

The objective of this experiment was to determine differences between 10 breed crosses with regards to eggshell properties and embryo metabolism. Eggs from the flocks (51 to 54 weeks of age) were incubated in a single machine, moisture loss measurements were recorded. Additionally, embryo weight with out yolk (EMB) and residual yolk weight (YLK) were determined at 15, 18 and 21 d.

Average daily moisture loss (% of initial egg weight) demonstrated significant differences and ranged from 0.665% to 0.561%. Significant differences in EMB and YLK existed at 15 and 18 d but not at 21 d. Correlation between EMB and YLK at 21 d ranged from $r = -0.99$ to -0.54 . This information demonstrate differences between breed crosses for the functional properties of the eggshells. These differences may also influence metabolism and embryo growth.

Key Words: Egg shell properties, Moisture loss, Embryo growth

34 Profiling egg storage: The effects on egg weight loss, egg characteristics, and hatchability. G. M. Fasenko* and F. E. Robinson, *University of Alberta*.

Broiler breeder eggs (n=4032) were collected from a commercial flock at peak production. Eggs were divided into preincubation storage treatments of 2, 4, 6, 8, 10, 12, 14, and 16 d. All eggs were identified and weighed at the time of collection, and after storage, and at transfer. After storage was complete, a sub-sample of eggs (n=72) from each storage treatment group were analyzed for egg quality characteristics. Remaining eggs were incubated and any unhatched eggs remaining after 21 d were broken open to assess fertility, hatchability and embryo mortality. Egg weight loss was significantly affected by storage length (P=.0001). Egg weight loss was .61g greater in 16 d versus 2 d stored eggs. Haugh units were also significantly lower in 16 d (5.2 ± 1.1) versus 4 d stored eggs (6.2 ± 1.1). Hatch of fertile eggs significantly decreased as length of storage increased. The hatch of fertile eggs for 2 d (82.5%) was significantly higher than both 8 d stored (70.5%) and 16 d stored eggs (68.0%). The results of this experiment provide a profile of hatchability which can be used to estimate the hatchability of stored eggs.

Key Words: Broiler breeders, Egg weight loss, Egg storage, Hatchability, Egg quality characteristics

Monday, AM, John Q. Hammons Hall II, NUTRITION A

36 Utilization of high levels by ruminant by-product meal in diets for male turkeys when using digestible formulation. J. M. Brown*, J. D. Firman, K. A. Baker, E. C. Blair, and D. T. Moore, *University of Missouri-Columbia*.

Recent legislation has banned the use of ruminant by-products in ruminant rations. As a result, turkey producers will likely have more access to these by-products. Experiments were conducted to determine the effects of feeding high levels of ruminant by-product meal to male turkeys to 18 weeks of age. Floor pens were used to house 1500 Nicholas toms, which were randomly assigned to 6 treatments with 5 replicate pens. Treatments consisted of diets containing the by-product meal as 0, 10, 20, 30, 40 and 50% replacement of soybean meal in the ration. Performance was judged on the basis of weight gain (BW), feed:gain (F:G), mortality, and carcass yield. At three weeks of age, the 10, 30, 40 and 50% treatments had increased BW and decreased F:G compared to the 0% (P<.05). During this period, the 40 and 50% treatment groups exhibited lower F:G than the 0% (P<.05). Eighteen week data will be reported as well. The data indicates that ruminant by-product meal can replace up to 40% of the protein source in rations for male turkeys without compromising performance. An important consideration when using high levels of ruminant by-product meal is that of Ca and P levels. Since these minerals are present in high concentration in the by-products, NRC requirements must be exceeded when using increased amounts of the ruminant by-product meal in turkey rations.

Key Words: Turkey, By-product, Performance, Digestible formulation

35 Prestorage incubation of broiler breeder eggs improves hatchability of eggs stored for 14 days. G. M. Fasenko*, F. E. Robinson, A. I. Whelan, K. M. Kremeniuk, and J. A. Walker, *University of Alberta*.

A total of 2800 broiler breeder eggs were collected from a commercial flock and divided into storage treatments of 4 or 14 d. Prior to egg storage, the eggs were further divided into prestorage incubation (PRSI) treatments of 0, 6, 12, or 18 hr. Embryos (n=30) from each of the storage x PRSI treatments were examined after storage to determine the stage of embryonic development. All eggs were weighed prior to and after storage, then incubated, and weighed again at transfer. After 21 d of incubation, all unhatched eggs were broken open to determine fertility, hatchability, and stage of embryonic death. Significance was measured at P<.05.

Prior to the 21 d of incubation, stage of embryonic development was not influenced by the duration of storage (P=.6710). As the number of hours of PRSI increased, embryonic development advanced in both the 4 d (P=.00001) and 14 d (P=.00001) storage groups. Hatch of fertile was significantly lower in 14 d (60.9%) versus 4 d (91.3%) stored eggs. Eggs incubated prior to storage for 0 hr had a hatch of fertile of 89.7% in 4 d stored eggs, and a hatch of fertile of 72.2% in 14 d stored eggs. The PRSI treatment of 6 hr numerically improved hatch of fertile of 4 d stored eggs (93.7%), and significantly improved hatch of fertile in 14 d stored eggs (81.9%) when compared to PRSI 0 hr treatments. The PRSI treatment of 18 hours also numerically improved hatch of fertile in 4 day stored eggs (94.4%), but significantly decreased hatch of fertile in 14 day stored eggs (11.5%) when compared to the PRSI 0 hr treatments. These results not only show that prestorage incubation of 6 hr improves hatchability over no prestorage incubation, but that the two storage treatments respond differently to long hours of prestorage incubation.

Key Words: Broiler breeders, Embryo mortality, Hatchability, Prestorage incubation, Egg storage

37 The effect of ethoxyquin on the quality of ground poultry mortality preserved by lactic acid fermentation and phosphoric acid stabilization. T. F. Middleton*, L. C. Boyd, and P. R. Ferket, *North Carolina State University, Raleigh, NC*.

The nutritional value and shelf life of poultry by-products depend upon the protein quality and lipid oxidative stability. The protein quality of poultry mortality preserved by lactic acid fermentation and acidification with phosphoric acid has been documented, but no information has been reported on the effects of these preservative systems on lipid stability. The objective of this research was to determine the effect of an antioxidant, ethoxyquin, on lipids in poultry mortality silages. Ground poultry mortality, with and without the addition of 183 PPM ethoxyquin (wt./wt., as is basis), was stored for 14 days following stabilization by (1) lactic acid fermentation and (2) acidification with various levels of feed grade phosphoric acid. All treatments were monitored for various parameters reflective of silage quality, including pH, volatile nitrogen, oxidative stability, and levels of free fatty acids. The changes in pH and the content of volatile nitrogen compounds were not significantly affected by ethoxyquin addition (p = 0.246). However, the addition of ethoxyquin to the poultry silages significantly improved lipid quality as indicated by increases in the oxidative stability index (OSI) induction period (p < 0.001). Ethoxyquin addition had no effect (p = 0.144) on nutrient proximate analysis values. This experiment demonstrated that the addition of ethoxyquin to preservation systems for the storage of ground poultry mortality improves the lipid quality of the ground material without compromising protein quality or affecting nutrient parameters.

Key Words: Poultry Mortality, Ethoxyquin, Lactic Acid Fermentation, Phosphoric Acid, Oxidative Stability

38 Indicators of nutritional value of experimentally processed feather meals. J. S. Moritz* and J. D. Latshaw, *Department of Animal Sciences, The Ohio State University.*

This study was conducted to explain changes in feather meal (FM) protein quality due to different processing pressures and times. Feathers were collected from a commercial broiler plant and cleaned of all viscera, heads and feet. The feathers were then processed in an experimental batch cooker utilizing saturated steam for hydrolysis. A constant density trial was performed to evaluate various combinations of pressure (30-105psi) and time (106-4.5min) that produced meals of similar bulk density (28-32pcf). In addition, a constant time series (36 min) was completed to evaluate the effect of increasing pressure (30-75psi) on bulk density and nutritional value. Crude protein of the experimental meals averaged 91.2% and was not affected by processing treatments. In the constant time series, bulk density and 0.20% pepsin digestible protein (PDP) were related in a linear manner ($R^2 = 0.96$). True amino acid availabilities (TAAA) determined with force-fed White Leghorn cockerels demonstrated that the greatest effect of processing was observed with TA Cys ($p < .0001$), but other amino acids were also affected ($p < .05$). FM processed at the highest pressure (75psi) had the highest PDP (93.7%); however, this meal had the lowest TA Cys (1.48%) and highest lantionine. In contrast, FM processed at the lowest pressure in this series (30psi) had the lowest PDP (70.4%), highest TA Cys (4.00%) and lowest lantionine. These results suggest that a PDP above 70% indicates over-processed FM. In the constant density series, FM samples of similar bulk density generally had similar TA Cys and PDP; however, the combination of high pressure and short hydrolysis time appeared to produce FM samples of more nutritional value than FM samples produced using low pressure and long hydrolysis time.

Key Words: Feather meal, True available cystine, Pepsin digestible protein, Bulk density

39 The effects of standard oilseed extraction and processing on the nutritional value of canola meal for broiler chickens. R. W. Newkirk* and H. L. Classen, *University of Saskatchewan, Saskatoon, SK, Canada.*

Canola meal quality can be variable and characterized by a relatively low availability of essential amino acids such as lysine. The source of the variability and the cause of reduced amino acid availability are not known. The objective of this experiment was to determine whether any of the stages of standard oilseed processing adversely affect canola meal quality and contribute to meal variability. Three separate sets of samples were collected at monthly intervals from a commercial processing plant. The samples were collected following flaking, cooking, expelling, solvent extraction, toasting, and final meal production. Apparent ileal amino acid and protein availability, and fecal AME of the samples were determined using broiler chickens between 28 and 35 d of age. Prior to toasting, processing had little effect on meal quality, however toasting reduced ($P < 0.05$) crude protein digestibility (81% to 74%), lysine availability (87% to 79%) and the availability of most other amino acids. Lysine content was also reduced ($P < 0.05$) from 6.02 to 5.28 g/16g N by toasting. As expected, AME decreased ($P < 0.05$) as oil was extracted during processing. However, AME was also numerically reduced from 2321 to 2103 kcal/kg as a result of toasting. Meal quality was most adversely affected by toasting in the first set of samples collected, however all showed the same trends for meal quality. Since the effects of toasting were not consistent between sets of samples, it would appear that variability within toasting conditions contribute to the inconsistent nature of canola meal. In conclusion, canola meal toasting conditions reduced amino acid content and availability for broiler chickens, and affected the consistency of the meal.

Key Words: Amino acid, Availability, Lysine, AME, Toasting

40 Adverse effects of dietary lupine seeds in broiler chickens. B. I. Olkowski¹, A. A. Olkowski², and H. L. Classen*², ¹*Agricultural & Pedagogical University, Faculty of Agriculture, Siedlce, B. Prusa 14, Poland,* ²*Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon, SK, S7N 5B5, Canada.*

The development of low alkaloid cultivars of lupine has expanded the potential use of lupine seeds in poultry diets. Most of the past research efforts were focused on the evaluation of performance parameters, hence there is a shortage of information on more specific adverse effects. The aim of this study was to evaluate the potential adverse effects of seeds

from sweet varieties of *L. albus*, *L. luteus*, and *L. angustifolius* where soy bean meal (SBM) was completely replaced by lupine seed meal in practical corn based diets for broiler chickens. Test diets contained either 35% SBM (control), or raw (40%), raw autoclaved (40%), or dehulled (35%) lupine seeds, and were isocaloric (3230 kcal/kg AME) and isonitrogenous (23% crude protein). Each diet was offered ad-libitum to 16 (4 replications of 4 birds per replication) day-old male broiler chicks for 21 days. Adverse effects of dietary lupine were seen during the first week and persisted throughout the trial. Decreased food intake and growth rate were the main signs observed in all birds fed lupine diets. No other signs of toxicity were observed in birds fed *L. albus* or *L. luteus*, based diets. Mortality (4) and signs of poisoning occurred only in groups fed diets containing seeds of *L. angustifolius*. Typical clinical signs included leg weakness, lack of coordination, muscle paralysis, torticollis, and skeletal deformity. Dehulling or autoclaving did not have any impact. Post mortem examination did not reveal any gross changes associated with the dietary treatments, but the birds fed lupine based diets had 15 to 20% heavier gastrointestinal tracts. Liver microsomal cytochrome P-450 content was higher in lupine fed birds (means 0.40 to 0.52 pg/mg protein) in comparison to controls (mean 0.25 pg/mg protein). This indicates a systemic effect. Based on the present results it can be stated that the addition of high levels of sweet lupines to broiler diets may cause significant adverse effects.

Key Words: Broiler, Lupine, Toxicity, Feed intake, Cytochrome P-450

41 The effect of pre-germination of barley on its feeding value for broilers. T. A. Scott*¹ and K. Campbell², ¹*Agriculture & Agri-Food Canada, PO Box 1000, Agassiz, BC / Canada, V0M 1A0,* ²*Breathru Seeds Ltd, 55037 RR 214, Fort Saskatchewan, Alberta, T8A 3B9.*

Germination, sprouting and soaking of seeds is routinely used to improve the palatability and food value of the diet of man. A process (G.E.M.TM; Growth Enhancement Method) developed by Breakthru Seeds Ltd was applied to barley and evaluated using a broiler chick AME bioassay. The process relies on attaining a specific imbibition (water uptake over time) and then processing and drying of the material to produce a dry stable product. Pre-germination (PG+) is used to describe the G.E.M. process, as actual germination (defined as the point of radical emergence) was not achieved. The bioassay used 4 groups of 6 male broilers fed (from 4 to 17 d of age) each of four diets containing 80% control (PG-) or PG+ barley (with 20% high protein basal diet containing 1% "celite" as an acid insoluble ash marker) with or without enzymes. AME and broiler performance (feed intake (FI), body weight (BW) and feed conversion (F:G)) from 4 to 17 d were measured. Pre-germination of grain resulted in a significant increase FI and BW at 17 d as compared to the control diet with (E+) or without (E-) enzyme. Relative to the PG-E- diet there was a significant improvement due to enzyme for FI and BW (9.2 and 13.8%, respectively); with PG+ there was a relative increase in FI and BW (22.4 and 20.6%, respectively) that was significantly higher than FI and BW measured for PG-E- or PG-E+ diets. Enzymes did not significantly change the FI or BW of PG+ barley. F:G or AME were not improved by PG+. Digesta viscosity of the control and pre-germinated barley-based diets with (7.7 and 6.4 cps, respectively; $P > 0.05$) and without (64.2 and 32.4 cps, respectively; $P < 0.05$) an enzyme demonstrate that the improvements in FI and BW with pre-germination were not solely on changes in endogenous beta-glucanase activity in PG+ barley. Pre-germination appears to have a significant impact on voluntary intake of the diet and subsequently the growth of the broiler fed a barley-based diet.

Key Words: Pre-germination, Barley, Feed intake, Broilers, Enzymes

42 Improvements in feed value of newly harvested wheat and barley after storage (six months) for broilers. T. A. Scott*¹ and A. Pierce², ¹*Agriculture and Agri-Food Canada, PO Box 1000, Agassiz, BC / Canada, V0M 1A0,* ²*United Grain Growers, PO Box 50, Site 2, RR #2, Okatoks, Alberta T0L 1T0.*

The feed industry often refers to poor response when birds are fed newly harvest grain, however, little information exists regarding the validity of this belief. A broiler chick AME bioassay was used to measure changes in feeding value of wheat (n=14), hullless (n=14) and hulled (n=10) barley with or without a commercial enzyme appropriate for wheat- or barley-based diets. The broiler chick bioassay uses four pens of six male broiler chicks, fed ad lib from 4-17d diets containing 80% of a test cereal and a high protein basal mixture containing 1% "celite" as an acid insoluble

ash marker. Each of the grain-based diets with or without enzyme was tested within 3 mo. of harvest and again 6 mo. later. With storage, there were consistent ($P < 0.05$) increases in feed intake (FI) between 4-17d and body weight (BW) at 17 d of age with wheat-based diets fed with (12.5 and 16.9%, respectively for FI and BW) or without (16.1 and 22.7%) enzymes. In hullless barley diets without enzyme there was a significant improvement in BW (7.5%) with storage, while storage had a significant effect on FI and BW (2.9 and 6.3%, respectively) when fed with enzyme only. For all other barley diets there was a positive effect on FI and BW, but it was not significant. Feed conversion ratios decreased marginally ($P > 0.05$) with storage of grain. AME of diets was improved within each period by enzyme supplementation. However, there were measurable decreases ($P < 0.05$) in AME with storage of grains for the three grains with enzyme supplementation (ranging from -3.2 to -8.2%). The r^2 of the above measurements for the different sources of grain between periods ranged from 0.71 to 0.92, indicating that the relative ranking of the cereals with respect to feeding value remained similar after storage. However, it does indicate that factors in newly harvested grain may impact the voluntary intake and subsequent growth in a significant manner.

Key Words: Grain storage, AME, Broiler performance, Wheat, Barley

43 The nutritional evaluation of high-oil sunflower meal in broiler starter diets. N. Senkoylu¹, N. Dale^{*2}, and R. Bakalli², ¹Dept. of Animal Science, Trakya University, 59030 Tekirdag, Turkey, ²Dept. of Poultry Science, University of Georgia, Athens, GA, 30602.

Three experiments were conducted with broiler chicks to determine the nutritive value of high-oil sunflower meal (HO-SFM), a sunflower oil extraction by product obtained through pre-press extraction and expanding processes with a proximate composition of 32%CP, 11%CF and 19% EE. In the 1st experiment dietary treatments consisted of three levels (0, 14 and 28%) of HO-SFM at the expense of soybean meal (SBM). Metabolizable energy, protein and fiber levels were equal in all diets. In the 2nd experiment the effects of a higher level (46.4%) of HO-SFM on chick performance and gastrointestinal organs was tested. The 3rd experiment was carried out to examine if pelleting the feed could overcome the bulkiness resulting from inclusion of HO-SFM at a high level. Four dietary treatments consisted of SBM and HO-SFM diets both as mash and pellets. The results of the 1st experiment demonstrated that there was no detrimental effect of 28% inclusion of HO-SFM in terms of gain and feed efficiency, but liver weight, liver lipids were significantly ($P < 0.05$) reduced. The results of the 2nd experiment indicated that addition of 46.4% HO-SFM to broiler starter diets significantly ($P < 0.05$) depressed body weight, feed intake and gain, but not feed efficiency. Fat pad and liver lipid were again significantly ($P < 0.05$) decreased in the HO-SFM treatment. Impaired performance may have been due to the bulkiness of the HO-SFM diet (608 g/L) compared to the SBM control (723 g/L). When bulkiness was overcome by pelleting it was found that pelleting the feed significantly improved body weight with both SBM and HO-SFM diets and there was no depression in growth or feed conversion associated with HO-SFM. Liver weights and lipid content were again decreased in HO-SFM diets. The results of this study suggest that HO-SFM can be used up to 28% without adverse effects on chick growing performance, provided the feed is pelleted. Liver weight and lipid content were consistently reduced.

Key Words: Sunflower meal, Broiler starter, Fiber, Pelleting, Liver lipid

44 Waxy corn improves pelleted feed quality, broiler performance, and meat yield. N. E. Collins^{*1}, E. T. Moran, Jr.¹, and H. L. Stilborn², ¹Auburn University, AL, ²Optimum Quality Grains, L.L.C., Des Moines, IA.

The starch component of waxy corn is 99% amylopectin, whereas normal dent varieties contain approximately 75%. The highly branched structure of amylopectin, combined with the loose crystallinity of its granule, is expected to enhance steam-pelleted feed quality while improving digestibility. AME_n determinations were conducted on a normal dent (ND) corn hybrid and its waxy (WX) equivalent using week-old broiler chicks and mature SCWL cockerels. Chick values (ND=2.79 kcal/g; WX=2.86 kcal/g) were considerably lower than cockerel values (ND=3.27 kcal/g; WX=3.23 kcal/g), with the WX variant providing more energy than the ND variety for the young bird. An experiment was conducted with male broilers in floor pens to compare the feeding value of the ND and WX

corn hybrids under practical conditions to 7 weeks of age. Nutritionally equivalent corn-soybean meal diets were formulated to satisfy NRC (1994) recommendations, using actual nutrient profiles of the test corns in the data matrix. In addition, starter rations employed the measured chick and cockerel AME_n values for the corn hybrids, whereas grower and finisher diets relied upon the cockerel values only. Inclusion of the WX corn hybrid improved pellet durability and increased overall particulate size of the complete feeds as compared to the ND corn diets ($P \leq 0.05$). Broilers fed the WX corn rations demonstrated greater body weight gain than those receiving the ND corn diets, although feed conversion was generally poorer ($P \leq 0.05$). Birds provided the WX corn diets were also at advantage for chilled carcass weight and for meat yield after deboning ($P \leq 0.05$). Performance and yield differences in response to altering the corn hybrid AME_n values for starter diet formulation were negligible. Based upon the benefits to pelleted feed quality, live production and processing yields, WX corn is a favorable ingredient for practical broiler diets.

Key Words: Waxy corn, Pellet durability, Broiler

45 Effect of a Sorghum-Based Diet Subjected to Various Feed Manufacturing Processes on Subsequent Broiler Performance. K. R. Cramer^{*}, K. J. Wilson, R. S. Beyer, L. J. McKinney, and K. C. Behnke, Kansas State University, Manhattan, Kansas 66506.

The purpose of this study was to evaluate broiler performance when fed a sorghum-based diet differing in feed processing methods. The treatments consisted of unprocessed mash (UM), standard conditioning prior to pelleting (SC), and expansion conditioning prior to pelleting (EC). Each treatment consisted of 14 replicated pens of 8 commercial male broiler chicks per pen. The study was conducted using Petersime battery brooders for a 20-day growing period. The diet was formulated to meet or exceed NRC recommendations. Feed conditioning temperature was 180° F (82° C). The expansion conditioning was performed using an Amandus Kahl (Hamburg, Germany) model OE 15.2 annular gap expander with cone pressure set at 200 PSI (14 kg/cm²). The standard conditioning was performed using a conventional CPM conditioner/pellet mill (California Pellet Mill, Crawfordsville, IN). The SC and EC treatments were pelleted using a 5/32" x 1 1/4" (4mm x 32mm) pellet die. During the manufacturing of pellets, fines were sifted from the SC and EC treatments in order to determine percent fines produced. Percent fines were 66.4 % for the SC treatment and 11.5 % for the EC treatment. Pellet Durability Index (PDI) values for SC and EC were 30 % and 90 %, respectively, in the pre-crumbled pellet form. The sifted pellets were then crumbled through a crumble roller mill with a roll gap width set at 0.788" (2mm). Post-crumbling PDI values for SC and EC were 73.6 % and 85.5 % respectively. The average particle size for UM, crumbled SC, and crumbled EC was 975, 1290, and 1481 μm, respectively. The broiler performance measurements (i.e. feed efficiency and weight gain) obtained in this experiment revealed no significant differences between the three treatments due to varying degrees of processing. Further investigations are required to determine the optimum parameters for processing sorghum-based diets.

Key Words: Sorghum, Expansion, Pellet Durability

46 Protein quality evaluation of soybean meals processed from genetically modified high protein soybeans. H. M. Edwards, III^{*}, M. W. Douglas, C. M. Parsons, and D. H. Baker, University of Illinois, Urbana, IL USA.

A conventional and two genetically modified soybean samples were processed to dehulled soybean meal (SBM) at a pilot plant and were compared to a SBM from a commercial processing plant. Two chick bioassays and a true digestibility assay with adult cecotomized cockerels were carried out to assess protein quality. In the chick assays, four pens of four chicks were fed cornstarch/dextrose diets containing 25% SBM from each source. Crude protein levels (%) of the SBM samples were: M700, 52.5; M702, 53.4; M703, 62.7; and UI, 47.5. In Exp. 1 weight gain and gain:feed were not different ($P > 0.10$) for the UI and M700 SBM, but they were lower ($P < 0.05$) for M702 and higher ($P < 0.05$) for M703 than for either UI or M700 SBM. Protein efficiency ratio (PER) calculations indicated that UI and M700 SBM were superior ($P < 0.05$) to M703 which was in turn superior ($P < 0.05$) to M702. Because of the unexpected poor performance of the soybean meals from the pilot plant, a Soy-Chek[®] assay was conducted which revealed they were under-heated.

After sufficient autoclaving, Exp.2 was conducted. In this assay, weight gain, gain:feed, and protein accretion were not different ($P > 0.10$) for M700 and M702 SBM, but they were lower ($P < 0.05$) for UI and higher ($P < 0.05$) for M703 than for M700 or M702 SBM. Efficiency of protein utilization as measured by PER and protein accretion as a percent of protein intake was similar among the four SBM samples evaluated in Exp.2. Digestibility assessment (four cockerals per SBM sample) revealed that autoclaving increased ($P < 0.05$) the true digestibility of amino acids, and also tended to increase TME_n values. Digestible Lys, Met, Cys, Thr, and Val, and also TME_n were higher ($P < 0.05$) whereas NDF, fat and phospholipids were lower in M703 than in the other SBM samples. The results of this study indicate that M703 has considerable advantages over conventional SBM as a feed ingredient for broiler chickens.

Key Words: Chicks, Soybean meal, Digestibility, Protein Quality, Assessment

47 Chemical composition and nutritive value of yellow-seeded *Brassica napus* canola for broiler chickens. P. Jiang^{*1}, B. A. Slominski¹, and G. Rakow², ¹University of Manitoba, Winnipeg, Manitoba, Canada, ²Agriculture and Agri-Food Canada, Saskatoon, Saskatchewan, Canada.

Plant selection programs directed towards the development of yellow-seeded canola are among approaches undertaken to reduce the fiber content, increase the protein content and to improve nutrient utilization. A relatively new initiative in breeding for yellow-seed coat color has been the development of yellow-seeded *B. napus* canola. The objective of this study was to compare a new yellow-seeded *B. napus* line with its black-seeded counterpart, both types originating from the same genetic background and produced under identical growing conditions in two consecutive years. On average, in comparison to black-seeded, yellow-seeded types contained more protein (46.2% vs 45.2%), more sucrose (9.0% vs 7.8%), less dietary fiber (26.6% vs 30.8%) but similar amounts of oligosaccharides (3.4% vs 3.1%), starch (0.46% vs 0.40%), available phosphorus (0.69% vs 0.67%) and ash (6.8% vs 6.7%). Although similar in the content of non-starch polysaccharides (18.0% vs 18.3%), cell wall protein (2.9% vs 3.0%) and minerals associated with the fiber fraction (0.9% vs 1.0%), the overall lower fiber content in yellow-seeded samples was reflected in a lower content of lignin with associated polyphenols (4.9% vs 8.6%). When expressed in g/16g N, no difference in amino acid level was observed. There was a significant difference in the content of glucosinolates which averaged 13.2 and 19.3 $\mu\text{mol/g}$ for yellow- and black-seeded samples, respectively. In a two-week feeding trial, broiler chickens were fed wheat (56%)/canola meal (32%) diets containing 22% crude protein and 3050 kcal/kg available energy. On average, chickens fed diets containing meals derived from yellow-seeded canola showed significantly higher body weight gain (398 vs 342 g/bird/14 days) and lower feed to gain ratio (1.53 vs 1.60) than those fed the black-seeded type.

Key Words: Canola meal, Seed color, Chemical composition, Fiber, Broiler chicken

48 Effect of autoclave heat treatment on soybean lectin concentration, urease activity and trypsin inhibitor activity. Y. Fasina^{*1}, H. L. Classen¹, and J. D. Garlich², ¹University of Saskatchewan, Saskatoon, Saskatchewan, Canada, ²North Carolina State University, Raleigh, NC USA.

Recent evaluation of commercially processed soybean meal (SBM) for lectin content revealed that the meals contain residual lectin activity (0.2 to 0.6mg SBA/g meal; Maenz et al. 1999). Autoclaving is one of the effective methods used to reduce the levels of antinutrients in feed ingredients. This study was carried out to investigate the effect of autoclaving temperature and time on soybean lectin content. Ground, defatted soybeans adjusted to 20% moisture were autoclaved at varying temperatures between 90 to 120 C for 5 to 20 min. Soybean lectin was isolated from processed meals according to the affinity chromatography procedure developed by Maenz et al. (1999) and quantified using a modified Lowry protein assay (Scachterle and Pollack 1973). The levels of trypsin inhibitor and urease activities were also measured to determine whether a relationship exists between the rate of denaturation of lectin and urease or trypsin inhibitor. Total lectin content, urease activity and trypsin inhibitor activity decreased exponentially ($r \geq 0.96$) with increasing temperature and time. Total lectin content, trypsin inhibitor and urease activities in the unprocessed sample were 2.68 mg/g, 46.59

mg/g and 2.45 pH units, respectively. More than 90% inactivation of the antinutrients was achieved when the samples were autoclaved at 100 C for 5 min. Urease activity and lectin exhibited a similar rate of decline during autoclaving, while trypsin inhibitor activity declined at a lesser rate. Thus, urease activity may be used for monitoring lectin inactivation during SBM processing.

Key Words: Soybean meal, Autoclaving, Lectin, Urease, Trypsin inhibitor

49 Nutritional evaluation of low-phytate and Nutri-Dense[®] corn. M. W. Douglas^{*}, C. M. Peter, S. D. Boling, C. M. Parsons, and D. H. Baker, University of Illinois.

Two experiments were conducted to evaluate two genetically modified corns, low-phytate and Nutri-Dense[®], obtained from Exseed Genetics, Decatur, IL. The first experiment was conducted to determine availability of phosphorus (P) in the low-phytate corn compared to conventional corn. One-week-old New Hampshire \times Columbian chicks were fed from 8 to 20 d of age a cornstarch-dextrose-soybean meal basal diet containing 0.10% available P, or the basal diet supplemented with 0.06 or 0.12% P from KH_2PO_4 or 20 or 40% of conventional or low-phytate corn. Analyzed total P values for conventional and low-phytate corn were 0.26 and 0.27% on a DM basis, respectively. Weight gain and tibia ash responded linearly ($P < 0.05$) to the additions of either KH_2PO_4 or low-phytate corn but responses ($P < 0.05$) were observed only for the 40% level of conventional corn. Using tibia ash (mg/bone) compared to KH_2PO_4 as the response criterion, the relative bioavailability of P in the conventional and low-phytate corn was estimated by standard curve methodology using only the data for the 40% corn levels. These calculations yielded relative bioavailability values of 31.4 and 86.2% for the P in conventional and low-phytate corn, respectively. The second experiment was conducted to determine true digestibility of amino acids in conventional and Nutri-Dense[®] corn using the precision-fed cecectomized rooster assay (9 roosters per corn sample). Analyzed values (% of DM) for CP and selected AA for conventional and Nutri-Dense[®] corn, respectively, were: CP, 9.3 and 13.1, lysine, 0.30 and 0.42, methionine, 0.19 and 0.24 and cystine, 0.22 and 0.26. Average true digestibility coefficients (%) of amino acids in conventional and Nutri-Dense[®] corn were similar ($P > 0.05$) at 88.5 and 88.6, respectively. The results of this study indicated that the low-phytate corn contained almost 3 times more available P than conventional corn and the Nutri-Dense[®] corn contained substantially higher levels of digestible amino acids than conventional corn.

Key Words: Chicks, Low phytate corn, Phosphorus bioavailability, Amino acid digestibility

50 Nutritional values of perilla and sesame oilmeals and effects of their dietary supplementations on the performance of broilers. C. W. Kang^{*} and S. H. Park, Kon-Kuk University, Seoul, Korea.

Abstract Text :

Two experiments were conducted to evaluate the feeding values of perilla (POM) and sesame (SOM) oilmeals and to investigate the effects of their dietary supplementations on broiler performances. In Exp. 1, TME, TMEn, and TAAA values of the meals were determined by force-feeding twenty four roosters (ISA-Brown) and collecting the total excreta from the birds. The TME and TMEn of POM were 2.68 and 2.41 kcal/g, respectively, and those of SOM were 2.05 and 1.77 kcal/g, respectively. The average TAAA of 16 amino acids in POM and SOM were 77.96% and 60.38%, respectively. In Exp. 2, a total of 135 broiler chicks (Avian) were divided into 5 groups with 3 replicates of 9 birds each. They were fed ad libitum one of five experimental diets containing different levels of POM and SOM for 3 weeks (i.e., 7% POM, 15% POM, 7% SOM, 15% SOM, and 0% POM and SOM). Although there were slight decreases in the body weight gains in 15% POM and 15% SOM groups, the differences were not significant statistically. There was no significant difference in feed intakes, feed conversion rates, and body compositions among the treatments. The results indicate that feed formulation using bioavailability values such as TMEn and TAAA is an effective method for protecting broiler feeds from quality decrease, and that POM and SOM can be used for broiler feeds up to 15% level without any significant negative effects.

Key Words: Perilla oilmeal, Sesame oilmeal, Nitrogen corrected true metabolizable energy, True amino acid availability, Broilers