The utilizable energy content of wheat distillers dried grains with solubles (wheat-DDGS) without or with supplementation of enzyme containing xylanase, amylase and protease (XAP) activities was determined for turkeys using linear regression method. A total of 126 BUT 10 male turkeys were fed a nutrient-adequate starter diet from d 1 to 14. On d 14, the birds were assigned to 6 dietary treatments consisting of 3 levels of wheat-DDGS (0, 300, or 600 g/kg) and 2 levels of XAP (0 or 250 mg/kg of diet) in a randomized complete block design with 7 replicate pens and 3 birds per replicate pen. The diets were fed for 7 d. Energy-yielding ingredients in the wheat-soybean meal reference diet were replaced by wheat-DDGS in a way that their ratios were the same across all the diets. Grab excreta samples were collected from each pen from d 18 to 20 to determine the AME of the diet by the index method. The AME or AME_{n} of wheat-DDGS was determined from the slope of regression of wheat-DDGS-associated energy intake (kcal) against wheat-DDGS intake (kg). Increasing the dietary inclusion of wheat-DDGS from 0 to 600 g/kg of diet linearly decreased (P < 0.05) dry matter retention and total tract energy retention, irrespective of XAP supplementation. There were wheat-DDGS × XAP interactions (P < 0.05) on dietary AME and AME_{n}. Dietary AME and AME_{n} values decreased linearly (P < 0.05) as the level of wheat-DDGS increased in the diets without XAP, whereas there was no effect of increasing wheat-DDGS level on dietary AME or AME_{n} in XAP-supplemented diets. From the regression analysis, the ME values (kcal/kg DM) of wheat-DDGS without and with supplemental XAP were 3,355 and 3,558, respectively. Corresponding ME_{n} values (kcal/kg DM) were 3,109 and 3,294, respectively. Enzyme supplementation increased (P > 0.05) both the ME and ME_{n} of the wheat-DDGS by 6 percent. It was concluded from the current study that the wheat-DDGS is a valuable source of ME for turkeys and that XAP supplementation can further increase energy availability from the feedstuff.

Key Words: wheat-DDGS, metabolizable energy, enzyme supplementation

37 Prediction equations for apparent metabolizable energy of corn distillers dried grains with solubles determined in broiler chicks from 10 to 18 days of age. K. J. Meloche*1, B. J. Kerr2, G. C. Shurson3, and W. A. Dozier III4. 1Auburn University, Auburn, Alabama. 2USDA-ARS National Laboratory for Agriculture and the Environment, Ames, IA. 3University of Minnesota, St. Paul.

The ethanol industry has been extracting 2 to 6% corn oil from corn distillers dried grains with solubles (DDGS) as a strategy to generate additional revenue through the production of crude corn oil. As a result, the AME_{n} value of reduced oil DDGS may be decreased by as much as 300 to 600 kcal/kg. An experiment was conducted to examine the nutrient composition of DDGS to develop prediction equations for AME_{n} in broilers. Fifteen samples of DDGS ranging in ether extract (EE) from 3.15 to 13.23% (DM-basis) were collected from various dry milling plants and were subsequently fed to broiler chicks to determine AME_{n}. A corn-soybean meal control diet was formulated to contain 15% dextrose, and test diets were created by mixing the control diet with 15% DDGS at the expense of dextrose. A total of 1,344 male Ross x Ross 708 chicks housed in battery grower cages (7 birds/cage; 0.06 m²/bird) was randomly assigned to 16 dietary treatments (12 replicate pens per treatment). Broilers were fed experimental diets from 10 to 16 d of age, followed by a 48 h total excreta collection period. On a DM-basis, AME_{n} of the 15 DDGS samples ranged from 1,869 to 2,824 kcal/kg. Analyses were conducted to determine the gross energy (GE), CP, EE, moisture, starch, total dietary fiber (TDF), neutral detergent fiber (NDF), acid detergent fiber (ADF), and ash content of the DDGS. Stepwise regression resulted in the following best-fit equation for AME_{n} (DM basis): AME_{n} kcal/kg = −12,282 + (2.60 × GE) + (89.75 × CP) + (125.80 × starch) − (40.67 × TDF) (R² = 0.90; SE = 98.76; P ≤ 0.0001). Ether extract did not enter the model as a significant predictor of AME_{n}. These results indicate that the composition of DDGS may be used to generate prediction equations for AME_{n} in broiler chicks.

Key Words: broiler, distillers dried grains with solubles, metabolizable energy, prediction equations, fiber

38 Effect of dietary cereal grain on different male line broiler crosses. A. G. C. DesLauriers*, M. J. Zuidhof, and D. R. Korver, University of Alberta, Edmonton, AB, Canada.

In many regions worldwide, wheat replaces corn as the main cereal in commercial broiler diets. Different broiler lines may respond differently to inclusion of wheat in the diet. Growth and yield differences were observed in response to a 2 × 2 factorial arrangement of treatments, with corn- and wheat based-diets fed to chicks from Ross 708 hens bred to either a North American (NA ML) or a European (EU ML) male line. It was hypothesized EU ML birds fed wheat-based diets would have higher growth and yield performance relative to the NA ML. Broilers were obtained from 43 wk old Ross 708 commercial females crossed to a NA ML or a EU ML. Broilers (n = 1,600) were randomly assigned to corn- or wheat-based diets. Broilers were allocated into 16 pens with 4 replicate pens per treatment of 100 birds with a stocking density of 14.55 birds/m². Group BW and feed intake were measured at 0, 10, 25, and 35 d and FCR calculated. At 35 d of age, 288 broilers were processed to collect Pectoralis major and minor, thigh, drum, wing and fatpad weights. Differences were reported as significant at P ≤ 0.05. Total breast muscle yield was higher in the corn treatment than the wheat treatment (22.5% and 19.2%, respectively). Thigh yield (10.8%) was lower in the EU ML group fed corn than all other treatments, which ranged from 11.4% to 11.8%. All treatments had similar FCR, averaging 1.84. Wheat-fed birds had lower overall BW compared with corn-fed birds from 10 to 35 d of age (1,995 and 2,304 g at 35 d, respectively). The NA ML group fed wheat had 12.20% lower BW at 35 d than NA ML group fed corn (2,093 and 2,347 g, respectively); and lower total breast yield (17.9% and 21.9%, respectively); but 0.76% higher wing yield. Yield differences were greater due to cereal type than due to male strain. Overall the EU ML group did not have higher growth and yield performance on wheat-based diets than the NA ML group.

Key Words: broiler, wheat, corn, performance, yield
39  Effect of adding phytase to low phytate and normal phytate SBM diets on male broiler performance and gizzard weight. B. M. Nusairat*, C. R. Stark, and J. Brake, Prestige Department of Poultry Science, North Carolina State University, Raleigh.

This study evaluated the effects of phytase in diets containing Normal Phytate (NP) versus Low Phytate (LP) soybean meal (SBM) on BW, feed intake (FI), and adjusted FCR (AdjFCR) of broilers grown to 35 d of age. A total of 512 Ross 708 male broiler chicks were assigned to 32 pens in 4 blocks with 16 birds per pen. From 1 to 9 d, corn-SBM diets either with or without phytase were fed to 16 pens per diet. From 10 to 35 d, a 2 × 2 factorial arrangement of SBM type (LP and NP SBM) and phytase addition (with and without) with 8 pens per diet was used. Birds and feed were weighed at 9, 22, and 35 d of age and 3 birds per pen were necropsied at both 22 and 35 d of age to determine gizzard weight. Data from 10 to 35 d were analyzed as a randomized complete block design. From 10 to 22 d FI decreased when phytase was added to the LP SBM diet (1,103 versus 1,054 g) but no decrease was observed in birds fed NP SBM with added phytase and treatments did not affect BW and AdjFCR. A similar decrease in FI was observed from 23 to 35 d when phytase was included in the LP diets. Broiler BW was decreased by phytase in the LP SBM diet (2,183 versus 2,034 g) at 35 d but increased when phytase was added to the NP SBM diet (2,249 versus 2,094 g). The AdjFCR was improved by phytase addition to the NP SBM diet (1.64 versus 1.78 g:g but was poorer for birds fed the LP SBM diet (1.84 versus 1.71 g:g). Phytase decreased gizzard weight of birds consuming LP SBM compared with other combinations at 22 d but was comparable among SBM phytase combinations at 35 d. Results demonstrated that phytase significantly improved live performance in broilers fed diets formulated with NP SBM. Reduced gizzard weight in birds consuming LP SBM with phytase at 22 d could be causally related to the poorer subsequent performance of these broilers and/or there could have been a negative effect of intestinal calcium and phosphorus balance in the LP SBM environment.

Key Words: broiler, normal phytate SBM, low phytate SBM, phytase

40  Improving the safety of food and feed from low quality grains using a novel grain sorting technology. M. Kautzman*1, J. Smillie1, M. Mostrom2, M. Wickstrom4, and T. Scott1, 1University of Saskatchewan, Saskatoon, SK, Canada, 2North Dakota State University, Fargo.

Current grading standards of grains in Canada are based on visual grading of the physical characteristics. An increasingly common cause of downgrading is the incidence of Fusarium damaged kernels (FDK). This physical damage is attributed to Fusarium, a fungus which develops under favorable environmental conditions and infection can cause lower crude protein (CP) deposition. Incidence of FDK > 0.25% will lower the grade, with a tolerance of 5% FDK for export feed grain. During infestation, the fungi can produce a variety of mycotoxins, the most common being deoxynivalenol (DON). It is well recognized that Near Infrared Reflectance (NIR) can accurately predict CP of whole grain. Our objective is to evaluate the capacity of this new technology to sort individual wheat, barley or durum kernels for FDK based on CP. During calibration a sample of kernels are scanned, the distribution of CP established and 10% increments of grain from the distribution curve are produced for validation of actual CP values. Each fraction was analyzed to determine the concentrations of 16 common mycotoxins. Five FDK wheat samples of unsorted grain contained levels of FDK ranging from 1.4 to 7.6%, associated concentrations of DON varied from 0.9 to 8.4ppm and CP, from 12.7 to 15.4%. Based on preliminary sorting, the lowest 20% CP kernels had the highest incidence of FDK and DON and the remaining 80% of the material was substantially reduced. The correlation between FDK and DON was significant (P < 0.0001, r² = 0.62) but not between FDK and CP (P = 0.26, r² = 0.06) or DON and CP (P = 0.09, r² = 0.14). There does seem to be some inconsistency in the ability to eliminate all FDK and mycotoxins between grain sources; however, these appear to be related to specific sources of damaged grain. These results suggest the opportunity to increase safety and value of Fusarium downgraded grain.

Key Words: fusarium, deoxynivalenol, near infrared reflectance, crude protein, wheat

41  Effect of particle size and inclusion level of distillers dried grains with solubles (DDGS) and pellet quality on growth performance and gastro-intestinal (GIT) development of broilers. W. J. Pacheco*, A. C. Fahrenholz, C. R. Stark, P. R. Ferket, and J. Brake, Department of Poultry Science, North Carolina State University, Raleigh.

Distillers dried grains with solubles (DDGS) is a competitive ingredient in least-cost poultry feeds, but dietary inclusion is often limited because of its adverse effects on pellet quality and nutrient digestibility. Dietary inclusion of coarse ground particles of feed ingredients can alter GIT development, nutrient digestion, and broiler performance. The objective of this study was to evaluate the effect of particle size and inclusion level of DDGS, and pellet fines on broiler live performance and GIT development. A total of 2,304 male broilers were randomly distributed among 12 treatments with 6 replicate pens per treatment consisting of a 2 × 2 × 3 factorial arrangement of DDGS particle grind sizes (350 and 700 µm), DDGS inclusion levels (15 and 30%), and pellet fines levels (0, 25, and 50%). The starter diets were fed in crumbled form and the grower and finisher diets in pelleted form. Feed consumption and BW were determined at 14, 35, and 42 d of age and adjusted feed conversion ratio (AdjFCR) was calculated by including mortality weights. Gizzard and proventriculus were collected at 42 d of age. Birds fed 350 µm DDGS exhibited greater BW at 42 d than birds fed 700 µm DDGS (P < 0.05). Birds fed pellets with no fines had greater 35 and 42 d BW than birds fed 50% fines (P < 0.05). Birds fed 30% DDGS had poorer AdjFCR (P < 0.05) at 42 d than birds fed 15% DDGS. Birds fed 30% DDGS had greater proventriculus weight (P < 0.05) than birds fed 15% DDGS. In contrast, gizzard weight was only affected by particle size and pellet fines. Birds fed 700 µm DDGS had greater gizzard weight (P < 0.05) than birds fed 350 µm DDGS. Additionally, the birds receiving no fines in the feed had smaller gizzards as compared with birds receiving 25% or 50% fines (P < 0.05). The results of this experiment indicated that birds performed better when fed 350 µm DDGS with no fines in the pelleted feed.

Key Words: particle size, DDGS, pellet quality, gizzard, proventriculus

42  Broiler diet formulation using algae biomass based on digestible nutrient content. A. M. Evans*, D. L. Smith2, and J. S. Moritz3, 1West Virginia University, Morgantown, 2Eastern New Mexico University, Portales.

Crude oil prices have influenced the development of next generation alternative fuel sources. Algae is a leading candidate as an alternative fuel due to its short growing cycle, lack of requirement for arable land or potable water, and photosynthetic efficiency. The extraction of oil from algae for fuel generates a co-product, algae biomass, that when dried, has potential as a feed ingredient. The objectives of the current study were 1) to determine true metabolizable energy (TMEn) and true digestible nutrient content.

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43 The effects of wheat supplementation to corn and soybean meal based diets on the manufacture of pellets and subsequent turkey performance. J. W. Boney*, A. E. Lamp, and J. S. Moritz, West Virginia University, Morgantown.

Corn price and benefits associated with pelleting may encourage wheat supplementation in turkey diets. The objectives of this study were to describe the manufacture effects of corn and soybean meal based diets with and without supplemented wheat and to assess turkey performance when these diets were fed. The wheat source was a hard winter variety with and without supplemented wheat and to assess turkey performance describe the manufacture effects of corn and soybean meal based diets. Corn price and benefits associated with pelleting may encourage wheat supplementation to corn and soybean meal based diets containing up to 21% algae biomass was successfully formulated. 

Key Words: wheat, feed manufacture, poult performance, pellet durability, true metabolizable energy

44 Effect of dried distillers grains with solubles and wheat bran on broiler and layer chick performance, energy and fiber digestibility. M. Walugembe*, M. F. Rothschild, and M. E. Persia, Iowa State University, Ames.

The recent increases in the prices of corn and oil have led to an increase in the use of dietary fiber in poultry rations to reduce feed costs. An experiment was conducted in a 2 x 2 factorial arrangement of treatments to evaluate the effects of feeding high and low fiber diets on the performance of chickens bred for egg production and meat production. The low fiber diet was based on corn-soybean meal (SBM) and the higher fiber diets were formulated using corn-SBM-distilled dried grains with solubles (DDGS) and wheat bran. The higher fiber diet contained 6% DDGS and 6%wheat bran from 1 to 12 d of age and 8% DDGS and 8% wheat bran from 12 to 21 d of age. The 2 strains of chicks, broilers and layers, were randomly assigned to experimental diets with 11 replicate cages per treatment. The evaluation criteria consisted of body weight gain, feed intake, feed conversion, nitrogen corrected apparent metabolizable energy (AMEn), and neutral detergent fiber (NDF) digestibility. Higher fiber inclusion reduced broiler chick weight gain but had no effect on layer chick weight gain resulting in an interaction (P < 0.05). There were no significant differences in AMEn between either strains or dietary fiber concentrations although layer chicks had increased NDF digestibility in comparison to broiler chicks, regardless of dietary fiber (P < 0.05). Increased fiber concentration also resulted in significant ileal and total tract NDF digestibility (P < 0.05). These differences in performance and digestibility may be related to feed intake and passage rate differences between the strains and suggest that layer chicks may be able to better utilize feedstuffs higher in fiber in comparison to broiler chicks.

Key Words: dietary fiber, layer, broiler, performance

45 Nutritional evaluation of canola meals produced from new varieties of canola seeds. C. Parr*, X. Chen, and C. Parsons, University of Illinois, Urbana.

Nine new varieties of test canola meal (CM) were evaluated and compared with conventional canola meal (Conv CM). Results showed that the test CMs had higher levels of crude protein and AA in comparison to the Conv CM. All of the test CMs also had lower fiber values as measured by acid detergent fiber and neutral detergent fiber. Precision-fed rooster assays were conducted to determine true metabolizable energy (TMEn) of the CMs wherein roosters were tube-fed 30 g of CM and excreta were collected for 48 h post-feeding. When TMEn values of the test CM were compared with Conv CM, all of the test CMs had higher values than the Conv CM (P < 0.05). Precision-fed cecectomized rooster assays were then conducted to determine standardized AA digestibility in the CMs. Standardized AA digestibility values for most of the test CM were higher than those for the Conv CM (P < 0.05) and the test CM contained much higher levels of digestible AA than the Conv CM due to their higher protein and AA content. The results of this study indicate that canola meals from the new varieties of canola seeds have increased TMEn and digestible AA levels for poultry when compared with Conv CM.

Key Words: canola meal, true metabolizable energy, amino acid, precision-fed rooster assay, poultry

46 Performance, health and tissue weights of broiler chickens fed graded levels of hairless hulled yellow and brown canary seed. H. L. Classen1, M. Cho1, P. Hucl1, S. Gomis1, and C. A. Patterson2, 1University of Saskatchewan, Saskatoon, SK, Canada, 2Pathfinders Research and Management Ltd., Canada.

Canary seed (Phalaris canariensis L.) is not registered as a feed ingredient in Canada and research is required to confirm its efficacy and safety.

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in animal feeding. Research examined the effects of dietary levels (0, 15, 30 and 45%) of yellow (C05041) and brown (CDC Maria) canary seed on the performance and health of broiler chickens. Eight (6 birds each) and 5 (4 birds each) replications per treatment were used from 0 to 21 and 22 to 35 d (d) of age, respectively. Statistical analyses for growth performance and cause of mortality (0 to 21 and 22 to 35 d) and organ weights (35 d) were completed using SAS version 9.2 using Proc Mixed as a 4 × 2 factorial arrangement. Proc Reg of SAS version 9.2, linear and quadratic regression analyses, were used to define the effect of canary seed level. Growth rate and feed intake were affected in a quadratic manner by canary seed level from 0 to 21 d with highest growth achieved by 15 and 30% treatments, but these response criteria were not affected from 22 to 35 d. Feed to gain ratio decreased linearly with increasing canary seed for both 0–21 and 22–35 d time periods. Mortality was not affected by level of canary seed. Birds fed the C05041 cultivar died more (primarily from yolk sac infection) than did birds fed CDC Maria from 0 to 7 d of age, but there was no effect of cultivar from 7 to 35 d of age. Level of canary seed affected jejunal weights from 0 to 21 d with highest growth achieved by 15 and 30% treatments; cultivar did not affect the weights of these organs. On a percentage of live weight bases, level and cultivar of canary seed did not affect carcass, gizzard, ileum, heart, liver and spleen weights. No interactions were found between dietary level and cultivar of canary seed. Treatment did not affect gross necropsy at trial end or histopathology of key organs. Yellow and brown hairless canary seed has nutritional merit and is safe for animal feeding.

Key Words: canary seed, feed, growth, health, chicken

47 The effects of varying levels of dietary raffinose and stachyose on the virulence of Clostridium perfringens in broiler chickens. E. McMillan, D. Toole, G. Page, and M. Vegani*, Nutreco Canada, Guelph, ON, Canada.

Diet composition is known to influence the occurrence and severity of necrotic enteritis (NE) caused by Clostridium perfringens (CP). Raffinose (RF) and stachyose (ST), anti-nutritional factors present in large quantities in soybean meal, are poorly digested in chickens, but have been cited as preferential energy sources for CP. Reducing the level of these carbohydrates in the diet may be associated with the lower occurrence of NE in broilers. The objective of this study was to investigate if the presence of varying levels of these compounds, derived from different soybean meal varieties, can have any impact on NE in broiler chickens in a NE disease challenge model. Ross 708 male broiler chicks (1,152) were assigned to 64 pens (18 birds per pen) in a completely randomized block design with a factorial arrangement of 2 diets (low or high levels of RF and ST) and 7 strains of CP in a 24-d study. In the pre-challenge period (d 0–14), feeding a low RF and ST diet significantly reduced feed intake (P = 0.006) and improved FCR (P < 0.001), with no impact on average daily gain (P = 0.35). However, low RF and ST levels had no effects on performance variables post-challenge (d 14–24, P > 0.20) or overall (d 0–24, P > 0.12). Dietary levels of RF and ST had no effects on NE lesion scores (P = 0.17) or mortality (NE-related or total mortality, P > 0.73). The present results indicate that using low RF and ST soybean meal is of limited benefit in reducing NE severity in a challenge model, but may improve production performance of broiler chickens under non-challenge conditions.

Key Words: necrotic enteritis, Clostridium perfringens, raffinose and stachyose, lesion score, broiler chicken

48 Influence of source and level of glycerin in the diet on growth performance, liver characteristics, and nutrient digestibility in broilers from 1 to 21 days of age. H. A. Mandalawi1, M. V. Kimiaeit-alab1, V. Obregón2, D. Menoyo1, and G. G. Mateos1, 2Bio-Oils Huelva, S.L., Huelva, Spain.

In total, 630 one-day-old Ross-308 chicks were used to study the influence of source and level of inclusion of raw glycerin (Gly) in the diet on growth performance, digestive traits, total tract apparent retention (TTAR), and apparent ileal digestibility (AID) of nutrients in broilers from 1 to 21 d of age. There was a control diet based on corn and soybean meal and 8 additional diets that formed a 2 × 4 factorial with 2 sources of Gly varying in glycerol content (H-Gly, 87.5% glycerol and L-Gly, 81.6% glycerol) and 4 levels of Gly inclusion (2.5, 5.0, 7.5, and 10%). The 2 Gly used were obtained from a single batch of soy oil used for biodiesel production, dried under different processing conditions. Each treatment was replicated 7 times. Main effects and interaction were studied. Also, pre-planned polynomial contrasts were performed to study the L and Q effects of Gly level on the different traits. From d 1 to 21, FCR improved linearly (L, P < 0.01) as the Gly content of the diet increased. At 21 d of age, the relative weight (% BW) of the digestive tract and liver (L, P < 0.01) and the lipid content of the liver increased as the level of Gly in the diet increased. Liver color was not affected by diet. TTAR of DM was higher for the H-Gly diet than for the L-Gly diet (P < 0.05) and increased quadratically (Q, P < 0.05) as the Gly content of the diet increased. The AMEn of the diets increased (L, P < 0.001) with Gly inclusion. Also, the AID of DM and GE increased (P < 0.01) with increased level of dietary Gly. It is concluded that raw glycerin obtained from the biodiesel industry from soy oil can be used efficiently as a source of energy at levels of at least 10% in diets for broilers from 1 to 21 d of age.

Key Words: broiler performance, glycerol, ileal digestibility, liver lipid, nutrient retention

49 Nutritive value and protein quality of soybean meals according to origin and crop year. P. G. Rebollar, C. de Blas, R. Lázaro, B. Saldaña, and G. G. Mateos*, Universidad Politécnica de Madrid, Madrid, Spain.

Nutrient composition and protein quality of soybean meal (SBM) depend on genotype, environmental conditions during plant growth, storage, and processing of the beans. Previously (5 yr period; 2007–2011), we had collected and analyzed for major dietary components, AA, and protein quality a total of 387 samples collected from USA, Brazil (BRA), and Argentina (ARG). During yr 2012, 90 extra samples (30 per each country) were collected and the analytical data were compared with those of the previous 5 yr. On DM bases (samples of the 6 yr period; 2007–2012), SBM from USA (n = 179) and BRA (n = 144) had more CP (53.7, 53.0, and 51.7%; P < 0.001) than SBM from ARG (n = 156). Also, USA meals had more sucrose, oligosaccharides, and P contents, but less crude fiber and NDF than BRA meals, with ARG meals being intermediate (P < 0.001). Trypsin inhibitor activity (3.5, 2.9, and 2.8 mg N/g), PDI (19.7, 15.3, and 16.4%), and KOH solubility (86.6, 82.6, and 81.6%) were higher (P < 0.001) for USA than for BRA and ARG meals. Lys content per unit of CP was higher (6.16, 6.09, and 6.05%; P < 0.001) for USA than for ARG and BRA meals. The average CP, P, and sugars contents of the SBM, independent of country of origin, were similar in the 2 periods considered. However, USA meals had less CP (52.5 vs. 53.9%; P < 0.05) and more sucrose (8.9 vs. 8.1%; P < 0.05)
in 2012 than in the previous 5 yr period. Also, Lys profile independent of origin was higher for SBM of the 2012 crop than for the average of the 5 previous year crops (6.13 vs. 6.10% CP, respectively; $P < 0.001$). The differences in nutrient content of the SBM among the 3 countries considered were similar in 2012 than in the previous 5 yr period. It is concluded that nutritive value of SBM varies with country of origin and year of collection but that the differences among origins are maintained. Therefore, SBM had to be analyzed frequently, taking into account origin of the bean and crop year, to better evaluate its nutritional value.

**Key Words:** crop year, nutritive value, protein quality, soybean meal origin