

maize grain from commercial hybrids when fed to commercial broiler chickens.

Key Words: Maize, Corn, *Bacillus thuringiensis* subsp. *Aizawai*

685 Nutrient composition of peanut meal. N. M. Dale* and A. B. Batal, *Poultry Science, University of Georgia, Athens.*

Solvent extracted peanut meal is becoming increasingly popular as a feed ingredient for poultry. Due to limited availability, levels of inclusion in broiler diets are generally in the range of 3-4%. The ingredient is an especially good source of arginine, while having a low level of lysine. As the origin of nutrient values for peanut meal reported in the standard tables of nutrient composition is unclear, a study was undertaken to document the nutrient composition of peanut meal samples currently available to the poultry industry. Seventeen samples of peanut meal were obtained during 2003 from commercial sources in the southeastern United States. Each was analyzed for proximate composition, true metabolizable energy, and mineral composition. Seven representative samples were analyzed for total and available amino acid content. All values have been adjusted to a 90% dry matter basis, this being representative of the meals evaluated in this study. While considerable variation was noted between samples, a reasonable consistency was observed in samples from each of the five suppliers, reflecting modest differences in processing procedure. Metabolizable energy (TME_n) ranged from 2314-2821 kcal/kg, with a mean of 2663 kcal/kg. Protein ranged from 40.1 to 50.9%, with a mean of 45.0%. Mean values for fat, fiber, and ash were 2.5, 8.7, and 5.2%, respectively. Total concentration and percent availability, respectively, of several critical amino acids were: lysine, 1.58% (85); methionine, 0.53% (88); cystine, 0.66% (80); threonine, 0.58% (81); and arginine, 5.08% (91). Average levels of calcium, phosphorus,

sodium, and potassium were 0.08, 0.56, 0.01, and 1.19%, respectively. The variation observed between samples strongly indicates that confirmatory analyses should be conducted prior to utilizing samples from a new supplier.

Key Words: Peanut Meal, Metabolizable Energy, Protein and Amino Acids

686 Sweet potato as a feed resource for layer production in Nigeria. O. A. Ladokun* and O. O. Tewe, ¹*University of Ibadan, Ibadan, Nigeria.*

A study was carried out on the utilization of sweet potato roots (SPR) as a replacement for maize and sweet potato tops (SPT) as a replacement for wheat bran in layer's diet. 150 point of lay Yaffa birds were fed for 84 days. The SPR was incorporated at levels of 21 and 42% to partially and completely replace maize respectively. The SPT was incorporated at levels of 10 and 20% to partially and completely replace wheat bran. The age at first egg was significantly ($P < 0.05$) different. The birds on the control, laid the first egg at 154 days while those on the complete replacement of maize and wheat bran laid the first egg at 189 days. There was a significant ($P < 0.05$) difference, across the treatments, in the feed intake of the birds, which ranged from 108.77g/bird/day to 127.97g/bird/day. Birds on the control diet had the best hen-day production of 61.83%. The yolk weight did not follow any particular trend but there was a significant ($P < 0.05$) difference across the treatments. Results of the study show that: SPR and SPT can be included in layer diet at not more than 50% of maize and wheat bran respectively. The replacement could be achieved concurrently.

Key Words: Sweet Potato, Replacement, Hen-Day Production

Ruminant Nutrition: Beef and Dairy Calves

687 Calf adipose tissue fatty acid profile, immune function and performance while nursing beef cows consuming high-linoleate or high oleate safflower seed supplements. S. L. Lake*, E. J. Scholljegerdes, E. L. Belden, R. L. Atkinson, D. C. Rule, and B. W. Hess, *University of Wyoming, Laramie.*

Thirty-six Angus \times Gelbvieh calves were used to determine the effect of maternal lipid supplementation on calf adipose tissue fatty acid composition, immune response, and performance. Beginning 3 d postpartum, cows were randomly assigned to be fed hay and a low fat control supplement (CON) or supplements consisting of either high-linoleate cracked safflower seeds (LIN) or high-oleate cracked safflower seeds (OLE) until d 60 of lactation. Cow rations were formulated to be isonitrogenous and isocaloric. Safflower seed supplements were formulated to provide 5% DMI as fat. Calf adipose tissue biopsies were collected near the tail-head region on d 60 of lactation. Calves were injected s.c. with antigen (hen egg albumin) at 21 d of age and again at 48 d of age. Antibody responses were determined in serum; cell mediated immunity was assessed by intradermal antigen injection at 60 d of age. Maternal lipid supplementation did not affect calf adipose tissue content (mg FA/g of adipose tissue) of 14:0 ($P = 0.10$), 15:0 ($P = 0.46$), or 16:0 ($P = 0.12$). Calves nursing LIN and OLE cows had greater content of 18:1 *cis*-9 ($P = 0.05$) than CON calves. Calves nursing LIN cows had greater 18:0 ($P < .0001$), 18:1 *trans*-11 ($P < .0001$), 18:2 ($P = 0.06$), and CLA ($P < .0001$), while OLE calves had greater 18:1 *trans*-9 ($P < .0001$). A trend was noted ($P = 0.10$) for CON calves to have a greater antigen response compared to LIN and OLE calves; however, there was no difference in cell-mediated immune response ($P = 0.86$). Maternal dietary lipid supplementation also did not affect ($P = 0.44$) calf ADG. Adipose tissue content of metabolically important fatty acid was increased in calves nursing lipid-supplemented cows and, although there was a tendency for decreased immune response by these calves, calf ADG was not affected by providing the dam with high-linoleate or high-oleate supplements.

Key Words: Beef calf, Lipid supplementation, Immune response

688 Effect of feeding extruded soybeans to nursing beef cows on conjugated linoleic acid concentrations in adipose tissue of suckling calves. C. Paradis*¹, R. Bertiaume², C. Lafrenière², and P. Y. Chouinard¹, ¹*Universite Laval, Quebec, QC, Canada,* ²*Agriculture and Agri-Food Canada, Lennoxville, QC, Canada.*

The concentration of conjugated linoleic acids (CLA) in meat and milk fat can be increased in ruminants by feeding pasture or extruded soybeans. Nursing calves on pasture have both access to fresh grass and dam milk; the latest being protected against ruminal biohydrogenation by the closure of the oesophageal groove. The objective of this study was to determine the effect of supplementing pasture-fed nursing beef cows with extruded soybeans on the concentrations of CLA in milk fat of cows, and subcutaneous adipose tissue of suckling calves. Thirty-two spring-calving cows and calves were separated in two groups. Cows were distributed in order to have 8 calves of each sex in both groups. Cows and calves were turned out to pasture on June 19 (95 ± 8 days post calving) under a rotational grazing management. Dams received 2 kg/d of full fat soybeans; raw ground (RGSB) for the first group, as a control, and extruded (EXSB) for the second group. Calves were weaned on October 8. The last week before weaning, milk yield of cows was estimated by the weigh-suckle-weigh technique. Milk was sampled for fatty acid (FA) analysis prior to calf nursing. Subcutaneous adipose tissue biopsies were obtained between the 11th and 12th ribs over the longissimus dorsi of the calves. Dietary treatments had no effect on final weight and weight change of cows during the pasture season. Cows fed RGSB tended to produce more milk (5.8 kg/d) than cows fed EXSB (4.1 kg/d) ($P = 0.07$). Weaning weight of calves was not affected by treatments, although the average daily gain tended to be higher for males as compared with females ($P = 0.07$). Milk fat content of CLA increased from 11.2 mg/g of FA in cows fed RGSB to 29.2 mg/g of FA in cows fed EXSB ($P < 0.01$). The CLA concentrations in adipose tissue increased from 17.7 mg/g of FA for calves nursing cows on RGSB to 25.7 mg/g of FA for calves nursing cows on EXSB ($P < 0.01$). Gender had no effect on the CLA concentrations in adipose tissue. Feeding EXSB to cows on pasture increased the concentrations of CLA in subcutaneous adipose tissue of suckling calves by 45%.

Key Words: Conjugated Linoleic Acid, Cow-Calf, Milk Fatty Acids

689 Responses of neonatal calves to milk replacer formulation and pasteurized whole milk. M. Hill*, J. Aldrich, and R. Schlotterbeck, Akey, Lewisburg, OH.

The objective was to compare feeding pasteurized whole milk to feeding milk replacers (MR) formulated using dairy NRC (2001) and Akey guidelines. The whole milk (M) was pasteurized at 72 °C for 15 seconds, quickly cooled and fed immediately. The MR formulated to NRC guidelines (N) was 22% CP from whey and whey protein concentrate (WPC) and 20% fat from edible lard. The MR formulated to Akey guidelines (A) was 20% CP formulated with whey and WPC plus synthetic lysine and methionine, and 20% fat formulated with edible lard plus a vegetable oil blend. Both MR were formulated to contain the same mineral and vitamin contents. Each liquid diet was fed at two levels (1X being equal to a MR powder fed at 454 g as-fed daily=436 g DM daily; 1.2X being equal to 3.8 L of milk, 14.1% DM, 3.2% CP, 3.6% fat=523 g DM daily). The trial used 48 calves (initially 36 kg BW at approximately 3 days of age) that were weaned at 42 days. Data were analyzed as a completely randomized block design with factors of liquid (M, N, A), level of liquid (1X, 1.2X), and the interaction of liquid and level of liquid. Average daily gains from 0-42 days were greatest for A (530 g) and least for N (440 g), with M (483 g) being intermediate ($P < .05$). Average daily gains from 0-56 days were greatest for A (637 g) and least for N (563 g), with M (584 g) being intermediate ($P < .05$). Gains from 0-56 days were greater ($P < .05$) for 1.2X (630 g) vs. 1X (559 g) liquid. Starter (18% CP, 62% corn, .0025% decoquinat) intake from 0-42 and 0-56 days for calves fed M was greater ($P < .05$) than for calves fed N but did not differ ($P > .1$) for level of liquid fed. Feed efficiency was best ($P < .05$) for calves fed A vs. calves fed M and N and for calves fed 1.2X vs. 1X liquid. Abnormal fecal score days were greater ($P < .05$) for calves fed N vs. A and M and for calves fed 1X vs. 1.2X liquid. In summary, calves fed A gained the fastest and were most efficient. Calves fed N gained the slowest and scoured the most. Calves fed 1.2X gained faster and more efficiently than calves fed 1X.

Key Words: Calves, Pasteurized Milk, Milk Replacer

690 Effect of level of starch and Apex botanicals in neonatal calf starter feeds. M. Hill*, J. Aldrich, and R. Schlotterbeck, Akey, Lewisburg, OH.

Previous research in our nursery has shown improvements in calf gains when Apex was fed in all milk protein or soy and milk protein milk replacers (MR). We have observed that gains were improved when Apex was fed via the starter. Additionally, we have observed that high starch (60% corn) starters were used more efficiently by calves than low starch (approximately half of the corn replaced with various of fibrous feeds) starters. Our objective in this trial was to evaluate the addition of .05% Apex 3030 (BFI Innovations) to a high starch (61% corn, 21% soybean meal, 5% distillers grains) and low starch (62% soy hulls, 14% soybean meal, 7% corn, 5% distillers gains) starter (18% CP, .0025% decoquinat, as-fed) when the calves were fed 454 g daily of a 20% all milk protein, 20% fat, .005% decoquinat MR. The trial used 48 calves (initially 41 kg BW at approximately 3 days of age) that were weaned at 42 days. Data were analyzed as a completely randomized block design with factors of starch level, Apex inclusion, and the interaction of starch X Apex. Calves fed the high starch diets grew 11% faster ($P < .09$) and were more ($P < .06$) efficient between 43-56 days than calves fed low starch diets. Calves fed the high starch diets grew 6% faster ($P < .09$) and were 3.6% more efficient ($P < .06$) between 0-56 days than calves fed low starch diets. Calves fed starters with Apex grew 14% faster ($P < .08$) between 43-56 days and 12% faster ($P < .07$) from 0-56 days than calves not fed Apex. Calves fed starters with Apex tended ($P < .14$) to consume more starter from 0-42 days, consumed 10% more ($P < .08$) starter from 43-56 days, and consumed 17% more ($P < .09$) starter from 0-56 days than calves not fed Apex. In summary, calves fed the high starch starter gained 1.2 kg more and were 3.6% more efficient from 0-56 days than calves fed the low starch starter. Calves fed Apex gained 2.4 kg more and consumed 5.3 kg more starter from 0-56 days than calves not receiving Apex.

Key Words: Calves, Starch, Botanicals

691 Effect of feeding neonatal calves selenium yeast or sodium selenite and supplementing specific fatty acids. M. Hill*, J. Aldrich, and R. Schlotterbeck, Akey, Lewisburg, OH.

The objectives were to compare feeding selenium (Se; .3 ppm Se in diets) from either 100% sodium selenite or 100% Se yeast (Lallemand) in the milk replacer (MR) and starter. Additionally we evaluated supplementing a blend of medium chain, 18:2, and 18:3 fatty acids to the MR (FA). The treatments were 1) selenite and no FA, 2) Se yeast and no FA, 3) selenite plus FA, and 4) Se yeast plus FA. Calves were fed 454 g of a 20% all milk CP, 20% all animal fat, .005% decoquinat MR and free-choice 18% CP, 62% corn, 21% soybean meal, 5% distillers, .0025% decoquinat starter. Data were analyzed as a completely randomized design in a 2 by 2 factorial arrangement (Se source and FA) with their interaction. The trial used 48 calves (initially 37 kg at approximately 3 days of age) that were weaned at 42 days. There were no significant ($P > .1$) effects for Se source. Calves supplemented with FA gained 9% faster ($P < .07$) from 0-42 and 0-56 days than non-supplemented calves. Calves supplemented with FA had greater ($P < .01$) starter intakes from 0-42 (28%) and 0-56 (17%) days than non-supplemented calves. Calves supplemented with FA had greater ($P < .07$) hip width changes from 0-42 (8%) and 0-56 (7%) days than non-supplemented calves. Other measurements were not ($P > .1$) significant. Source of Se had no effect on gain, starter intake, or other gross measures in calves up to 56 days. Blood or tissue analysis for Se would have been useful to determine if there were differences in Se status because of Se source. Improvements in gain and starter intake from supplementing specific amounts of medium, 18:2, and 18:3 FA are consistent with five previous trials where the average improvement ($P < .05$) in daily gain from 0-42 days has been 13%.

Key Words: Calves, Selenium Yeast, Fatty Acids

692 Performance and plasma amino acid concentrations of calves on an enhanced-growth feeding program. M. Terré¹, A. Bach^{1,2}, and M. Devant¹, ¹IRTA-Unitat de Remugants, Barcelona, Spain, ²ICREA, Barcelona, Spain.

Thirty-six Holstein and eight crossbred female calves were used in a 2x2 factorial arrangement of treatments to study the effects of level of milk replacer (MR), and addition of a rheological sepiolite for liquid feeding (RSLF) on performance, scour scores, and plasma amino acid (AA) concentrations. The treatments were high MR (HM) or low MR (LM), each of them supplemented with (WS) or without (NS) RSLF. The LM calves were fed 4 l/d of MR at 12.5% DM throughout the suckling period. The HM calves were offered MR at 18% DM: 4 l/d from 1-6 d, 6 l/d from 7-13 d, 8 l/d from 14-33 d, and 4 l/d from 34 d to weaning day at 45 d of study. Calf starter and water were offered ad libitum until the end of the study (94 d). Calves fed HM were heavier ($P < 0.05$) than LM calves at weaning (69.5 vs 59.0 kg, respectively) and at the end of the study (111.6 vs 102.7 kg, respectively). Starter intake was greater ($P < 0.001$) for LM than for HM calves until 1 wk after weaning (476 vs 221 g/d, respectively) and similar afterwards. Before day 34 ADG was greater ($P < 0.001$) for HM calves than for LM (881 and 427 g/d, respectively), but it was lower ($P < 0.001$) from 34 to 52 d of study (315 vs 707 g/d, respectively). Scour scores were greater ($P < 0.05$) in HM calves, but HMWS improved ($P < 0.01$) fecal scores during the highest MR consumption (8 l/d). The positive slope of the regression line that described ADG vs plasma AA concentrations indicated that plasma AA were not limiting growth in HM calves during high MR consumption weeks. However, when MR was reduced to 4 l/d in HM calves, starter intake was insufficient to maintain former ADG. Plasma Lys concentration of LM calves decreased linearly ($R^2 = 0.16$; $P < 0.05$) as ADG increased during the suckling period, suggesting that Lys could have limited growth. In conclusion, LM calves growth could be limited by Lys supply, whereas the HM treatment seemed to supply sufficient AA to sustain growth while high amounts of MR were fed; but it may limit calves performance due to low starter intake around weaning.

Key Words: Amino Acid, Milk Replacer, Sepiolite