

of plant or marine n-3 and n-6 PUFA on (1) egg and chick quality, (2) liver antioxidant activity and lipid oxidation products, and (3) heart tissue PUFA composition of newly hatched chicks. Fertilized eggs ($n = 240$) were collected from Ross breeder hens ($n = 45$) fed one of 3 experimental diets containing 3.5% fish (FO) (long chain n-3), flax (FL) (18:3 n-3), or safflower oil (SF) (18:2 n-6) and were incubated. The egg and yolk weight were lowest for eggs from hens fed fish oil ($P = 0.09$, $P = 0.02$). There was a significant difference in arachidonic (20:4 n-6) and docosahexaenoic (22:6 n-3) acid content between FO and SF and between FL and SF eggs ($P < 0.001$). Chick weight was 41.2, 45.3, and 43.3 g, for FO, FL and SF, respectively ($P = 0.003$). Liver tissue SOD and GSH-PX activity were highest in chicks hatched from FO eggs ($P < 0.001$). No difference was observed in liver CAT activity. Lipid oxidation products measured as thiobarbituric acid reactive substances were lowest in chicks hatched from FL eggs ($P < 0.01$). Docosahexaenoic acid was lowest in the heart tissue of SF chicks, where a significant increase in arachidonic acid when compared with chicks hatched from FL and FO eggs was noted ($P < 0.002$, $P < 0.007$). It is concluded that regulation of antioxidant activity and tissue PUFA content of newly hatched chicks is dependent on parent hen diets.

Key Words: maternal diet, antioxidant enzyme, oxidative status, polyunsaturated fatty acid

P390 Corticosterone regulation of ovarian follicular development is dependent on the energy status of laying hens. H. Lin*, X. J. Wang, Y. Li, Q. Q. Song, and Y. Y. Guo, *Shandong Agricultural University, Taian, Shandong, China.*

The objective of this study was to investigate the effect of glucocorticoids on reproductive performance of laying hens. In experiment 1, forty-eight 26-wk-old hens were randomly subjected to 1 of the 2 treatments: subcutaneous injection of corticosterone at a dose of 2 mg/kg/day body mass for 7 d (CORT) or sham injection of the same volume of vehicle-corn oil (Control). In experiment 2, forty-eight 30-wk-old hens were provided with either a normal diet (2654 kcal/kg) or a high-energy diet (2917 kcal/kg). After a 3-wk dietary treatment period, half of the hens in each group were randomly assigned to either CORT administration or sham treatment for 7 d as in Experiment 1. Body weight, feed intake, egg number and egg mass were recorded daily for each group. On d 7, 8 chickens from each treatment were selected for a blood sample. The liver, ovaries and follicles, and abdominal fat were harvested and weighed. The number and weight of hierarchical follicles (HF, >12 mm) and small yellow follicles (SYF, 5–12 mm) were recorded. The liver and the follicular membranes of HFs were sampled. The results show that in the presence of an energy deficit, CORT significantly decreased laying performance by suppressing follicular development ($P < 0.01$). CORT suppressed follicular development was associated with the reduced availability of yolk precursor, indicated by the lower plasma concentrations of very-low density lipoprotein (VLDL) and vitellogenin and the decreased proportion of yolk-targeted VLDL ($P < 0.01$). Meanwhile, CORT decreased the expression of apo-B and apo-VLDL-II in the liver ($P < 0.05$). A drop in VLDL receptor content ($P < 0.05$) and an increase in the expression of the tight junction proteins occludin and claudin1 ($P < 0.05$) were also observed in HFs of CORT-hens. The results suggest that the decreased apo-lipoprotein synthesis and VLDL secretion by the liver are responsible for the decreased availability of circulating yolk precursor in CORT-hens and that the upregulation of occludin and claudin expression in the HF granulosa further prevent yolk deposition into oocytes.

Key Words: corticosterone, follicle, liver, very low density lipoprotein, laying hen

P391 Evaluation of crude glycerin on pellet mill efficiency. F. de C. Tavernari*, G. J. M. M. Lima¹, L. S. Lopes¹, N. E. Manzke², P. G. S. Pires², and V. Verniz³, ¹Embrapa Swine and Poultry, Concórdia, SC, Brazil, ²Federal University of Pelotas, Pelotas, RS, Brazil, ³Sao Paulo State University, Dracena, SP, Brazil.

Crude glycerol reduces friction in the pelleting process, which helps to lower the use of electricity by feed industry. Most broiler diets produced in Brazil are pelleted and there is crude glycerin (80% glycerol) available as a co-product from biofuel production. Therefore, the objective of this study was to evaluate the effects of inclusion of crude glycerin on pelleted diets, formulated for initial phase broilers (7 to 21 d), based on corn and soybean meal, using pelleting productivity. Four treatments (inclusion of 0, 4, 8, and 12% crude glycerin) and 5 replicates of 250 kg were studied according a randomized complete block design to study amperage and duration time of pelleting. Diets were homogenized and pelleted with 50 kg of milled wheat bran between runs to avoid cross contamination. Energy consumption (kWh/t) during the pelletization of each batch was calculated using amperage and time data. Temperature and humidity during processing were noted. From each of the 5 replicates, 4 subsamples of 700 g, in average, were collected to determine the pelleting durability index (PDI, 10 min at 50 RPM) and to measure the temperature of pellets. Regression analysis was performed after ANOVA results conducted using PROC MIXED (SAS). There was a significant linear decrease ($P < 0.05$) in electricity consumption (kWh/t) when diets were pelleted with the inclusion of increasing levels of crude glycerin. However, there were no significant effects ($P > 0.05$) in ton of pelleted feed produced per hour. There was linear improvement ($P < 0.05$) in the PDI and a quadratic effect ($P < 0.05$) in the temperature of the pellets produced. Besides its use as energy source to animals, crude glycerin is an efficient pelleting enhancer which can be used to reduce electric power consumption by feed mills and improve pellet quality.

Key Words: broiler, diet processing, energy consumption, feed meal

P392 Effects of programmed nutrition strategy on the performance and nutrient absorption of chicks. T. Ao*, K. A. Dawson, M. Paul, A. J. Pescatore, A. H. Cantor, L. M. Macalintal, R. S. Samuel, and M. J. Ford, *Alltech-University of Kentucky Nutrition Research Alliance, Lexington, KY.*

Several studies have indicated that nutrients provided in early life may interact directly with genes and their regulatory elements at the cellular level to permanently alter nutrient absorption and gene expression. The programmed nutrition (PN) strategy uses a post-hatch diet designed to condition future nutrient absorption and allow for changes in dietary nutrient density in later life. A study was designed to test the effects of PN and duration of feeding the conditioning diet on growth performance and nutrient absorption of chicks using a 2×3 factorial treatment structure. Two conditioning diets including a corn-soy control diet and a PN Post Hatch Broiler Chick Starter (Alltech Inc.) diet were fed for 3 different time periods (48, 72 and 96hr). After the conditioning period, all chicks were fed the same diet that contained decreased levels of ME, minerals and vitamin E. Celite was included in the diet as an internal marker for evaluating ileum P digestibility of chicks. One d of age, 924 chicks were randomly assigned to 6 dietary treatments with 7 replicate groups of 22 chicks and were raised in an environmentally controlled floor pens for 38d. Chicks were fed the conditioning diets after 12h being picked up at the hatchery. Chicks fed the PN Post Hatch Broiler Chick Starter diet had greater ($P = 0.09$) weight gain (1958 vs. 1917) and higher ($P < 0.01$) ileum P digestibility