

# Production, Management and the Environment: Poultry 1

**173 Effect of dietary supplementation of mannan-oligosaccharides and *Lactobacillus*-based probiotics on indigenous intestinal bacterial ecology and intestinal microarchitecture of broilers reared under heat stress.** M. U. Sohail\*, I. Ahmad, H. Rehman, K. Ashraf, S. Yousaf, S. Ashraf, and H. Zaneb, *University of Veterinary and Animal Sciences, Lahore, Punjab, Pakistan, 54000.*

The present study aims at evaluating the effects of dietary supplementation of prebiotics or probiotics alone or in combination on growth performance, relative-weight of viscera, mucosal microarchitecture and some selected intestinal microbiota in broilers reared under hot humid conditions. Day-old broilers (n = 250) were randomly divided into 5 groups. Birds in the control group were reared under standard management conditions and fed a corn-based basal diet without any dietary supplementation. The birds exposed to cyclic-heat stress (35°C and 75%RH, 8hr/d, 1000–1800 h from d22 to 42), were fed a basal diet (HS group) alone or supplemented with 0.5% mannan-oligosaccharides (MOS), or 0.1% *Lactobacillus*-based probiotics (LP) or combination of both (symbiotic). On d 42, 15 birds from each group were killed to determine relative-weights of visceral organs, mucosal morphometry and numeration of jejunum and cecal *Clostridium perfringens*, coliform and *E. coli*. The data were analyzed using ANOVA. Results revealed that heat stress decreased ( $P < 0.01$ ) body weight gain, feed conversion ratio (FCR) and relative weights of organs compared with the control group. Dietary supplementations increased the FCR ( $P < 0.05$ ), relative weights of spleen ( $P < 0.01$ ), small intestine ( $P < 0.01$ ) and cecum ( $P < 0.01$ ) compared with HS group. However, supplemented diets did not affect the relative weights of bursa of Fabricius ( $P = 0.07$ ) liver, pancreas, gizzard and heart. Heat stress increased the cecal population of coliform, ( $P < 0.05$ ) *Clostridium perfringens* ( $P < 0.01$ ) and *E. coli* ( $P < 0.05$ ) compared with control group without affecting the jejunal ( $P = 0.61$ ) bacterial count. Supplementation of MOS alone or probiotics reduced ( $P < 0.05$ ) the cecal count of *Clostridium perfringens*. The villus height was more ( $P < 0.05$ ) in supplemented groups compared with the HS group. In conclusion, supplementation of prebiotics and probiotics is a good tool for maintaining production performance of broilers during hot humid months.

**Key Words:** broiler, heat stress, prebiotics, probiotics

**174 Effects of turning frequency during incubation on broiler embryonic development.** Y. M. Lin\*<sup>1</sup>, J. T. Brake<sup>1</sup>, S. Yahav<sup>2</sup>, and O. Elibol<sup>3</sup>, <sup>1</sup>North Carolina State University, Department of Poultry Science, Scott Hall, Raleigh, <sup>2</sup>Institute of Animal Science, ARO, The Volcani Center, Bet-Dagan, Israel 50250, <sup>3</sup>Department of Animal Science, Faculty of Agriculture, University of Ankara, Ankara, Turkey.

The effects of turning broiler hatching eggs 24 (24X) or 96 (96X) times daily to E15 was studied. Eggs were obtained from Ross 344 male x Ross 708 female broiler breeders at 36 wk of age. Freshly laid eggs were weighed and selected to provide equal egg weights in each turning treatment before storage for 1 d at 16 C and 60% RH followed by preheating at 24 C for 12h prior to setting. Each of 180 individually weighed eggs per turning treatment constituted a replicate. The 24X treatment was turned 24 times daily to E18, while the second group was turned 96X from E0 to E15 followed by 24X to E18 before transfer to hatching baskets in individual pedigree bags. Incubators were operated at 53% RH at all times and an air temperature of 37.5 C until E12, 37.3 C from E13 to E 18, and 36.9 C thereafter in Natureform NMC-1000 incubators. At E15 of incubation, 30 fertile eggs were necropsied to determine embryo

length, and weights of the egg, embryo, yolk sac, and embryonic fluids. Chick BW and length were measured on all chicks at E20.5. A T-test was used to compare means and variances. Embryo length at E15 was greater ( $P < 0.05$ ) in the 96X treatment but with a greater variance ( $P < 0.05$ ) as well as a greater variance ( $P < 0.05$ ) in relative yolk sac weight and embryo weight. However, at hatching (E20.5) chick weight relative to initial egg weight and chick length was greater ( $P < 0.05$ ) in the 24X treatment but there was greater variance ( $P < 0.05$ ) in the relative chick weight. These data indicated that more frequent turning to E15 resulted in a faster growing but less uniform embryo at E15. However, after the 96X turning frequency was discontinued at E15 the 96X treatment regained its uniformity as embryo growth relative to the 24X treatment apparently slowed to E20.5. These data suggest that embryo growth and development is affected by turning frequency

**Key Words:** broilers, incubation, turning

**175 Effects of arginine, vitamin E and mannanoligosaccharides after coccidiosis vaccination and challenge in broiler chickens.** D. J. Chan-Diaz\*<sup>1,2</sup>, D. Caldwell<sup>1</sup>, S. Pohl<sup>1</sup>, G. Casco<sup>1</sup>, A. Pro<sup>2</sup>, S. Fitz-Coy<sup>3</sup>, and C. A. Ruiz-Feria<sup>1</sup>, <sup>1</sup>Texas A&M University, College Station, <sup>2</sup>Colegio de Postgraduados, Montecillos, Mexico, <sup>3</sup>Intervet/Schering-Plough Animal Health, Millsboro, DE.

Arginine (ARG), vitamin E (VE) and mannanoligosaccharides (MOS) have immunomodulatory effects. One d old broiler chicks (n = 200) were housed in wire cages and assigned to one of 8 treatments in a 2 × 4 factorial experiment: vaccinated (VA; Coccivac-B, 1X dose / chick at d 1) or non-vaccinated (NV) and fed a control diet (CTL, 3100 kcal / kg of EM, 22% CP, 1.4% ARG, and 40 IU of VE / kg of feed) or CTL plus ARG and VE (AVE; 0.3% and 40 IU, respectively); CTL plus MOS (MOS, 0.2%), or CTL plus ARG, VE and MOS (AEM, same levels). At 24 d, all birds were orally challenged with 2 × 10<sup>5</sup> oocysts from a mixed field-strain *Eimeria* inoculum (*E. acervulina*, *E. maxima* and *E. tenella*). The BW was recorded weekly; intestinal lesion score (LS) and immune organ weight (bursa of Fabricius, spleen, and thymus) were measured at d 30 (9 birds / treatment); oocyst shedding (OS; oocysts / g of feces) was measured from d 29 to d 31. Data were analyzed (ANOVA) and means separated using the Tukey procedure ( $P < 0.05$ ). At wk 4, VA birds were heavier than NV birds, but the effect of diet was not significant. The spleen and bursa were not affected by treatment, but birds in the group VA-MOS had the highest thymus weight. Birds in the VA-MOS and NV-CTL group had the highest LS (1.56 ± 0.2), whereas birds in the VA-CTL group the lowest LS (0.67 ± 0.2) in the upper intestine (duodenum). The OS was not affected by treatment at d 29 or 31, but at d 30 VA birds had less oocysts in feces (556,342.5 ± 140,756.2) than NV birds (1,021,775.0 ± 140,756.2). Thus, MOS supplementation increased LS but also increased the thymus weight. Vaccinated birds were heavier and had lower OS than NV birds irrespective of diet. The beneficial effects of ARG and VE were not noticeable, perhaps because birds were kept in cages and oocyst cycling was prevented.

**Key Words:** arginine, vitamin E, coccidiosis

**176 The effect of double interspiking on fertility, stress, and hormone levels in broiler breeder males in heat-stressed environments.** K. M. Chung\*, M. O. Smith, and H. G. Kattesh, *University of Tennessee, Knoxville.*

The male management technique of double interspiking is sometimes used to counteract fertility decline experienced by broiler breeders. The objective of this experiment was to investigate the effects of this practice on flock fertility, testosterone concentrations, and stress responses of broiler breeder males undergoing double interspiking in heat stressed environments. In a completely randomized design study, 2 hundred and 88 pullets and 36 roosters (Ross 708) were assigned to 3 groups at 21 weeks of age. All groups were housed on plastic slatted floor pens and experienced a simulated heat stress environment in which room temperature cycled from 23.8 to 30°C. Double interspiking was carried out among 2 groups at 42 and 52 weeks of age. Beginning when birds were 32 weeks of age, eggs were set every 2 weeks, candled at d 12, and percent fertility calculated. Testosterone and corticosterone levels were measured by RIAs at specific time points, and heterophils (H) and lymphocytes (L) were counted to calculate H:L ratios. All data were analyzed using the mixed model ANOVA (ANOVA) procedure of SAS 9.1 (SAS Institute, Cary, NC, USA), and least squares means used to determine significance. Introduction of new males resulted in a fertility increase ( $P < 0.01$ ) of 21.8% between control birds and spiked birds after the first interspike and a sustainment of fertility levels after the second interspike. Testosterone concentration declined ( $P < 0.0001$ ) from 1.95 ng/mL to 0.11 ng/mL as the birds aged. The male management practice of double interspiking shows promise in increasing fertility levels in a broiler breeder flock.

**Key Words:** broiler breeder, double interspiking, heat stress

**177 Effects of breeder feeding and trace mineral source on leg health and bone traits of broiler progeny.** P. E. Eusebio-Balcazar<sup>\*1</sup>, E. O. Oviedo-Rondón<sup>1</sup>, A. Mitchell<sup>2</sup>, J. Brake<sup>1</sup>, M. J. Wineland<sup>1</sup>, V. Moraes<sup>1,3</sup>, and N. Leandro<sup>1,4</sup>, <sup>1</sup>North Carolina State University, Raleigh, <sup>2</sup>USDA-ARS, BARC, Beltsville, MD, <sup>3</sup>Universidade Estadual Paulista, UNESP, Jaboticabal, SP, Brasil, <sup>4</sup>Universidade Federal de Goiás, Goiania, GO, Brasil.

This study evaluated the effects of breeder feeding practices and trace mineral (TM) sources for breeders on leg health and bone traits of broiler progeny at 49 d. Cobb 500 breeders were fed either corn (C) or wheat (W) based diets during rearing and production using either sigmoid late fast (LF) or sigmoid late slow (LS) feed allocation programs until peak egg production. At 23 wk, 69 females representing the BW distribution of each pen were placed in a 2/3 slat layer house where feeder space remained the same (S) or increased (M). From 56 to 62 wk of age, breeders were fed corn-soybean diets with 5% DDGS and either inorganic (ITM) or an organic (OTM) source (Mintrex P) to replace 30% of Cu, Zn, and Mn. Total levels of the TM evaluated were 25, 125, and 125 ppm, respectively. Eggs produced at 62 wk of age were incubated. Progeny were placed in 64 floor pens with 15 males and 15 females/pen and 4 replicates per breeder treatment. Broiler gait scores (GS) and prevalence of leg problems were evaluated at 11 and 47 d. Bone mineral density (BMD) and mineral content (BMC) were determined with DEXA. Data were analyzed as a  $2 \times 2 \times 2 \times 2$  factorial design considering main factors of diet type, feeding program, feeder space and TM source. For GS data, the log odds of probabilities were modeled within factorial effects to obtain the likelihood of observing each leg problem using GLIMMIX. Results indicated that broilers coming from breeders fed diets with 30% OTM were more likely to have better walking ability than broilers from breeders fed ITM in both GS evaluations. Broilers from breeders fed ITM and having M feeder space in production were more likely to have valgus deformations than the same group fed OTM. Wheat diets fed to breeders and broilers caused lower BMD and BMC in broilers at 49d. OTM fed to breeders caused

thicker shanks in broilers. Shank BMD and BMC was higher in broilers from breeders fed OTM compared with those breeders fed only ITM in the LS and S groups only. It appeared that 30% OTM in breeder diets may help to reduce some leg health issues observed in broiler progeny influenced by breeder feeding practices.

**Key Words:** breeder nutrition, trace minerals, leg problems

**178 Dietary vitamin E supplementation and shelf life of ground broiler chicken meat during refrigerated storage.** B. Saenmahayak<sup>\*</sup>, M. Singh, J. B. Hess, W. A. Dozier III, and S. F. Bilgili, Auburn University, Auburn, AL.

This study was conducted to determine the microbial spoilage and oxidative stability of ground raw and cooked breast and thigh meat from broiler chickens fed graded levels of vitamin E during refrigerated storage. A total of 480 female broilers were assigned to 4 dietary vitamin E treatments (IU/kg of feed): 30 (basal level), 60, 120 and 240. Each of the 4 dietary treatments was fed in a 3 stage feeding program to 12 replicate pens of 10 birds and reared to 49 d of age. Upon processing, one-half of the replicate pens from each dietary treatment were used for raw and the other half for cooked meat treatments. Boneless-skinless breast and thigh meat (5 birds per pen) was ground, pooled by pen, formed into patties, vacuum packaged (oxygen impermeable) either raw or cooked (internal temperature of 80°C), and held under 2°C. Samples were analyzed for microbial spoilage (aerobic plate counts; APC, lactic acid bacteria; LAB, and yeast and molds; YAM) and lipid oxidation (TBARS) following 1, 3, 6, 12 d of refrigerated storage. Microbial numbers increased with storage time in both raw breast and thigh meat ( $P < 0.05$ ), with APC counts on thigh meat reaching 7 log<sub>10</sub> CFU/g after 12 d of storage. Cooking reduced microbial counts and slowed the rate of microbial growth in breast and thigh meat during refrigerated storage. Vitamin E supplementation affected microbial counts only for raw (APC on 6 d) and cooked (APC and LAB on 6 and 12 d, and YAM on 12 d) for thigh meat, with levels of 240 IU/kg significantly impeding microbial growth as compared with basal levels. Lipid oxidation increased during refrigerated storage on both raw and cooked ground meat (breast < thigh meat). Dietary vitamin E supplementation at levels > 120 IU/kg significantly reduced the rate of lipid oxidation in cooked ground breast and thigh meat as compared with the basal level. In this study, microbial and oxidative changes that occur during refrigerated storage of ground cooked broiler meat appeared to correlate and were positively influenced by dietary vitamin E supplementation.

**Key Words:** vitamin E, shelf-life, lipid oxidation

**179 Impact of feeding time and photoperiod on egg production patterns in broiler breeder females.** D. C. Paul<sup>\*</sup>, M. J. Zuidhof, Ali Pishnamazi, and R. A. Renema, University of Alberta, Edmonton, Alberta, Canada.

The purpose of this study was to determine the effects of feeding time, dietary energy and photoperiod on egg production patterns in broiler breeder females. A total of 192 Ross 708 broiler breeder females were housed in 6 light- and temperature-controlled environmental chambers and each chamber containing 32 individual cages. The experiment was a  $4 \times 2 \times 2$  factorial of design, with 4 feeding time treatments (morning, noon, afternoon, or split feeding with 50% of the daily feed allotment split between morning and afternoon); 2 dietary metabolizable energy levels (high, 2900 or low, 2700 kcal/kg); and 2 photoperiods (24L:0D or 16L:8D). Standard breeder BW targets were achieved using daily feed restriction throughout the study period. Individual body weight was measured once per week. SAS Proc mixed was used to analyze the data.

Split feeding had increased egg weight compare to other feeding time ( $P = 0.1$ ). Moreover, the split feeding, high energy (2900 kcal/kg) and photoperiod (16L:8D) interaction had the highest egg weight. Hens were energy efficient with split (two times) feeding system than one time and shorter photoperiod. However, the main effects of dietary energy and photoperiod had no significant effect on egg weight and egg production. Efficiency of broiler breeder female can be improved ensuring split feeding, dietary high energy and photoperiod (16L:8D).

**Key Words:** feeding time, photoperiod, egg production

**180 Dietary camelina meal for broiler chickens: 1. Growth performance at 0, 5, and 10% inclusion rates.** R. M. Hulet\*, P. H. Patterson, A. Y. Pekel, and T. L. Cravener, *The Pennsylvania State University, University Park.*

*Camelina sativa* is an oilseed plant from the Brassicaceae family. It has recently been grown in N. America for biodiesel production with the residual meal utilized as a dietary protein supplement with a significant complement of omega-3 fatty acids. An experiment was conducted to examine the effect of dietary camelina meal (CM) supplementation on broiler live performance. A total of 864 Ross × Cobb-500 straight run chicks were allocated to control (Con), 5% or 10% CM diet treatments with 8 replicated pens per treatment from 1 to 35d. Data were analyzed using a 3-way ANOVA design with significance determined at the  $P \leq 0.05$  level. The CM utilized in this study contained 33.6% CP, 15.0% Fat and 4.22% total omega-3 fatty acids. Birds were given water and feed ad libitum. Birds and feed were weighed at 0, 14, 28, and 35 d of age. Body weight, feed intake and conversion were calculated at each period. Cumulative feed intake was not significantly different between dietary treatments. However, body weight at both 28 and 35 days, respectively, was significantly less for broilers fed the 10% CM diet (1.38, 2.52 kg) when compared to the broilers fed 5% CM (1.48, 2.20 kg) and Con (1.46, 2.17 kg) diet. Mean body weight was similar between the broilers on the Con and 5% CM dietary treatments at both 28 and 35 d. Therefore, feed conversion for the 0 to 35 day period was significantly greater for the 10% CM fed broilers (1.783) over the 5% CM (1.702) and Con (1.698) fed broilers. Mortality was not significantly different at any period or cumulatively with an overall average of 5.44% for the experiment. Based on this study, broiler growth performance equal to a Con diet can be achieved by feeding diets with an inclusion rate of at least 5% CM.

**Key Words:** *Camelina sativa*, broiler chickens, biofuel

**181 Evaluation of a poultry house for the presence of *Salmonella* and fungi at different sites through the broiler production continuum.** J. A. Byrd\*, C. L. Sheffield, and T. C. Crippen, *USDA-ARS-Food and Feed Safety Research Unit, College Station, TX.*

Companies continue to produce safe and wholesome products while facing increased regulatory pressure to control foodborne pathogens in poultry. Although many risk factors that contribute to *Salmonella* concentrations have been identified, precise identification of the most effective sites for intervention have not been established. The present observational study evaluates a new poultry house with different environmental parameters on *Salmonella* and fungal incidence at different points of production. One broiler house with 4 consecutive flocks was studied. Preharvest sample points included tray pads (2/sample point), litter (12/sample point), water (3/sample point), feed (3/sample point) and birds (20/sample point) sampled at d 0, 18, 32, 46, and 62. All samples were evaluated for *Salmonella* and fungi. Prior to placement on the farm, *Salmonella* and fungi was detected in all water, feed, hatchery

(traypads), and in 18% of the litter samples. Water samples were 100% positive for *Salmonella* at Days 1 and 18 in Flocks 1–3. Similarly, *Salmonella* was detected in high levels (60–100%) in Flocks 1 and 3 on Days 1 and 18. However, ceca samples evaluated for *Salmonella* were found under 5% on all days except for Flock 3 which had *Salmonella* 95% (Day 1) and 25% (Day 18). Fungal samples tend to decrease as the broilers get closer to market. The relationship between *Salmonella* and fungi will be evaluated. The data demonstrates the importance of pathogen-free environmental conditions even on new farm. Data from this study may help poultry professionals understand how environmental factors including fungi may affect foodborne pathogens in poultry and the difficulty that may be encountered in making risk management decisions.

**Key Words:** environmental, *Salmonella*, fungi

**182 Effect of abrupt versus gradual changes to daylength on productivity of broilers.** K. Schwean-Lardner\* and H. L. Classen, *University of Saskatchewan, Saskatoon, SK, Canada.*

With the objective of determining the impact of an abrupt change in day length and light intensity on productivity and welfare of broilers, 3 lighting programs were tested using Ross x Ross 308 broilers (2,160 male and 2,565 female). Birds were housed within 10 sex-separate pens in each of 9 rooms at 30 kg/m<sup>2</sup>. The lighting schemes tested were: 1. Control (C) - 23Light (L) (20 lx (l)):1Dark (D) (0 l) from d 0–38, 2. Abrupt (A) - 23L (20 l):1D (0 l) to d 10, then an abrupt change to 14L (1 l):10D (0 l) to d 38, 3. Gradual (G) d 0 - 23L (20 l):1D (0 l); d 1 - 21L (20 l):1 dusk:1D (0 l):1 dawn; followed by gradual changes in day length and intensity until d 10 - 13.5L (6 l): 1 dusk: 8.5D (0 l) 1 dawn. Data were analyzed with a nested design of Proc GLM, and when significant, Duncan's Multiple Range test for mean separation. Specific comparisons between abrupt and gradual data were analyzed using A Priori contrasts. At 14 and 21 d of age, birds raised under the A and G program were lighter than those raised under the C program, and contrasts show G birds were heavier than A. Daily feed consumption, measured from d 7 to d 13, showed a significant drop in intake when the abrupt lighting change took place, while no decline was noted in the gradual change. Birds on C ate the most until 21 d and overall. G birds ate more than A from 7 to 14 d and 14–21 d, but less from 21 to 38 d. Overall, birds on these 2 programs ate similar amounts. Gain to feed ratios were poorest for C birds, and were better for G vs A birds until 14 d and thereafter the ratios were similar. Mortality or uniformity did not vary with lighting program. Birds raised on C had a higher percentage of carcass based on live weight than A, higher breast yield than A or G, and a higher percentage of wings than G birds. In conclusion, abrupt changes to a lighting program cause an immediate and dramatic decline in feed intake and feed conversion efficiency that are not noted when the changes are made gradually.

**Key Words:** broiler, daylength

**183 Influence of long-bright, increasing-dim, and split-dark-bright lighting programs and strain on broiler performance.** R. J. Lien\*, J. B. Hess, and S. F. Bilgili, *Auburn University, Auburn, AL.*

Broilers were provided lighting programs either historically used to maximize growth, or meeting US National Chicken Council or European Union guidelines, to determine their influence on performance. Forty males of tray pack (TP) or breast yield (BY) strains were placed by strain in each of 2 1.5 by 3.7 m pens in 12 light controlled rooms. Four rooms were provided a long-bright photoperiod treatment (LB) (23L:1D and 2 footcandles [FC]). Four rooms were provided increasing-dim treatment

(ID) (1–7 d, 23L:1D; 8–14 d, 12L:12D; 15–21 d, 14L:10D; 22–28 d, 17L:7D; 29–35 d, 20L:4D; 36–47 d, 23L:1; 1 FC to 7 d and 0.25 FC thereafter). Four rooms were provided a split dark period and bright intensity treatment (SDB) (16L:4D:2L:2D and 2 FC). Ten birds per pen were processed at 47 d to determine parts weights and yields. Data were analyzed by GLM of SAS at a significance of  $P < 0.05$  for live and  $P < 0.10$  for processing variables. Feed consumption and BW were reduced in ID relative to LB and SDB at 15 and 21 d (all  $P$ s  $< 0.0001$ ). BW were greater ( $P = 0.036$ ) in ID and SDB than LB at 47 d. Feed conversion was improved ( $P = 0.006$ ) at 15 d in ID relative to LB and SDB, but otherwise unaffected ( $P > 0.05$ ). Weight and consumption were usually more ( $P < 0.05$ ) in TP than BY, and TP feed conversion was better at 15 ( $P = 0.011$ ) and 22 d ( $P = 0.023$ ). Mortality was greater ( $P = 0.003$ ) in TP than BY. Carcass yields were unaffected by treatment ( $P = 0.75$ ) or strain ( $P = 0.87$ ). Wing ( $P = 0.038$ ) and drum ( $P = 0.028$ ) weights were greater in ID than LB and SDB. Total breast ( $P = 0.08$ ) and fillet ( $P = 0.086$ ) yields were greater in LB than ID, with SDB intermediate. Tender yields were greater ( $P = 0.059$ ) in LB than SDB, with ID intermediate. Wing yields were greater ( $P = 0.029$ ) in LB and ID than SDB. All parts were heavier ( $P < 0.10$ ) in TP than BY and there were no strain effects ( $P > 0.10$ ) on parts yields. Fat pad weights ( $P = 0.033$ ) and yields ( $P = 0.002$ ) were greater in BY than TP. These results confirm our previous observations that broiler lighting can influence performance to a greater extent than strain, particularly with respect to breast yield.

**Key Words:** broiler, lighting, production

**184 Free-choice feeding of free-range meat chickens.** A. C. Fanatico\*<sup>1</sup>, V. B. Brewer<sup>2</sup>, C. M. Owens<sup>2</sup>, and A. M. Donoghue<sup>1</sup>, <sup>1</sup>*USDA Agricultural Research Service, Poultry Production and Product Safety Research, Fayetteville, AR*, <sup>2</sup>*University of Arkansas Department of Poultry Science, Fayetteville.*

Specialty poultry production is growing, including free-range, organic, and small flocks. Feed is a high cost, particularly for organic producers

and small-scale producers. Free-choice feeding, where feed ingredients are provided in separate containers, may offer cost savings, including the use of on-farm ingredients, reduction in feed transportation, and milling costs. A study was conducted to determine the impact of free-choice feeding on performance in free-range meat chickens. Pens of slow-growing chickens (20 birds per pen) were randomly assigned to one of 2 treatments: fully formulated diet (FF; control) or free-choice (FC) diet. There were 5 replications of these treatments. Birds were raised in floor pens in a naturally ventilated house; popholes provided access to grassy yards during the day. During the starter period (wk 0–3), formulated feed was provided to both treatments. During the grower period (wk 4–6), FC treatment also received formulated feed along with free-choice ingredients for training, and during the finisher period (wk 7–12), FC only received free-choice ingredients. Birds were commercially processed at 83 d. The formulated diet was a commercial product with an average of 20.75% crude protein (1.04% total sulfur amino acids); while the free-choice diet chosen by birds at 11 weeks was 13.2% crude protein (0.70% total sulfur amino acids). Final live weights were analyzed by *t*-test (SAS 9.2) and did not differ between treatments ( $P > 0.05$ ); however, ready-to-cook yields and breast yields were higher in the birds from the FF treatment ( $P < 0.05$ ). These higher yields are most likely due to amino acid supplements in the formulated feed. The diet chosen by FC birds at end of finisher period was less expensive than the formulated diet (\$0.07/kg vs. \$0.08/kg). These data indicate that while free-choice feeding of free-range chickens resulted in a 1.4% lower breast yield than formulated feeding, FC feed cost was lower. The USDA National Organic Program is planning to ban synthetic methionine, and when that occurs, there may be no difference in yield among birds from formulated and free-choice diets.

**Key Words:** dietary self selection, poultry, free-range