were higher in the yolk sac of the control progeny, both in embryos ($P < 0.001$), with 36.78% vs. 35.47%, and in newly hatched chicks ($P < 0.001$), with 42.79% vs 41.82%, respectively. CLA supplementation in breeder's diet affected chemical composition, increased DM and ether extract of chick yolk sac, and reduced crude protein content of embryos and chicks, possibly due to the change in lipid metabolism of breeder and the offspring.

Key Words: breeder nutrition, embryonic development, lipid metabolism, nutrient transfer

384P Nitrogen-corrected apparent metabolizable energy value of macadamia nut cake for broiler chickens. Sudhir Yadav*[SC], Julio D. Berrocoso, and Rajesh Jha, *Department of Human Nutrition, Food and Animal Sciences, University of Hawaii at Manoa, Honolulu, HI.*

Corn and wheat are still the most widely used energy feedstuffs in poultry diets. Market availability and competition among food, feed, and fuel for the use of these conventional feedstuffs has led to wide variation in prices, thereby affecting the feed costs of broilers. Thus, it is imperative to explore and evaluate novel feedstuffs for sustainable poultry production. Macadamia nut cake (MNC), an unused byproduct of the oil extraction industry, contains a large quantity of energy, fat, and a fair amount of protein. But, there is no or limited information available on its utilization in broiler chicken. Two energy balance studies were conducted to determine the nitrogen-corrected apparent metabolizable energy (AMEn) value of MNC. To accomplish this, 160 broiler chicks (Cobb 500) were raised on corn and soybean meal based control diet with MNC as test ingredient. Feed intake, body weight, energy intake and excretion, nitrogen (N) intake and excretion, AMEn, and AMEn intake were determined in both studies. In study 1, 2 dietary treatments (control, 0% MNC and test diet, 6% MNC) were fed from 4 to 11 d of age. AMEn was determined by subtracting AMEn of control diet from AMEn of diet with 6% MNC. In study 2 (from 17 to 24 d of age), 4 diets (0, 3, 6, and 9% MNC inclusion) were fed at 91, 94, 97, and 100% of ad libitum intake so the differences in AMEn consumption were assumed only due to MNC. AMEn intake was regressed against feed intake with the slope estimating AMEn of MNC. Regression equation used was $Y = 3{,}249.5x - 156.69$ ($P < 0.0001$; SE of the slope = 200; $r^2 = 0.85$). The AMEn of MNC was determined as 3,492 and 3,249 kcal/kg in study 1 and 2, respectively with an average of 3,370 kcal/kg. This result indicates that AMEn of MNC is comparable to conventional feedstuffs, thus can be incorporated in broiler diets.

Key Words: apparent metabolizable energy, broiler, coproduct, energy balance, macadamia nut cake

385P Withdrawn

386P Apparent metabolizable energy of microalgae (*Spirulina* sp.) for broilers under different methodologies. Fernando de C. Tavernari*[1,2], Lenilson F. Roza[2], Diego Surek[1], Marcel M. Boiago[2], and Diovani Paiano[2], *[1]Embrapa Suinos e Aves, Concordia, SC, Brazil, [2]Udesc, Chapeco, SC, Brazil.*

Besides having the potential to produce biofuels, microalgae present themselves as attractive for use in animal nutrition, as having significant amounts of protein, carbohydrates, minerals, vitamins, and ether extract. Given this, it is necessary to evaluate the metabolizable energy (ME) of this ingredient for broilers. Therefore, there was a metabolism test to determine the apparent metabolizable energy (AME) and corrected for nitrogen balance (AMEn) of microalgae (*Spirulina* sp.) for broilers through the total collection method (traditional) and partial (with indigestible indicator) excreta. A total of 280 male broilers Cobb 500 were used (1 d old) in a randomized block design with 2 treatments and 10 repetitions (metabolic cages) of 14 birds per repetition. The treatments consisted of one group of birds that received basal diet free of microalgae and another group that received 80% of basal diet + 20% of microalgae. The experimental period was between 14 and 22 d, with 5 d (14–18 d) of adaptation of the experimental diets and 4 d (19–22 d) of excreta collection. The methods used to determine the EMA was the total or partial collection (indigestible indicator ash insoluble in acid - Celite) in the amount of 10 g/kg of diet. The microalgae used was 89.02% DM, 51.46% C`P; 0.99% EE; 1:06 FB; 9:44 Ashes; 0.313% Ca, 1.101% P and 4399 Kcal / kg EB. Data were subjected to t-Student's test (P 0.05). According to the findings of the trial, the EMA microalgae determined by the total collection method (3219 kcal / kg DM) was higher ($P < 0.05$) than the partial collection method (2242 kcal / kg DM). The AMEn was also higher ($P < 0.05$) in the total collection method (2801 kcal / kg DM) compared with partial (2215 kcal / kg DM). The method evaluation of EMA influences on the results and could underestimate or overestimate the EMA.

Key Words: metabolizable energy, broiler, *Spirulina* sp.

387P Nutritional evaluation of Glutenol, a co-product of ethanol production. Shelby P. Reed*, Pamela L. Utterback, and Carl M. Parsons, *University of Illinois, Urbana/Champaign, IL.*

The objective of this study was to evaluate the nutritional value of Glutenol, a new co-product of the ethanol industry. Glutenol was produced by Quality Technology International in a modified wet milling plant using a hybrid process, NextGenFrac, that fractionates the corn kernel components before fermentation without the use of sulfur dioxide. Glutenol was analyzed to contain 52.3% CP, 1.7% Met + Cys, 1.32% Lys, 1.69% Thr, and 2.23% Val on a DM basis. Two precision-fed rooster assays with conventional and cectomized roosters were conducted to determine TME_n and amino acid digestibility respectively. The determined TME_n of Glutenol was determined to be 3,256 kcal/kg DM. Standardized digestibility values for Met, Lys, Cys, Thr, and Val were 90.4, 80.1, 74.1, 81.1, and 84.9% respectively. In addition, a 3-wk broiler chick assay was conducted with increasing levels of dietary Glutenol. Diet 1 was a standard corn/SBM diet with 0% Glutenol. Diets 2, 3, and 4 had increasing levels of Glutenol at 4, 8, and 12%, respectively. As the level of Glutenol increased, the level of SBM in the diet decreased from 35.77% in diet 1 to 29.42% in diet 4 to keep the protein levels equal among treatments. Ross 308 male broilers were housed in battery cages and fed the experimental diets from 3 to 22 d post-hatch. All diets were formulated to be equal in ME and digestible amino acids. Weight gain, feed intake and gain/feed ratio were measured. No significant differences in growth performance were observed among dietary treatments. In conclusion, Glutenol can be fed up to at least 12% in the diet of broiler chickens if diets are formulated to be equal in ME and digestible amino acids.

Key Words: distillers dried grains, Glutenol, broiler, digestibility, wet milling