290 Broiler response to equicaloric high oil corn and normal corn diets with added oil. N. J. Daghir1, M. T. Faran1, and G. W. Barbour2, 1American University of Beirut, 2Agriculture Research Institute.

Broiler response to equicaloric diets based on the cultivar #37497 high oil (6.49% oil, 9.14% CP, and 90% DM) and normal dent Pegaso (3.71% oil, 9.61% CP, and 88% DM) corn hybrids was tested during a 42 day production trial. Three starter and three finisher experimental diets were fed from 5-21 days and from 22-42 days, respectively. Weight gain and feed conversion at three weeks of age were significantly better with the normal corn supplemented with corn oil (NC+O) than the control (NC) or high oil corn (HOC) diets. At six weeks of age, only the feed conversion was significantly better with the NC+O than the NC treatment. At forty-two days, the birds were sacrificed and ready-to-cook (RTC) carcass, abdominal fat pad, pectoral major, thigh, and drumstick weights were recorded. Carcasses were also analyzed for protein, fat, and moisture content. Carcass fat and abdominal fat pad (% RTC) in birds receiving the NC+O were significantly higher than those of the control, but not different from those of the HOC treatment. There were no significant differences among the treatments for the other criteria measured. The improved feed conversion of birds on NC+O could be attributed to a better availability and utilization of the supplemental oil in comparison with the endogenous oil of the HOC.

Key Words: High oil corn, Broiler, Performance, Carcass composition

291 Quality control parameters for commercial full-fat soybeans (FFSB) processed by two different methods, and fed to broilers. N. Ruiz1, F. Belalcazar2, and C. J. Diaz3, 1ContiGroup Companies, Inc., Gainesville, GA, 2Nutritionalis Ltda., Santa Fe de Bogota, Colombia, 3National University of Colombia, Santa Fe de Bogota, Colombia.

FFSB samples obtained from 2 experiments conducted at the National University of Colombia were analyzed in vitro for urease activity (UA), Soy-Chek score (SCS), trypsin inhibitor activity (TI), and KOH protein solubility (KOHPS). They were also analyzed in vivo for amino acid digestibility (AAD) using the precision-fed cecotomized rooster assay at the University of Illinois. Samples from Exp. 1 corresponded to 6 temperature treatments (TRT) in a commercial extruder (Anderson Expander-Extruder-Cooker, Anderson Int’l Corp., Cleveland, OH, 44105); raw, 118, 120, 122, 126, and 140C. Samples from Exp. 2 corresponded to 6 temperature TRT along with different retention times in a commercial toaster (Thermal Processor for FFSB and Cereals, M. Tovar & A. Watemberg, Barranquilla, Col;): raw, 113,120, 130, 135, and 150C, and 0, 3.0, 4.5, 6.5, 7.0, and 9.5 min., respectively. In vitro results were compared to the already published performance data. TI & UA were significantly (P<0.05) correlated to body weight (BWT) in Exp. 1. TI, UA, and SCS were significantly (P<0.05) correlated to BWT & FCR in Exp. 2. There was no significant correlation in any Exp. between KOHPS and performance data. The analysis of the samples from the 2 Exps. allowed to conclude that the QC parameters applicable to FFSB are considerably different than for soybean meal. Less than 18,000 TI units/g, or less than 0.10 pH units of UA are adequate for optimum broiler chicken performance. Both, performance data and in vivo determined AAD failed to demonstrate that FFSB were over-processed in any of the experiments even though solubility values dropped as temperature TRT increased.

Key Words: Full-fat soybeans, Trypsin inhibitors, Urease activity, KOH protein solubility, Digestible lysine


This study was carried out to evaluate the use of pearl millet or corn based rations supplemented with different levels of soybean oil on the egg quality parameters of laying hens. In a 12-week feeding trial (37-49 week of age) divided in three periods of 28 days, 256 Isa Babbcock hens were allotted in a randomized block design. The eight experimental diets were: T1=corn + 0 % oil, T2=pearl millet + 0 % oil, T3=corn + 2.5 % oil, T4=pearl millet + 3.3 % oil, T5=cor + 3.5 % oil, T6=pearl millet + 4.3 % oil, T7=corn + 4.5 % oil and T8=pearl millet + 5.3 % oil. The percentage of yolk (in the whole egg) was influenced by the different diets in period 3, pearl millet + 3.5 % oil had a higher proportion of yolk than corn + 0 % oil. In period 3, corn + 0 % oil diet had a higher percentage of egg shell than corn + 4.5 % oil diet, and it was observed that corn + 0 % oil and corn + 3.5 % oil diets had thicker shells than corn + 4.5 % and pearl millet + 5.3 % oil diets. In period 1 the specific gravity of eggs from pearl millet + 3.3 % oil treatment had higher values than pearl millet + 5.3 % oil diet. And in period 2 corn + 0 % oil diet had better specific gravity values than pearl millet + 3.3 % and pearl millet + 4.3 % oil diets. No significant differences (p<0.05) were detected for egg and albumen weight and percentage of albumen (in the whole egg) among the different treatments. The results reported here indicates that the influences of diets in egg quality parameters (percentage of yolk) are more visible in older hens (47-49 wk) than in young hens (37-46 wk) and supplementation of diets with high levels of soybean oil seems to decrease the egg shell quality.

Key Words: Pearl millet, Soybean oil, Layers, Egg quality, Yolk

293 The impact of replacing dietary fat with lecithin on broiler chicken performance. W. R. Cox1, S. J. Ritchie2, M. Sifri3, B. Bennett4, and D.D. Kitts5, 1Animal Health Research Services, B.C. Canada, 2S. J. Ritchie Research Farms, B.C. Canada, 3ADM Animal Health and Nutrition, Quincy, IL USA, 4ADM Lecithin Division, Decatur, IL USA, 5University of British Columbia, Canada.

Soybean lecithin was evaluated for its potential use as a dietary fat replacement (2.5 - 3.5%) in straight-run broiler chickens by measuring body weight gain (BWG), total feed intake (FI), and feed conversion ratio (FCR) . The diets were formulated to replace the added fat with 0%, 25%, 50%, and 100% lecithin, respectively. The diets were fed to broiler chickens throughout a 39-day grow-out in a replicated floor-pen system. Treatments were assigned in a randomized complete block design. Body weights at 21 days of age were 0.739, 0.752, 0.751, and 0.757 Kg , and final weights at 39 days of age were 1.99, 2.01, 1.99, and 2.02 Kg for 0%, 25%, 50%, and 100% lecithin, respectively. The body weight differences were not statistically significant, but a trend (P=0.08) toward higher weights with added lecithin were seen. Feed consumption, in birds fed diets with added lecithin was significantly reduced (P<0.05), resulting in significant (P≤0.05) improvements in feed conversion ratio (FCR) at 21 and 39 days of age. Feed conversion ratios were 1.487, 1.447, 1.304, and 1.386 at 21 days of age for 0%, 25%, 50%, and 100% lecithin, respectively. At this age, the 50% and 100% lecithin groups had significantly (P≤0.05) better feed conversion ratios than the 0% lecithin group. The final feed conversion ratios were 1.921, 1.885, 1.836, and 1.838 for 0%, 25%, 50%, and 100% lecithin, respectively. All levels of dietary lecithin resulted in an improvement over the 0% lecithin group (P<0.05) of 1.87, 4.42 and 4.32%, respectively. There was no significant effect of any of the treatments on mortality.

Key Words: Lecithin, Fat, Broilers, Performance, Energy

Sunday, AM, NUTRITION B

294 Influence of feed quality in the brooding period of commercial turkeys and its subsequent effect on market performance. A. N. Crouch1, S. P. Lerener1, and D. Karunakaran2, 1British United Turkeys of America, 2Rocco Turkeys.

The purpose of this experiment was to quantify the effect of feeding starter feeds of different quality to commercial turkey hens and the subsequent effect on performance and carcass yields. Day-old turkey hen pouls were placed in floor pens on fresh pine shavings and were divided into two treatment groups (Group A - birds fed from Feed Mill A and Group B - birds fed from Feed Mill B). Both mills produced feeds that were designed to be isonitrogenous and isocaloric: a 28% CP pre-starter for the first 21 days and a 26% CP starter from days 22 through 42. The primary difference between groups was the final quality of feed. Feed Mill A produced pre-starter and starter diets that consisted of 72.94% pellets/crumbles and 27.06% granules/fines, while Feed Mill B produced diets that consisted of 44.13% pellets/crumbles and 55.87% granules/fines.
At 42 days of age, birds of Group A were heavier (4.66 vs. 3.18 lb, P<0.05) with an improved feed conversion (1.43 vs. 1.72, P<0.05) compared to birds of Group B. All birds were then individually tagged and were moved to a typical turkey growout facility. Group A and B birds were raised together and were fed grower and finishing feeds from Feed Mill A. When marketed at 14 WOA, there was a difference in body weight by treatment group (17.88 vs. 14.72 lb, P<0.05, for Groups A and B, respectively). All surviving tagged birds were processed to determine their yield of bone-in-breast (% of chilled carcass) when compared to those of Group B (51.02% vs. 49.16%, P<0.05). In conclusion, along with proper husbandry techniques, the presence of good quality feed during the brooding period of a turkey poult is of critical importance. Good quality feed promotes consumption, enhances appetite, and supports rapid growth; benefits that substantially enhance performance to market age and final gross profit margin.

**Key Words:** Feed Quality, Turkeys, Body Weight, Feed Conversion, Carcass Yield

### 295 The Effect of Virginiamycin on Digestibility of Nutrients in Growing Turkeys. Andrew Walker1, Ian Givens2, and Timothy S. Cummings3, 1ADAS Land Research Centre - UK, 2ADAS F.E.N.S. - UK, 3Pfizer Animal Health - US.

A virginiamycin (VM) study was conducted at the ADAS Land Research Center in the UK to evaluate the effect of VM on digestibility of nutrients in growing turkeys. Sixteen BUT T8 male turkeys were fed a diet containing 20 ppm VM or a diet without the additive (eight animals/treatment) in order to measure the apparent metabolisable energy (AME) content of the diet and apparent digestibility of amino acids, from 7 to 24 weeks of age. After a period of six weeks in floorpens, the birds were transferred into individual metabolic cages for excreta collection. The feeding program was according to normal practice, with feed change occurring every four weeks. Excreta were collected for five consecutive days, from day 21 to 25, of each period. Daily excreta output was recorded, bulked, and analysed. There was no impact of VM on either Dry Matter or Organic Matter digestibility, but there was an overall improvement in aminoacids digestibility, even if not always significant. The effect of VM on amino acid digestibility was only significant in period 1, for cysteine, aspartate, methionine, serine, proline, alanine, valine, and isoleucine. Also, nitrogen digestibility was consistently numerically higher for VM, but only significantly higher in period 1. AME concentration of the diet was consistently numerically higher for VM fed birds. Water consumption was significantly reduced by VM, but no impacts were registered on feed intake, weight gain, or feed efficiency. Apparently the birds did not suffer by being housed in metabolic cages, as live weights were constantly about 10% above the standard growth curve, as supplied by BUT.

**Key Words:** Virginiamycin, Turkeys, Metabolic cages, Amino acid digestibility, Apparent metabolisable energy


An experiment was conducted to estimate the calcium (Ca) and nonphy- tate phosphorus (npP) levels needed for toms in the starter (ST) (3-9 wk of age) and the grower/finisher (G/F) (9-15/15-17 wk of age) periods to support growth performance, bone breaking strength and carcass parameters. After 3 wk of group brooding, pouls (B.U.T.) were divided into treatment (trt) pens and fed pellets containing Ca and npP at approxi- mately NRC requirements (3 wk interval basis) or at typical industry (IND) levels (breeder recommendations). At 9 wk of age, birds from each ST trt were fed either a low npP (75% of NRC requirement) diet, the NRC recommended level, or an IND level of npP (Ca:npP=2:1 for all trts) until marketed at 17 wk of age. The birds were weighed every 3 wks and at 17 wk of age. Feed intake was recorded to calculate feed efficiency. There were 15 pens of 31 birds/pen for each trt in the ST period and 5 pens for each of the 6 trt combinations during the G/F period. Three pens/pen were selected at 15 and 17 wk for bone and component yield measurements. All birds from 3 pens/trt were used for a walking score (range 1-5, 5 best) during the 17th wk. There was no difference in body weight or feed intake in the ST period. Body weight was decreased when the NRC ST-low npP G/F trt was fed relative to the NRC ST-IND G/F trt (p<0.005) or the IND ST-NRC G/F trt (p=0.033) at 17 wk. Femur shear force strength was higher (p<0.013) for toms fed the NRC ST-IND G/F and IND ST-NRC G/F trts compared to the other four trts at 15 wk. Walking scores were lower (p<0.091) for birds fed the NRC ST-low npP G/F and the NRC ST-NRC G/F trts compared to the IND ST-NRC G/F fed birds. There was no difference in carcass yield or breast button/blister incidence between trts. Comparing the two best trts based upon the parameters measured, inorganic P intake was decreased by about 20% and feed cost was decreased by approximately 4 cents per bird when toms were fed the IND ST-NRC G/F combination versus the NRC ST-IND G/F combination.

**Key Words:** Bone strength, Calcium, Phosphorus, Turkey, Yield

### 297 The role of dietary calcium and available phosphorus in the aetiology of tibial dyschondroplasia in growing turkeys. P.M. Hocking1, S. Wilson1, L. Dick1, L.N. Dunn1, G.W. Robertson1, and C. Nexi.y2, 1Roslin Institute, Roslin, Midlothian, UK, 2British United Turkeys Ltd, Tarvin, Chester, UK.

There is little information on skeletal responses to dietary calcium and phosphorus in growing turkeys. A significant prevalence of tibial dyschondroplasia (TD) has recently been noted in field cases of lameness and an experiment was conducted to determine the optimum dietary cal- cium and phosphorus for skeletal health in growing turkeys. BUT Big 6 male turkeys were fed 16 wheat-soya diets containing 4 concentrations of calcium (6, 10, 14 and 18g/kg) and available phosphorus (3, 5, 7, 8g/kg) in a 4 x 4 factorial experiment. Dietary energy and crude protein content was decreased in line with commercial recommendations. There were 3 replicates (pens) of each treatment and the skeletal health, morphology and mineral status of 4 turkeys from each pen was assessed 10 and 13 weeks of age. Less than 6% of the turkeys had an abnormal gait at 13 weeks of age. The prevalence of tibial dyschondroplasia increased from 50% at 10 and 71% at 13 weeks. The lesion was localised in the caudal aspect of the proximal tibiae. Dietary calcium and available phosphorus did not affect the prevalence of the lesion except in turkeys on the diet containing 6g calcium/kg where body weight and the incidence of tibial dyschondroplasia were low. Increasing dietary calcium increased tibial radio-density. Radiodensities increased to 10 weeks of age and were sig- nificantly lower at 13 weeks. A rapid increase in plasma creatine kinase activity also occurs at this time and is associated with disturbances in intracellular calcium homeostasis. We hypothesise that there may be a common mechanism underlying both phenomenon. Dietary calcium concentra- tion should be considerably higher than NRC recommendations for TD and decreasing to 8.5g/kg from 1 to 12 weeks. The results suggest that for rapidly growing modern turkeys dietary calcium concentrations for optimum skeletal condition could be as high as 18g/kg for 4 to 13 weeks of age.

**Key Words:** Turkeys, Tibial dyschondroplasia, Calcium, Phosphorus, Bone density

### 298 Defatting poultry by-product meal and meat meal improves pulverizing efficiency and particle size. Z. J. Cheng1, K. C. Behnke1, and W. G. Dominy2, 1Kansas State Uni- versity, Manhattan, Kansas, USA, 2The Oceanic Institute, Waimanalo, Hawaii, USA.

It is often necessary to fine-grind high-fat animal protein meals prior to inclusion in specialty feeds. The effect of defatting two types of poultry by-product meal (regular meal, PBM, and low ash petfood grade meal, PBMPG) and two types of feather meal (hydrolyzed, FTM, and a high digestibility meal, FTMHD) on pulverizing efficiency, particle size and moisture loss was investigated. Grinding PBM through a Jacobson pulverizer resulted in a significant reduction in particle size (415 vs. 223 µm, p = 0.028) while defatting without grinding resulted in a similar apparent reduction in particle size (415 vs. 295 µm, p = 0.046). Defatting and grinding PBM resulted in even greater particle size change (295 vs. 119 µm, p<0.013). Defatting PBM reduced grinding energy consump- tion dramatically (98 vs. 68 Kwh/MT, p<0.05). Neither pulverizing (371 vs.336 µm, p = 0.295) nor defatting (371 vs. 245 µm, p = 0.136) significantly reduced particle size for PBMPG. Defatting had no effect on grinding energy (80.5 vs. 79.4 Kwh/MT, p = 0.864) for PBMPG. Pulverizing also significantly reduced particle size for both types of FTMs (540 vs. 261 µm for FTM, and 492 vs. 154 µm for FTMHD, p<0.001). Furthermore, pulverizing reduced moisture contents of all animal protein meals.
299 Evaluation of Canaryseed as a Feed Ingredient for Broiler Chickens. J.I. Ram†, H.L. Cassen, P.J. HucI, and E.S.M Abdel-Aal, University of Saskatchewan, Saskatchewan, SK, Canada.

The nutritional value and potential toxicity of two canaryseed cultivars (CDC Maria and Keet) vs. a hard red spring wheat (CDC Teal) was determined by nutrient retention (AMEt, ileal protein and starch digestibilities, and fecal fat digestibility) and performance experiments in broiler chickens. On a dry matter basis, the AMEt of CDC Teal wheat, dehulled and hulled (hulls included) CDC Maria, and hulled Keet was determined to be 2.303, 3867, 3205, and 3292 kcal/kg, respectively. CDC Teal wheat, dehulled and hulled CDC Maria, and hulled Keet had similar protein digestibilities of 86.1, 86.4, 88.3, and 86.2%, respectively. The dehulled CDC Maria was significantly (P<0.05) more digestible than CDC Teal wheat in terms of starch (97.9 vs. 86.0%) and fat (74.4 vs 45.3%). The hulled CDC Maria and hulled Keet had significantly (P<0.05) higher starch (100% and 100%, respectively) and fat (87.7 and 90.8%, respectively) digestibilities compared to the dehulled CDC Maria. Broilers fed the three canaryseed diets (at a 50% concentration) in a 5-week performance study fared as well as birds on the CDC Teal wheat diet with similar gain to feed ratios ranging from 0.609 to 0.635. Total weight gain was similar between the hulled canaryseed diets and CDC Teal wheat; weight gain for birds on dehulled CDC Maria was similar to those on wheat, but was slightly lower than those on the hulled canaryseed diets (P<0.05). No significant differences between diets were detected in broiler serum lactate dehydrogenase and creatine kinase levels which were measured to determine if possible toxic constituents from the canaryseeds were producing cellular injury. There were also no significant differences in potential target organ weights (e.g., bursa, heart, kidney, liver, pancreas, spleen) when expressed as a percentage of body weight. The incidence of gizzard ulcers was similar for the CDC Teal wheat, dehulled and hulled CDC Maria diets. Hydropericardium severity in the hulled canaryseed diets was significantly higher vs. dehulled CDC Maria (P<0.05), but was similar to the wheat diet; there was also no difference between the wheat and dehulled CDC Maria diets. In summary, the nutritional value of canaryseed in broiler chickens appears to be equal or better than that of wheat.

Key Words: Canaryseed, Toxicity, Apparent metabolizable energy, Broiler chickens


Samples of soybean meal, 44% (SBM) and fullfat soybean (FFSB) were collected in Spain in 1997 and in 1998 to evaluate quality and variability between years. A total of 60 samples of SBM, and 10 samples of FFSB in 1997, and of 44 SBM and 55 FFSB in 1998 were collected at random from Spanish feed mills. Most of the samples collected in 1998, except for nitrogen soluble in KOH (NsoKOH) that was lower than recommended, fulfilled the standards of quality set by the Spanish Feed Industry. Mean values for SBM and FFSB were: 12.4 & #61617;617;9.82, and 8.82 & #61617;617;1.1% for moisture (M); 45.1 & #61617;617;1.2, and 38.5 & #61617;61617;1.6% for crude protein (CP); 72.1 & #61617;617;4.6, and 77.8 & #61617;61617;6.1% for NsoKOH; 0.06 & #61617;617;0.79, and 0.07 & #61617;61617;0.06 for urease test (UT); 4.3 & #61617;617;4.1, and 2.5 & #61617;61617;3.0 for biogenic amines index (BAI), respectively. For FFSB, the mean values for ether extract after acid hydrolysis and for peroxide index were 20.8 & #61617;61617;9.9%, and 0, respectively. Microbial counts were low but growth was affected (P<0.05) by the crusher. In conclusion, the chemical and microbiological quality of the SBM and FFSB marketed in Spain in this period was acceptable, but Salmonella presence, and variability between year should be controlled. Year of crop and crusher might affect nutritional quality of soybean products for broilers.

Key Words: Soybean, Quality, Soybean origin, Crusher, Broiler

301 The effects of mill type and particle size on the nutritional value of food-grade sorghum in broiler chicks. D.W. Dean†, J.D. Hancock, R.H. Hines, K.C. Behnke, and L.J. McKinnie, Kansas State University, Manhattan.

A total of 500 Cobb x Cobb broiler chicks (1 d old) were used in a 14-d growth assay to determine the effects of mill type and particle size on the nutritional value of food-grade sorghum. The chicks were housed (five chicks/cage and five cages/treatment) in brooder batteries and allowed ad libitum access to feed and water. Treatments were corn, bronze-pericarp sorghum (Pioneer 8500), and three food-grade (white pericarp/tan plant) sorghums (NC+ 7W97, Cargill 888Y, and Jowar 1) ground through a hammermill and rollermill to coarse and fine particle sizes (i.e., a 5 x 2 x 2 factorial arrangement of treatments). The sorghums required less energy to grind with greater production rate than corn (P < 0.001). There were no differences in energy required to grind (P > .3) or production rate (P > .8) for the bronze-sorghum versus the food-grade sorghums. However, among the food-grade sorghums, the NC+ hybrid (heterowaxy starch type) required less net energy to grind (P < .001) with greater production rate (P < .001) than Jowar 1 and Cargill 888Y (i.e., normal starch types). There were no differences in rate or efficiency of gain among chicks fed corn versus the sorghums (P > .06), bronze versus food-grade sorghums (P > .6), and heterowaxy versus normal starch type sorghums (P > .1). In conclusion, growth performance of chicks fed sorghum was not different than that of chicks fed corn and growth performance was not improved by feeding chicks food-grade versus bronze pericarp sorghum. But, production rate can be increased while grinding energy can be decreased when processing sorghum versus corn and NC+ 7W97 ground more efficiently than did the other food-grade sorghums.

Key Words: Food-grade, Sorghum, Grinding, Chick

302 Effects of sorghum ergot in diets for broiler chicks. D.W. Dean†, R.H. Hines†, J.D. Hancock, J.K. Porter†, and C.L. Jones, Kansas State University, Manhattan, R.B. Russell Agricultural Research Center, USDA/ARS, Athens.

A total of 75 Cobb x Cobb broiler chicks (1 d old) were used in a 14-d growth assay to determine the effects of sorghum ergot on growth performance. The chicks were housed (five chicks/cage and five cages/treatment) in brooder batteries and allowed ad libitum access to feed and water. Treatments were: 1) normal sorghum; 2) 50% normal 50% ergot infected sorghum (1.3 ppm dihydroergosine in the diet); and 3) ergot infected sorghum (3.6 ppm dihydroergosine in the diet). Average daily gain and ADFI decreased (linear effects, P < .05) as contaminated grain in the diets was increased from none to 100%. Gain/feed was not affected (P > .6) by ergot contamination of the sorghum. In conclusion, our results suggest that ergot infected grain sorghum (resulting in dietary concentrations of dihydroergosine as low as 1.3 ppm) will decrease feed intake and growth in broiler chicks.

| Item                  | Normal | 50% normal | Ergot infected sorghum | 50% ergot | sorghum | SE | P <  
|-----------------------|--------|------------|------------------------|-----------|---------|----|------  
| ADG, g                | 30.7   | 28.9       | 28.4                   | .6         | .03     |    |        
| ADFI, g               | 33.3   | 31.8       | 31.2                   | .6         | .05     |    |        
| Gain/feed, g/g        | 924    | 913        | 915                    | .015       | .70     |    |        

Key Words: Sorghum, Ergot, Chick

303 Nutritional evaluation of biosolids harvested from poultry processing plant effluent. D. Maurice†, D. Wicker†, B. Lewis†, J. E. Toler†, and S. F. Lightsey†, Clemson University, Clemson, SC 29634-0361, USA, Fieldale Farms Corporation, Baldwin, GA 30511, USA.

A treatment of food processing plant effluent generates waste like dissolved air flotation sludge that poses an environmental challenge. Fieldale Farms Corporation has applied an innovative method to harvest biosolids from products in this experiment, especially for FTM. There was an average moisture reduction of 2.4% for both PBMs and FTM’s used in this experiment.

Key Words: poultry by-product meal, feather meal, pulverizer, defatting, particle size
304 Nutritional value of low fiber cultivars of hulless barley for broiler chickens. H.L. Claassen¹, Zhi Yuan Niu¹, B.G. Rossnagle¹, and T.A. Scott², ¹University of Saskatchewan, Saskatoon, SK, Canada, ²Pacific Agri-Food Research Centre, Agassiz, BC, Canada.

Hulless barley has a higher AME and protein content than hulled barley because of the diluting effect of the fibrous hull. Within hulless barley cultivars, low fiber content has been suggested to further enhance nutritional value for broiler chickens. The objective of this research was to confirm the AME and feeding superiority of low fiber hulless barley cultivars for broiler chickens. Eight cultivars, selected on the basis of fiber content, were each grown in three locations in Year 1 and one location in Year 2. All samples were analyzed for nutrient composition as well as for soluble and total dietary fiber, and extract viscosity. Year 1 samples were used to study the effect of genotype and environment on AME with and without a microbial enzyme source. Year 2 samples were similarly characterized for AME and also compared (with dietary enzyme) in a litter floor experiment using broilers raised to 35 d. Cultivar and growing condition affected both nutritional and chemical characteristics in Year 1 with the former effect larger. AME of all cultivars was increased by the use of a dietary enzyme. However, even with enzyme use, cultivar differences in AME approached 10%. Significant cultivar variation was also found for AME and broiler performance in Year 2. In Year 1, correlation analysis revealed negative relationships between estimates of total and soluble fiber fractions, and AME, regardless of enzyme addition. With enzyme addition the correlations were similar for soluble and total fiber estimates indicating that the dilution effect of fiber was at least partially responsible for the negative correlation. Similar trends were shown in Year 2. Extract viscosity was negatively correlated with AME (with enzyme) in both years and also with gain to feed ratio (mortality corrected; -0.75) in the 35d broiler trial. The results confirm the superior feeding value of low fiber hulless barley cultivars and support the use of extract viscosity in predicting their nutritional value.

Key Words: Dietary fiber, Barley, Cultivar, Environment, Enzyme

305 Effects of zinc or copper deficiency and pair-feeding on hepatic leptin mRNA expression. Chris Ashwell*, Mark Richards¹, John McMurtry⁴, RL Walzem*, and reducing feed intake without feed restriction in management schemes with copper-deficient diets may be methods for stimulating leptin production relative to that of controls. These observations support the hypothesis that zinc-deficiency elicits in chickens is a reduction in feed intake. This study was performed to determine the effects of zinc or copper-deficiency on leptin expression levels in chickens. Birds were fed formulated diets deficient in either zinc or copper, or a control diet of equivalent energy. A fourth group was pair-fed to the reduced level of feed intake presented by the zinc-deficient group. After 28 days of treatment the birds were sacrificed and both blood plasma and hepatic tissues were collected. Using a QRT-PCR based assay, the level of hepatic leptin expression was measured. The leptin expression levels were significantly increased in both the zinc and copper-deficient dietary treatments relative to controls. Upon comparison of those birds pair-fed to the level of feed intake presented by the zinc-deficient group, a reduction in leptin expression levels was observed relative to that of controls. These observations support the hypothesis that reduced feed intake resulting from zinc-deficiency is brought about by leptin action. A correlation was observed between leptin expression levels and plasma insulin, plasma IGF-II, as well as body weight. Zinc or copper-deficient diets may be methods for stimulating leptin production and reducing feed intake without feed restriction in management schemes where it is presently required.

Key Words: Feed intake, Nutrition, Growth, Leptin, Zinc Deficiency

306 Plasma lipoprotein profiles during a complete egg laying cycle. RL Walzem¹, ², G Brower², and RJ Hansen², ¹Poultry Science Department, Texas A&M University, ²VM:Molecular Biosciences, University of California at Davis.

Yolk consists mainly of small diameter (<30nm) lipase resistant apolipoproteinD-containing very low density lipoprotein termed VLDLy. VLDLy are assembled in the liver, travel to the ovary and are deposited into yolk follicles by receptor-mediated endocytosis. Increased VLDL diameter and appearance of low density lipoprotein (LDL), an end product of non-VLDL lipolysis, accompanies failed egg production in overfed hens. Hypothesis: total egg production depends upon the hens' capacity to initiate and sustain VLDL assembly. To rigorously test this notion we monitored plasma VLDL and VLDLy size distributions by dynamic laser light scattering, and plasma VLDL and LDL cholesterol distribution by enzymatic assay following separation by size exclusion chromatography, of 47 Hyline W36 SCWL hens from 17 - 116 wks of age. Flock production (% lay/hen-day%) was 77/46, 99/77, 88/60 and 68/39 at 20, 29-67, 86 and 116 wks of age, respectively. At the wk29 peak, 100% of hens laid eggs and hen-day production was 90.4%. Flock median VLDL diameter decreased from 67.9 ± 5.1nm at 17wks to 29.3 ± 1.1nm at 20wks, indicating initiation of VLDL assembly. From 29 to 67wks flock median VLDL diameter was nearly constant, averaging 29.4 ± 0.3, 30.9 ± 0.4, and 29.9 ± 0.4nm at 29, 56 and 67 wks, respectively. Flock median VLDL diameter increased to 34.1 ± 0.5nm at 86 wks, and 40.6 ± 2.4nm at 116 wks. Importantly, hens without demonstrable LDL had increased egg production. At 29wks hen-day% was 4.6% greater (86.7 ± 82.9%), at 67wks was 6% (67.3 ± 63.3%, p < 0.05), at 86wks was 28% (65.2 ± 50.9%, p<0.05) and by 116wks was 56% (49.6 ± 7.5%, p<0.05) greater in LDL-free hens. The presence of LDL in plasma had no effect on yolk weight. Hen productivity and reproductive senescence is associated with appearance of LDL, an indirect indicator of reduced VLDL assembly. Ability to initiate and sustain VLDL assembly is an important reproductive trait supported by CALV-AH-123.