Nonruminant Nutrition: Management

W219   Broiler energy choice feeding with same protein levels and ambient housing temperatures.   S. Cerrate*, R. Ekmay, C. Salas, and C. Coon, *University of Arkansas*, *Fayetteville*.

Cobb male broilers (28 d of age) previously fed same starter diet were offered a single diet (control) and isoproteic choices between 2.950 and 3.250 kcal/g diets from 29 to 50 d. The control and dietary energy choices were fed to broilers housed in one of 2 ambient temperatures: 21 ± 1°C (normal temperature) and 30 ± 0.6°C (heat stress). Broilers housed at 21°C fed isoproteic choices varying in ME content had similar BW gain, feed intake (FI), feed conversion, ME intake and energy conversion as did birds fed the control diet. Broilers housed at 30°C fed the isoproteic choices varying in ME content had better BW gain, feed conversion and energy conversion compared with broilers fed the control diet. There was a marked preference (78.9% of FI) for the high energy diet (3.250 kcal/g) over the low energy diet (2.950 kcal/g) for broilers housed at 21°C, but this preference was less accentuated for broilers housed at 30°C (65.2% of FI). A potential explanation for broilers selecting diets with less ME in heat stress conditions compared with diet selection for broilers housed at 21°C may be related to the broiler trying to reduce gastrointestinal energy cost especially if hot ambient temperatures decrease fat and protein digestion as suggested by previous research. These data indicate that broilers in heat stress prefer reduced ME diets compared with broilers housed at 21°C.

Key Words: choice feeding, environmental temperature, energy requirement

W220   Effects of dietary creep feeding on performance, blood characteristics and behavior in sows and piglets.   H. D. Jang*, J. H. Lee, T. X. Zhou, L. Yan, S. M. Hong, and I. H. Kim, *Department of Animal Resource and Science, Dankook University*, *Cheonan, Choongnam, Korea*.

This study was conducted to evaluate the effects of dietary creep feeding on performance, blood characteristic and behavior in sows and piglets. In total, data were obtained from 30 sows (Landrace × Yorkshire) and their litters. Sows were randomly assigned with 1, 2 or 3+ parities to 1 of 3 creep feeding treatment groups. Dietary treatments included 1) CON (no creep feeding), 2) TRT1 [creep feed (DE 4,000kcal/kg) from 5d of age until weaning (21d)], and 3) TRT2 [high energy creep feed (DE 5,000kcal/kg) from 5d of age until weaning (21d)]. The behavior of sows (nursery, eating, standing) and piglets (sucking, sleeping, fighting) in each treatments was observed throughout this experiments. Each piglet was weighted and bled on 5, 10, 15 and 21 d after birth to evaluate the ADG and IgG concentration of piglet. In addition, all sows were also bled on the lactation and weaning day to evaluate, epinephrine, nrepinephrine and cortisol concentration, rectal temperature of each sows was also measured at the same time. In herein study, dietary TRT1 and TRT2 significantly decreased the Epinephrine, norepinephrine and cortisol concentration compared with the control group ($P < 0.05$). Higher piglet IgG concentration was observed in the TRT1 and TRT2 group compared with the control ($P < 0.05$). Dietary TRT1 and TRT2 led a lower diarrhea score of piglets than those of the control treatment ($P < 0.1$). A higher piglet ADG was detected in the TRT2 ($P < 0.1$) compared with the CON treatment. No significant difference was observed on the rectal temperature of sows, the behavior of the piglet and sows among treatments. In conclusion, creep feeding can increase the immunity of piglet and decrease the diarrhea score of piglets. A higher energy creep feeding can significantly increase the growth performance of piglet

compared with the those without creep feeding, while the creep feeding with lower energy show intermediate.

Key Words: creep feed, behavior, sow

W221   Crude glycerin in market turkey diets.   S. L. Noll*[1], K. Koch[2], and J. Brannon[1], [1]*University of Minnesota*, *St. Paul,* [2]*North Dakota State University*, *Fargo*.

Crude glycerin (CG) is produced as a co-product of the conversion of fats into biodiesel and contains 80–88% glycerol. Two studies were conducted to examine CG as a source of energy in growing diets of market turkey toms. In the first trial, CG replaced an equivalent amount of corn in diets of low and high nutrient density (LND vs. HND). Glycerin was added at levels of 2, 4, 6, and 8%. As glycerin replaced corn, diet Lys, Met, and Thr were adjusted to the control diet (0% CG) for each nutrient density series. The base diet contained corn, soybean meal, poultry byproduct meal, and distillers dried grains with solubles (20%). Diets were adjusted for age and fed to toms during 8–19 wks of age. Diets were fed as mash. A factorial analysis included CG and nutrient density. In Trial 2, the objectives were to compare performance of toms fed diets with CG replacing fat and corn in diets fed as mash or pellets and to determine the effect of CG on pellet quality. The base diet was similar to Trial 1. The source of fat was sunflower oil. The study was of a factorial design with factors of feed form (mash or pellets) and CG (0, 3, and 6%). Each diet was fed to 8 replicate pens of tom turkeys (Large White, Nicholas) during 11–19 wks of age. In trial 1, BW was decreased by 2.9% at 19 wks for the LND series as compared with the HND regimen or by feeding CG in excess of 4% ($P < 0.05$). Cumulative feed efficiency during 8 to 19 wks of age was increased for the LND as compared with HND (2.85 vs. 2.59) while no effect was observed for CG addition ($P < 0.05$). A significant interaction of nutrient density and CG was observed during 17–19 wks of age for feed/gain. In Trial 2, BW was not affected by diet. Pellet quality in general was poor. A significant interaction of feed form and CG occurred for cumulative feed efficiency ($P < 0.05$). The interaction was primarily due to a lowered feed intake of the pelleted diet containing 6% glycerin as compared with the response at 0 and 3% CG. The improvement in feed/gain with pelleting indicated an important role of reduction in feed wastage by the feeding of pellets even if they are of poor quality. Inclusion of up to 6% crude glycerin was possible without a negative effect on performance.

Key Words: turkey, glycerin, feed form

W222   The effect of vetch heat treatment on free amino acids profile in plasma, muscle and liver of growing chickens.   I. Fernandez-Figares*, M. Lachica, R. M. Nieto, and J. F. Aguilera, *CSIC, Spanish National Reseach Council*, *Granada, Spain*.

The aim of the present work was to evaluate the effect of feeding heat processed vetch meal to growing chickens on free amino acid (AA) levels in different tissues. Eight 4-week-old White Rock male growing chickens (mean LW 500 (s.e. 9.3) g) were given, for 3 d by crop intubation in 2 daily meals, 2 isoenergetic (13.1 MJ ME/ kg DM) and isonitrogenous (120 g CP/ kg DM) semisynthetic diets based on vetch seed meal, as a single source of protein, untreated or previously autoclaved at 120°C for 30 min. The paired-feeding level used was above that of maintenance (684 kJ EM/kg LW$^{0.75}$; Arch. Zootec. 36: 165–72). Four hours after the last meal, they were slaughtered by cervical dislocation and samples of

right biceps muscle and liver were frozen in liquid nitrogen and stored at −20°C until analysis. Also, heparinized blood samples were taken and plasma was obtained by centrifugation and finally frozen at −20°C. Samples were homogenized and deproteinized (by ultrafiltration) before analysis for free AA by HPLC, using the Waters Pico Tag method. Data were analyzed as one-way ANOVA using SAS software. The chickens were in a positive energy balance, but the diets supplied insufficient amounts of all essential AA, with an imbalanced profile (Anim. Prod. 57: 309–18). Heat treatment increased significantly ($P < 0.05$) plasma His and Met and decreased Ile, Ser and Pro. In muscle, birds fed heat-treated vetch had a tendency ($P = 0.05$–0.10) to increase Met and Trp and to decrease Thr and Lys. In liver, heat treatment increased ($P = 0.01$–0.05) free essential AA with the exception of Arg, Ile ($P = 0.013$–0.14) and Thr ($P = 0.99$). Previous work of this laboratory has shown that heat treatment increases the digestion and net absorption of total N and AA of some grain legumes, presumably by destruction of toxic constituents which stimulate endogenous protein excretion (Anim. Sci.60: 493–7). Consequently, liver free amino acid pool was more sensitive than muscle or plasma pools to this increased net AA absorption.

Key Words: free amino acids, legume, chicken

W223   Use of near infrared spectroscopy and color for identification of soybean meals by origin.   P. García-Rebollar, N. Núñez-Romero, S. Santos-Rosell, R. Lázaro, and G. G. Mateos*, *Universidad Politécnica de Madrid, Madrid, Spain*.

Recent work has shown that chemical composition and nutritional value of soybean meals (SBM) differ among origins. Near-infrared reflectance spectroscopy (NIRS) has demonstrate its potential to identify and classify food products, and color has also been used to detect improper processing conditions. The objective of this work was to evaluate NIRS and color methods and its application in the feed mill industry to permit rapid and accurate origin (Argentine, ARG; Brazil, BRA; USA) identification of commercial SBM. A total of 290 SBM unground samples of known origin (ARG, n = 84; BRA, n = 74; USA, n = 132) were scanned using a spectrophotometer (Foss NIRSystems 5000) over the range 1100–2500 nm. Color (CIELAB system) was recorded using a Minolta colorimeter (model CR-300). On the basis of spectral data, a Principal Component Analysis was performed and outliers with a Mahalanobis distance greater than 3 were removed. The 3 sets of SBM spectra were split using the CENTER algorithm (WinISI v.1.50) into a calibration set (ARG, n = 61; BRA, n = 53; USA, n = 86) used to develop linear discriminant models (PLS2-DA procedure), and an external validation set (ARG, n = 20; BRA, n = 16; USA, n = 43). The best discriminant model yielded a SECV of 0.2515 and over 97% of correctly classified samples in the training set (100% for ARG; 96% for BRA, and 98% for USA, respectively), whereas in the validation step 100% of the samples were correctly classified. Color parameters of SBM samples differed ($P < 0.001$) among origins, with the BRA meals being redder than the ARG and USA meals (7.6 vs. 6.5 vs 5.9, respectively). The yellowness and luminosity were higher for the USA meals (26.5 and 71.1) than for the South American meals (25.1 and 67.3 for ARG; 24.4 and 65.3 for BRA), respectively. The results obtained show that NIRS is a reliable method of origin identification of commercial SBM samples at the reception stage in the feed mill industry, and that color can help to confirm these results.

Key Words: soybean meal origin, color, near infrared spectroscopy