased by the sigmoid program while the linear feeding program increased female BW at 40, 48, and 56 wk...
of age. The sigmoid feeding program decreased female mortality during hot weather, which resulted in increased hen-housed egg production without difference in hen-day production. However, the linear treatment, where the daily feed allocation at 6 wk of age was 43 versus 50 g per pullet for the sigmoid program, exhibited increased cumulative fertility. Thus, a second experiment compared 4 rearing feeding programs with Ross 708 broiler breeders. The 4 pullet feeding programs were termed high-high (HH), high-low (HL), low-high (LH), and low-low (LL) with daily feed (g) per pullet at 6, 15, and 21 wk being (HH) 52–70–94, (HL) 52–64–94, (LH) 47.5–70–94, and (LL) 47.5–64–94, respectively. The LH feeding program exhibited the best fertility and hatchability, while the HH feeding program produced the poorest results ($P < 0.05$). In the present research, day-old chicks were fed a single starter diet with 17.5% crude protein (CP) and 2.9 kcal ME/g to 6 wk of age. This was followed by a 14.5% CP, 2.795 kcal ME/g crumbled growing diet to 26 wk of age with a 2.8 kcal ME/g and 14.5% CP layer diet fed from 27 to 64 wk of age. Three pullet feeding programs, applied to 4 replicate pens of 200 pullets each, with daily feed per pullet at 6 wk being 50, 45.5, and 42.2 g were evaluated with similar feed allocations being achieved from 19 wk and thereafter. Cumulative fertility and hatchability of the 42.2 g group was increased ($P < 0.05$) compared with the other 2 treatments. There was no difference in fertile hatchability or egg production. The application of feeding programs that supplied approximately 42 g daily at 6 wk of age compared with greater amounts produced an improved persistency of fertility in Ross broiler breeder pullets.

**Key Words:** broiler breeder, pullet feeding program, sigmoid feeding, hatchability, fertility

5 Monitoring the air cell temperatures of broiler hatching eggs using transponders and probe networks. Opeyemi C. Olojede*, Filip S. D. To, and David E. Peebles, Mississippi State University, Mississippi State, MS.

A system of miniaturized networked devices was developed to enable monitoring of embryo temperature of incubating eggs using probes. The system was evaluated with recording of the same measurement points using implanted radio temperature transponders. Correspondence of the 2 sets of data will facilitate an efficient and low cost method of monitoring metabolic output of embryos in a large scale. The system developed will enhance understanding of embryo metabolic development, and it will facilitate more advanced research to further advance the technology of egg-to-chicken conversion. The system has the potential of having an embryo-in-the-loop type of advanced and highly efficient incubation technology. This paper is a part of embryo temperature correlation research, which studies air cell temperatures with probes and implanted temperature transponders, and the temperatures of the eggshell using infrared thermometry. Sixty eggs were weighed and set in a single egg incubator with the 3 temperature measurement modes. Eggshell temperatures were recorded twice daily from 0 through 21 d of incubation (doi). On 12 doi all the eggs were candled, and the air cells of eggs containing live embryos were implanted with transponders and the networked probes (nodes), and the non-fertile eggs were excluded from the experiment. Eggshell and air cell temperature readings between 12 and 19 doi were positively correlated ($r = 0.42$; $P \leq 0.0001$), however mean shell (38.6°C) and air cell (38.8°C) temperatures differed significantly ($P \leq 0.0001$). To further substantiate the estimation of embryo temperature using air cell readings, a network of probes may be effectively inserted in the air cells of eggs alongside transponders from 12 to 19 doi.

**Key Words:** air cell temperature, transponder, probe, eggshell temperature, broiler embryo

6 Effects of pre-slaughter transportation on meat quality in divergently selected broiler lines. Sara K. Orlowski*1, Isaac D. Harford2, Alex D. Gilley1, and Nicholas B. Anthony1, University of Arkansas, Fayetteville, AR, 2Cobb-Vantress, Princess Anne, MD.

Pre-slaughter stress has been shown to induce several meat quality abnormalities. Two such abnormalities include pale, soft, and exudative (PSE) meat and dark, firm and dry (DFD) meat. Both PSE and DFD conditions have been known to affect the stability and wholesomeness of both fresh and further processed products. The purpose of this study was to compare the effects of transportation stress and genetic selection for PSE/DFD conditions on meat quality. The broiler lines used included the random bred control (RBC) as well as the High L* (HMC) and Low L* (LMC) meat color lines. Two replications of approximately 60 birds per line were equally and randomly separated into a transported (T) and non-transported (NT) groups. The T group was cooped and transported for 3 h before processing, whereas the NT group was only cooped moments before slaughter. Measurements were collected for breast muscle pH at 15 min, 4 and 24 h postmortem, breast muscle color at 4 and 24 h postmortem, and fillet drip loss at 24 h postmortem. Where differences are indicated, $P < 0.05$. A line by treatment interaction was present for all traits, except for 15 min pH. Subjecting the RBC line to transport stress resulted only in a decrease in 24 h L* (49.62 ± 0.21 vs. 48.92 ± 0.25). The T group of the LMC line exhibited decreased L* at 4 (44.08 ± 0.25 vs. 42.50 ± 0.28) and 24 h (46.88 ± 0.22 vs 45.70 ± 0.24) postmortem. The T group of the HMC line exhibited increased 4 (52.33 ± 0.31 vs 53.47 ± 0.27) and 24 h (54.07 ± 0.27 vs. 54.80 ± 0.24) L*. In addition, the T group of the HMC line experienced decreased 4 (5.60 ± 0.02 vs. 5.50 ± 0.02) and 24 h (5.52 ± 0.02 vs. 5.45 ± 0.02) muscle pH. When subjected to transport stress, the HMC line became more PSE-like and the LMC line became more DFD-like with very little change in the RBC line.

**Key Words:** broiler, transportation, meat color, meat quality, pH