Student Competition: Metabolism and Nutrition: General Nutrition I

71 Comparison of the nutritional and economic value of soybean meal from five origins in poultry and swine feed formulation. Joaquin A. Cabanas-Ojeda*[1], Paula A. Lozano-Cruz[1], Jhon J. Mejia-Abaunza[1], Valmiro Aragão-Netto[1], Edgar O. Oviedo-Rondón[1]; [1]*North Carolina State University, Prestage Department of Poultry Science, Raleigh, North Carolina, United States.*

Soybean meal (SBM) is the primary protein ingredient in poultry and swine diets and generally accounts for most of the feed cost. However, its quality and nutritional value vary due to regional crop, processing, and storage conditions which can impact animal performance and feed cost. This study aimed to evaluate the nutrient and energy composition of North Carolina (NC) SBM and compare the differential feed cost to SBM of other origins. A total of 35 and 45 samples of SBM produced in NC in 2020 and 2021 were collected and analyzed by NIRS. Proximate composition, energy, and quality parameters were determined using AminoNIR (Evonik) calibration curves. The nutrient and energy values of SBM produced in the Eastern and Western regions in the USA, Brazil, and Argentina were obtained from the AminoNIR (Evonik) 2020 and 2021 reports. Feed was formulated in a least-cost software (Concept 5.0®) for diverse feeding phases of broilers, layers, and swine. For each one of these diets, SBM of these five origins was included at different levels to achieve the lowest feed cost. Broiler starter (35-36% SBM inclusion), grower (33-35%), and finisher (29-31%) diets were formulated following Ross 708 (2019) nutrient specifications. Brown and white layer diets for phases 1 (26-28% SBM inclusion) and 2 (21-22%) were formulated following the Hy-Line (2021) nutrient guidelines. For swine, growing boars, and gilts, phases 2 (20-25% SBM inclusion), and 3 (14-16%), were formulated using PIC (2021) recommendations. Nutrient and energy data were analyzed in a one-way ANOVA and means separated using Tukey's HSD test. Significant differences between SBM of different origins were observed for all parameters evaluated ($P < 0.001$). The NC SBM had the highest ME values for poultry (between 29-218 and 57-167 kcal/kg more for 2020 and 2021, respectively) among all other sources. SBM produced in NC also had the highest crude protein content in both years (47.53% and 47.84%). NC SBM had slightly lower amino acid (AA) content than Brazilian SBM but higher than Argentinian and Western US SBM and very similar to Eastern US SBM ($P < 0.001$). For both years, diets formulated with NC SBM were cheaper than using all other sources, between 2.38-31.08 US$/ton for broiler diets, 0.88-22.96 US$/ton for laying hen diets, and 2.05-14.98 US$/ton for swine diets, except for Brazilian SBM in the broiler starter. In conclusion, this analysis indicated that SBM produced with soybeans grown in North Carolina in 2020 and 2021 had better nutrient and energy value, competitive AA content, and quality parameters. Therefore, using NC SBM would require lower synthetic AA and fat supplementation, reducing feed costs to obtain the same nutrient specifications.

72 Determination of TME_n, standardized amino acid digestibility, and phosphorus digestibility in soybean expellers produced from a new variety of soybeans fed to chickens. Minoy Cristobal*[1], Jennifer Blair[1], Pam Utterback[1], Hans H. Stein[1], Carl Parsons[1]; [1]*University of Illinois at Urbana-Champaign, Animal Sciences, Champaign, Illinois, United States.*

The objective of this study was to test the hypothesis that nitrogen-corrected true metabolizable energy (TME_n), standardized amino acid (AA) digestibility, and apparent ileal P digestibility are not different in a soybean expeller (SBE) produced from a new variety of Photoseed soybeans compared with SBE produced from conventional soybeans. The Photoseed soybeans have been developed to capture more carbon and sunlight, leading to an ingredient that has reduced environmental footprint from crop production. The two SBE contained approximately 46.3 % protein on a DM basis. In Experiments 1 and 2, two precision-fed rooster assays were conducted to determine TME_n and standardized AA digestibility in conventional and Photoseed SBE using conventional and cecectomized roosters, respectively. For each experiment, six replicate White Leghorn roosters were fasted for 26 h and then tube fed 25 g of each SBE, and excreta samples were collected for 48 h post-feeding. Data were analyzed as a one-way ANOVA for a completely randomized design. Differences between treatments were considered significant at $P < 0.05$. Results from Experiment 1 yielded TME_n values of 3.162 and 3.261 kcal/g DM for the conventional SBE and Photoseed SBE, respectively, with the value being greater ($P < 0.05$) for Photoseed SBE. Results from Experiment 2 showed standardized digestibility of most AA of approximately 90%, and there was no difference between the two SBE. However, Photoseed SBE had greater ($P < 0.05$) concentrations of digestible Arg, Lys, Phe, Trp, and Val compared with conventional SBE. In Experiment 3, an *ad-libitum*-fed broiler chicken assay was conducted to determine apparent ileal P digestibility in conventional and Photoseed SBE. Eighty commercial Ross 308 male chicks were fed a standard corn-SBM diet from 0 to 16 d of age and birds were then fed diets containing one of the SBE as the only source of P from d 17 to 21. The 2 experimental diets had a Total Ca:Total P ratio of 1.4:1 and TiO_2 was used as a digesta marker. There were 5 chicks per pen and 8 replicate pens per treatment and the pen was the experimental unit. On d 21, chicks were euthanized and ileal digesta were collected. Data were analyzed as in Experiments 1 and 2. Results indicated values for apparent ileal P digestibility of 46.8% and 40.6% for conventional SBE and Photoseed SBE, respectively, and these values were not different. In summary, TME_n was greater in Photoseed SBE compared with conventional SBE, but digestibility of AA and P was not different although Photoseed SBE had greater concentrations of some indispensable AA compared with conventional SBE. Results of this study indicated that Photoseed SBE has greater nutritional value than conventional SBE.

73 Assessment of Soybean Genotype Amino Acid and Oil Selection Improvements on Broiler Performance. Savannah Wells Crafton*[1], Kenneth B. Nelson[2], Matheus F. Costa[3], Benjamin L. Angel[1], Michael T. Kidd[4]; [1]*University of Arkansas, Poultry Science, Fayetteville, Arkansas, United States;* [2]*University of Arkansas, Poultry Science, Fayetteville, Arkansas, United States;* [1]*University of Arkansas, Poultry Science, Fayetteville, Arkansas, United*