43 Autosexing and sex ratio in the Dandarawi Egyptian breed. Mohamed A. Abdellatif*, Animal and Poultry Production Department, Faculty of Agriculture, Assiut University, Assiut, Egypt.

The present study was carried out on a population of the Egyptian local breed Dandarawi maintained in Assiut University Poultry Farm. Hatch- ing records of three lines in a selection program over two generations were considered. The results obtained showed that it is possible to identify the sex at hatching time (autosexing) by using down color where female chicks had a black spot on the head or irregular strips on the back, but male chicks had no markings on the head or back. At 8 wk of age, it was easy to separate males and females by the difference in their feather color which was black and white for males and brown for females. The degree of accuracy of autosexing at hatching time was 89.02% for males and 92.42% for females. Sexual dimorphism in feather color is due to the presence of autosomal recessive wild type genetic background (co+/co+). The observed number of female chicks exceeded that of males for primary, secondary, and tertiary sex ratios slightly deviated from the expected ratio of 1:1 based on pooled data of lines and generations. The embryos and chicks of the two sexes had the same chance for survival without preference towards one sex up to 8 wk of age.

Key Words: Dandarawi, Autosexing, Down color, Feather color, Sex ratio

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44 Non-phytate phosphorus requirement of broilers in the finisher phase of a four phase feeding program. A. S. Dhandu*, R. Angel, T. J. Applegate, and B. Ling, Department of Animal and Avian Sciences, University of Maryland, College Park.

An experiment was conducted to estimate the optimum non-phytate phosphorus (nPP) requirement of male (Ross 308) broilers in the finish- er phase (32-42 d) of a four-phase feeding program. Diets with four nPP concentrations (0.15, 0.27, 0.20 and 0.15%) were fed in the finisher phase and a broken line analysis was used to estimate the nPP require- ment. All diets had similar calcium (Ca) concentration of 0.71%. All the birds were fed Ca and nPP concentrations of 0.91 and 0.43% in the starter (hatch-18 d) and 0.81 and 0.36% in the grower phase (18-32 d), respectively. Twenty pens per diet (six birds per pen) were used. At 42 d, three birds per pen were sampled and the right femur and the right tibia col- lected for determination of stress, modulus of elasticity, breaking strength and ash (also toe ash). There were no significant differences in feed to gain ratio, feed intake and weight gain between the four treatments (P > 0.05). Modulus of elasticity of the femur from birds fed 0.15% nPP was significantly greater (P < 0.05) than for the other three diets. Birds fed 0.27 and 0.20% nPP had significantly greater (P < 0.05) femur ash (47.45%) than those fed 0.15% nPP (46.14%) and the same was true for tibia ash. The minimum dietary percent nPP for the finisher phase was 0.23 ± 0.02% (break point ± SE of the break point); as determined by break point analysis of tibia ash. Similar minimum dietary percent nPP requirements were found with femur ash (0.23 ± 0.02%) and femur modulus of elasticity (0.22 ± 0.02%). We conclude that the minimum nPP needed in the finisher phase is 0.23 ± 0.02%. This is lower than the nPP concentration recommended (0.35%) by the National Research Council (1994) for 32 to 42 d old broilers. In the finisher phase, using the tibia (versus femur or toe) for bone measurements resulted in the lowest CV and the most sensitivity. Optimum male broiler nPP requirement as determined based on bone measurements is higher than that determined based on performance parameters.

Key Words: Broilers, Phosphorus, Finisher phase, Bone ash

45 The non-phytate phosphorus requirements of broilers in a four-phase feeding program. B. Ling, C. R. Angel, T. J. Applegate*, N. G. Zimmermann, and A. S. Dhandu, University of Maryland, College Park, Maryland.

Two experiments (Exp) were conducted to determine the non-phytate phosphorus (nPP) requirements of male broilers (Ross 308) in a four- phase feeding program. In Exp 1, treatments consisted of a complete 2 × 3 factorial arrangement of dietary nPP levels; two (0.32 and 0.26%) in the grower (GR) phase, three (0.34, 0.27 and 0.20%) in the finisher (FN) phase, and three (0.28, 0.20, 0.14%) in the withdrawal (WD) phase. Calcium was 0.8, 0.71 and 0.6% in the GR, FN and WD phases, respec- tively. In Exp 2, birds were raised to 32 d on common starter and GR diets. A 3 × 3 incomplete factorial design was used with three dietary nPP levels (0.32, 0.26 and 0.18%) in the FN phase and three (0.28, 0.19 and 0.14%) in the WD phase. Calcium was 0.71 and 0.6% in the FN and WD phases, respectively. In Exp 1, birds fed 0.32% nPP in the GR phase had greater (P<0.01) BW gain (BWG), femur, tibia (versus femur) bone breaking strength (BS), femur, tibia and toe ash and lower (P<0.01) feed to gain ratio (F/G) than those fed 0.26% nPP. In the FN phase, decreasing nPP from 0.27 to 0.20% decreased (P<0.01) femur BS by 13% and ash by 3.3%. Performance or bone characteristics were not (P>0.05) different between broilers fed 0.34 or 0.27% nPP in the FN phase or between broilers fed 0.28 or 0.20% nPP in the WD phase. Femur, tibia and toe ash and BS in the WD phase were greater (P<0.01) in birds fed 0.28 and 0.20% nPP vs 0.14% nPP. In Exp 2, lowering nPP from 0.26 to 0.18% in the FN phase decreased BWG and increased F/G by 11.7% and 7.5%, respec- tively (P<0.01). In the birds fed 0.32 or 0.26% nPP in the FN phase, feeding 0.19% vs 0.14 nPP in the WD phase resulted in greater femur BS (25.6 vs 21.1 kg; P<0.01) and femur ash (45.0 vs 43.6%; P<0.01). Dietary nPP did not significantly affect incidence of bone breakage in the whole bird in the processing plant. From these studies, nPP require- ment for maximizing bird performance, BS and ash fell between 0.32 and 0.26% in the GR phase, 0.26 and 0.18% in the FN phase, and 0.19 and 0.14% in the WD phase.

Key Words: Broiler, Phosphorus requirement, Bone ash

46 The effects of gastrointestinal tract micro-flora and dietary phytase on inositol hexaphosphate hydrolysis in the chicken. M.J. Kerr*, H.L. Classen1, and R.W. Newkirk2, 1University of Saskatchewan, Saskatoon, SK, Canada.

Three experiments were carried out to investigate the influence of gas- trointestinal tract (GIT) microorganisms (MO) and dietary phytase on hydrolysis of inositol hexaphosphate (IP6) in the GIT of the chicken. Ma- ture laying hens (Exp. 1) and broiler chicks raised under conventional (Exp. 2) and gnotobiotic (Exp. 3) conditions were fed low phospho- rus, corn-soybean meal diets with and without an experimental phytase (600U/kg). Disappearance of IP6 and lower penta- through triphosphate derivatives was measured during GIT transit and in feces. IP6 hydrolysis occurred in the crop in all experiments regardless of enzyme treatment, but the degree of hydrolysis was generally greater with the use of dietary phytase. These data demonstrate the involvement of crop MO in IP6 hydrolysis and also that dietary phytase is active in the crop. Although IP6 disappearance was noted in the gizzard and upper portions of the small intestine, apparently differential passage rates for IP6 and acid insoluble ash content make exact interpretation difficult. Supplemental phytase was shown to be active in the jejunum and ileum, with signifi- cantly more IP6 disappearance in the terminal ileum in two of three experiments. With the exception of the gnotobiotic experiment, levels of IP6 and lower derivatives were very low in the ceca indicating rapid and nearly complete IP6 hydrolysis by cecal MO phytase. Although the gnotobiotic chicks did not remain germ-free, high IP6 values in the ceca indicate that the level of microbial involvement was minimal. Compar- isons of ileal and fecal IP6 disappearance support the conclusion that hindgut MO have an important impact on IP6 hydrolysis. Final fecal IP6 disappearance values reflect the use of supplemental phytase but may give an inaccurate estimate of phosphorus that is available to the bird. Further research is required to determine the nutritional impact of phosphorus released as a result of hindgut IP6 hydrolysis.

Key Words: Phytate, Phytase, Microorganisms, Gnotobiotic, Hindgut

47 Use of low-phytate corn and low-phytate/low-oligosaccharide soybean meal in broiler diets reduces phos- phorus excretion. J.D. Spencer*, G.L. Allele, J.W. Frank1, and T.E. Sauber2, 1University of Missouri-Columbia, Columbia, MO, 2Optimum Quality Grains, LLC, West Des Moines, IA.

Diets formulated with low-phytate corn (LP), containing the ‘lup-l’ allele, and soybean meal containing low levels of phytate and oligosaccharides (LPSBM) were fed to growing broilers to determine effects upon phos- phorus (P) excretion and retention. Sixty male broiler chicks (1-d) were allotted to one of three treatments (trxs.) with a three phase feeding regimen: 1) diets with LP corn and LPSBM to NRC level of available P(AP); 2) diets with normal corn and normal SBM formulated to the...
same AP as trt. 1; 3) diets formulated with LP corn and LPSBM to 75% of the NRC AP recommendation. Previously determined levels of .17 and .02% AP for LP and normal corn, and .41 and .20% for LPSBM and normal SBM, were used for diet formulation. There were 4 birds/pen, and 5 pens/trt. Total excreta from each phase was collected and analyzed for determination of P balance. At the end of the growth period (42-d), birds were fasted (12 h) and killed for whole-body P analysis. There were no differences in ADG, ADFI, or feed efficiency among trts. Total P balance calculated from total excreta analysis was 53.4, 42.3, and 61.3% of P intake for trts. 1, 2, and 3, respectively (P≤.01). Birds fed trt. 1 and 3 excreted 40 and 60% less total P (P≤.01) than those fed trt. 2, respectively. Body retention of P from tissue analysis was determined to be 43, 33, and 52% of P intake for trt. 1, 2, and 3, respectively (P≤.01). Among treatments, calculated P balance utilizing total excreta was similar to values of percent P retained in the body. These results suggest that total body retention and excretion of endogenous P is similar differences in P balance among treatments, and that both procedures are a valid method of determining P excretion. Furthermore, these results show that P excretion can be reduced 40 to 60% when diets are formulated with LP corn and LPSBM, with no detrimental effects upon growth performance.

**Key Words:** Phosphorus, Retention, Excretion, Broilers

48 Intestinal phytase activity in meat type chickens. A. Abudabos*, S. F. Lightsey, J. E. Toler, and D. V. Maurice, Clemson University, Clemson, SC 29634-0361, USA.

We have reported that chickens retain phytae phosphorus and its utilization is described by a logistic function suggesting the occurrence of age dependent phytae hydrolysis. However, the presence and effectiveness of intestinal phytae in chickens is controversial. This study examined determinants of intestinal phytae activity, the effect of location, age, gender, and diet composition. The release of phosphorus, when an extract of intestinal mucosa was incubated with phytic acid as substrate was used to measure phytae activity. Assay of phytae activity in different sections of the gastrointestinal tract showed that activity was most pronounced in the duodenum. Maximum phytae activity was at a plateau between pH 5.6 and 6.2 and activity was very low, almost negligible, at pH 7.0. Assay of portions of the duodenum showed that phytae activity was 39% higher (p<0.001) in the proximal duodenum compared to the distal region. Duodenal mucusa was assayed fresh and after 1 and 2 weeks of storage at -20 C. Statistically significant differences due to storage were not detected. Phytae activity was measured in female and male chicks from 2 to 8 weeks of age. Neither age nor gender had a significant effect on phytae activity. Iron supplementation significantly depressed duodenal phytae activity. The results of these experiments indicate that phytae activity is present along the gastrointestinal tract of chickens. Duodenal phytae was stable for at least 2 weeks when stored at -20 C, the activity was not evenly distributed, and maximal activity was exhibited in the pH range of 5.6 - 6.2. The response to pH and the differential activity in the duodenum suggest that it is not an alkaline dependent phytase. However, the presence and effectiveness of intestinal phytae in chickens is controversial. This study examined determinants of intestinal phytae activity in different sections of the gastrointestinal tract showed that activity was most pronounced in the duodenum. Maximum phytae activity was at a plateau between pH 5.6 and 6.2 and activity was very low, almost negligible, at pH 7.0. Assay of portions of the duodenum showed that phytae activity was 39% higher (p<0.001) in the proximal duodenum compared to the distal region. Duodenal mucusa was assayed fresh and after 1 and 2 weeks of storage at -20 C. Statistically significant differences due to storage were not detected. Phytae activity was measured in female and male chicks from 2 to 8 weeks of age. Neither age nor gender had a significant effect on phytae activity. Iron supplementation significantly depressed duodenal phytae activity. The results of these experiments indicate that phytae activity is present along the gastrointestinal tract of chickens. Duodenal phytae was stable for at least 2 weeks when stored at -20 C, the activity was not evenly distributed, and maximal activity was exhibited in the pH range of 5.6 - 6.2. The response to pH and the differential activity in the duodenum suggest that it is not an alkaline dependent phytase. The higher phytae activity in the proximal duodenum and sensitivity to dietary iron imply that intestinal pH and nutrient composition may be important modulators of intestinal phytae activity and phytae phosphorus utilization.

**Key Words:** Chicken, Phytase Activity, Small Intestine, Storage, Age

49 The effect of phytae addition or the reduction of dietary calcium and available phosphorus on growth performance and amino acid digestibility in growing chickens. S. L. Johnston* and L. L. Southern, Louisiana State University Agricultural Center, Baton Rouge, Louisiana.

A 15-d experiment was conducted to determine the effect of phytae addition or the reduction of dietary calcium and available phosphorus on growth performance and amino acid digestibility in chickens. All chicks were placed on a diet adequate in nutrients (NRC, 1994) for 13 d after delivery to Louisiana State University. Starting at D 14 posthatching, chicks (initial and final weights were 306 g and 1,182 g) were allotted to four treatments with 10 replicates of four chicks each in a completely randomized design. Treatments were: 1) corn-soybean meal (0.90% Ca, 0.35% AP), 2) Diet 1 but with reduced Ca and P (0.80% Ca, 0.25% AP), 3) Diet 1 with 600 FTU of phytase, or 4) Diet 2 with 600 FTU of phytase. The chicks were fed the treatment diets for 15 d. On D 14 of the experiment, chicks and feeders were weighed for determination of daily gain, feed intake, and gain:feed. On D 15, all chicks were killed and the ileal digesta collected, pooled by pen, and immediately frozen using dry ice and acetone. Compared with the control diet, reducing the concentration of dietary Ca and phytase (Diet 2) decreased gain, feed intake, and gain:feed (P < 0.07). There was no effect (P = 0.20) on growth performance when phytase was added to the diet adequate in Ca and phytase (Diet 3), but phytase addition to the diet with reduced Ca and phytase addition increased growth performance to that observed in chicks fed the control diet. Phytase addition to the control diet resulted in no increase in amino acid digestibility (P = 0.20), but reducing the concentration of Ca and phytase in the diet increased digestibility of histidine (P < 0.04). The combination of reduced level of Ca and phytase addition increased digestibility of lysine, isoleucine, and leucine (P < 0.09).

**Key Words:** Chickens, Phytase, Amino Acids, Calcium, Phosphorus

50 Potential of dietary Pseudomonas sp. lipase to improve fat digestibility and performance of turkey poults. H. Kermanshahi*†, H. L. Classen‡, and D.D. Maenz** 1Department of Animal Science, College of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran, 2Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon, SK, Canada.

An in vivo experiment was conducted to study the use of dietary Pseudomonas sp. lipase to improve fat digestibility by young turkeys from 0-21 days of age. In a completely randomized experiment, 112 day-old Hybrid Large White male turkey poults were assigned to battery cages with 4 per cage and 8 replicates per treatment. A commercial liquid form of Pseudomonas sp. lipase was added at 0, 20, 40 and 60 units per gram of diet to a corn-soybean meal based diet containing 8% pure beef tallow. Feed and water were provided ad libitum. Acid insoluble ash was used as indigestible marker for fat and fatty acid digestibilities. Samples of feces were collected at 5-7, 12-14 and 19-21 days of age for determination of fat and fatty acid digestibility. Dietary Pseudomonas sp. lipase decreased body weight gain from 0-7, 7-14 and 0-21 days of age and feed intake from 7-14 and 0-21 days of age. Lipase addition increased feed to gain ratio from 0-7 days of age but had no effect for other time periods. Enzyme use did not affect overall fat digestibility. However, the dietary lipase increased the digestibility of C18:0 and decreased the digestibility of C14:0 and C18:1. It was concluded that dietary supplementation of Pseudomonas sp. lipase did not improve the overall fat digestibility and performance of young turkey poults but has the potential to improve the digestibility of long chain saturated fatty acids.

**Key Words:** Pseudomonas sp. Lipase, Fatty Acid Digestibility, Tallow, Poults

51 Effect of phytae supplementation on the performance of two strains of laying hens under heat stress. M.A. Jalal*, S.E. Scheideiler†, and E. Pierson‡, 1University of Nebraska-Lincoln, 2Finneeds International, St. Louis, MO.

Two strains of laying hens, Hy-Line Brown and Hy-Line W-36 aged 26 weeks were fed 3 diets containing 0.55 or 0.22% nonphytate phosphorus (NPP) with and without phytase in a 2 x 3 factorial arrangement with repeated measure variables of time and temperature. Phytase was added at a rate of 250 IU/kg feed. Hens were exposed to temperatures at 25°C and 35°C for seven days respectively, with a relative humidity of 50%. Treatments were replicated with 4 pens per treatment (3 hens per pen). Fecal samples were collected at the end of the trial for Ca, P, and amino acid digestibilities. Data collected during the two weeks indicated heat stress significantly reduced (P<0.001) feed intake, feed conversion NPP intake, hen weights, egg production, egg size, egg mass, shell breaking strength, specific gravity, wet and dry shell percent, wet yolk and phosphorus digestibility. Significant strain differences (P<0.05) showed that Hy-Line Brown hens had higher NPP intake, egg weight, specific gravity, albumen percent and Ca digestibility, while Hy-Line W-36 had greater wet and dry yolk percent, wet and dry shell percent, bone ash and P digestibility. Phytase supplementation significantly (P<0.05) improved wet yolk and dry shell percent in contrast to no improvement of phytase for both strains during both heat stress and control periods. Hy-Line W-36 had higher (P<0.05) protein and cysteine digestibilities than Hy-Line Brown. Phytase significantly (P<0.05) improved digestibilities of methionine, cysteine, total sulfur amino acids, histidine, alanine, and glycine for low 0.22% compared to 0.55 and 0.22% NPP without phytase for both strains. In summary, heat stress reduced overall performance of laying hens and lowered their production. The severity of heat...
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Two trials were conducted to evaluate the influence of enzyme supplementation (ES) to a corn-soybean meal diet on performance, intestinal viscosity, and digestive organ size of broiler chicks. In experiment I there were three treatments; a control diet (T1), diet T1 plus 137.5 IU of β-glucanases and 200 IU of xylanases per kg of feed (T2), and diet T2 plus 1,550 IU of α-amylases per kg of feed (T3). Each treatment was replicated 6 times (10 Cobb chicks per cage). In experiment II we evaluated the inclusion of α-amylases alone or in combination with other enzymes on broiler growth. There were three treatments; a control diet (T1), and two additional diets supplemented either with 4,500 IU of α-amylases per kg of feed (T2) or 27 BAU of α-amylases, 6,000 TLXU of xylanases and 5,700 PU of proteases per kg of feed (T3). In experiment I, ES did not affect performance (P>0.05) but reduced relative weight of liver at 7d (4.3 vs 3.8%; P<0.01) and pancreas at 28d (0.39 vs 0.34%; P=0.00). The α-amylase supplementation (T3) reduced relative weight of liver at 28d (2.9 vs 2.4%; P<0.05) and increased relative weight of pancreas at 28d (0.31 vs 0.37%; P=0.07) when compared to T2. Intestinal viscosity was not affected by ES. In experiment II, ES improved BW at 7d (133 vs 141g; P<0.05) but did not affect feed conversion (1.16 vs 1.13g/g; P>0.05). Dietary treatments did not affect performance at 42d of age (P>0.05). No differences were observed due to dietary treatments for any of the relative weights of the organs studied except for the pancreas at 28d, that was reduced by ES (0.39 vs 0.33%; P<0.01). Intestinal viscosity was not affected by ES. It is concluded that ES to corn based diets did not improve productive performance of broilers at 42d of age. However, α-amylase supplementation improved performance of broilers at early stages of development.

Key Words: Corn, Enzymes, Amylases, Performance, Broilers

Nutritive value of enzyme pre-treated canola meal. D. S. Liang*, B. A. Slominski, L. D. Campbell, and W. Guenter, The University of Manitoba, Winnipeg, Manitoba, Canada.

The objective of the research was to explore the potential for improving the nutritive value of canola meal (CM) by pre-treatment with a combination of enzymes during the canola seed crushing process. A number of (22) carbohydrase-like (ie., α-galactosidase, pectinase, cellulase) and phytase enzymes were evaluated in vitro for their ability to hydrolyze oligosaccharides and phytate and to depolymerize the non-starch polysaccharides (NSP) of canola meal. Three selected enzyme blends (Enzyme A, B and C) were used in laboratory incubation trials with canola meal and demonstrated that under optimum moisture conditions (80%) a high degree of hydrolysis for both phytate (66-100%) and NSP (11-20%) was observed with enzyme C being more effective than either A or B. Complete hydrolysis of oligosaccharides was achieved by all three enzyme blends. In preparation for in vivo analyses a large quantity of desolventized CM was obtained from a commercial crushing firm and laboratory incubation trials using Enzyme A, B and C were conducted at existing moisture (16-20%) and temperature conditions (50°C declining to 22°C). In contrast to the results at optimum incubation conditions little or no hydrolysis of phytate, oligosaccharide or NSP occurred, probably due to the low moisture conditions. However, when the enzyme-pre-treated meals were fed (30% of diet) to 4-day broiler chickens for a 2-week period improvements in growth performance relative to a control diet were noted. Compared with control, all three enzyme blends improved (P<0.05) ileal protein (77.3 vs 80.3%) and phytate (29.0 vs 41.5%) digestibilities and A and B blends improved (P<0.05) AME (2865 vs 3017 kcal/kg). The study indicated that there is potential for improvement to the quality of CM by enzyme treatment. However, the relatively low moisture content in desolventized meal would appear to limit the effectiveness of pre-treatment of CM during the crushing process and further research is needed to realize optimum effects of added enzymes.

Key Words: Canola meal, Enzyme pre-treatment, Broiler chicken

Hulless barley with or without exogenous enzymes as a replacement for wheat in laying hen diets. T.N. Nortey*, W. Guenter, and L.D. Campbell, University of Manitoba, Winnipeg, Manitoba, Canada.

A 9-month trial was carried out with 1280 Single Comb White Leghorn layers using a completely randomized design, with a 2x5 factorial arrangement of treatments, to determine if feeding hulless barley would result in equal or better performance compared to feeding a regular wheat based diet. Four hulless barley diets (variety 1, 2, 3 and 4) and a wheat diet (control) were fed with or without an exogenous enzyme cocktail. Hens with an average initial weight of 1.2kg were randomly assigned to the diets. The dietary treatments had 8 replicates, each having 16 hens divided evenly among 4 adjacent cages. Feed and water was given ad lib and eggs were collected and enumerated twice daily. All eggs laid on the final 3 days of each 28-day period were collected and weighed individually. Feed intake, feed efficiency, egg weight, egg mass and egg production were calculated for each 28-day period and averaged for the 9-month trial. Feed efficiency, egg mass, and egg weight of hens fed vars. 1, 3 and 4 were similar (P>0.05) to hens fed the control diet which had values of 2.1, 47.6g and 57.11g respectively, but were significantly lower (P<0.05) than hens fed var. 2, 1.99, 50.21 and 58.73 respectively. Hens fed var. 3 and 4 had the lowest egg production, 82.14 and 83.25% respectively, which were significantly lower than for hens fed var. 1, 2 and the control diet, 84.7, 84.7 and 84.3% respectively. Enzyme inclusion resulted in better egg production, feed efficiency, egg mass and egg weight for hens fed all varieties, which were similar (P>0.05) to, or better (P<0.05) than feeding the control diet, and better (P<0.05) than feeding the un-supplemented hulless barley diets. These results show that hulless barley with exogenous enzymes can replace wheat in diets for layers.

Key Words: Hulless barley, Exogenous enzymes, Layers

Evaluating the efficacy of two enzyme preparations added to a wheat based diet on the digesta viscosity and performance of broilers by the slope of a log-linear model. Z. Zhang*, W. Guenter†, R. R. Marquardt‡, and R. Kampen‡,

Department of Animal Science, University of Manitoba, Winnipeg, Manitoba, Canada. R3T 2N2, BASF Canada Inc., Abbotsford, British Columbia, Canada, V2S 7G7.

A dose-response study was carried out to determine if the efficacy of two commercial enzyme preparations (A and B) when added to a viscous wheat-based chick diet could be accurately estimated by the slope of a log-linear model. Enzyme concentrations utilized in the study were 0, 0.125, 0.5, and 2 g/kg in a 60% wheat-based diet. The results demonstrated that the slope values of enzyme A for weight gain and digesta viscosity for feed to gain ratio were greater when enzyme B (p < 0.05), suggesting enzyme A is more efficacious than enzyme B. However, there was no significant difference between the slope values of two enzymes for feed to gain ratio. A 2 wheat x 2 enzyme x 2 doses factorial study was also carried out to determine if the effect of the two enzyme preparations added to low viscous wheat-based diets would uplift the nutritive value of the diet. Two varieties of wheat (Kapowa or Barrie) were used at dietary inclusion rates of 65% and enzyme at the level of 0.5 g/kg, and 62% of the wheats were used as the control diets. The results showed that there were no significant differences between the main effect on performance of enzyme A and enzyme B compared with those of the control diets (p > 0.05). Furthermore, the costs of feed for the control, enzyme A and enzyme B addition were 0.269, 0.262, and 0.262 $/kg bird, respectively. Overall, these results suggest that the efficacy of enzyme A on the improvement of weight gain and reduction of digesta viscosity was significantly greater than that of enzyme B when the two enzymes were added to a relatively viscous wheat diet. The economic benefits of the two enzymes when added to the diet containing low viscous wheat was achieved by uplifting their nutrient concentration.

Key Words: Efficacy, Enzyme preparations, Wheat, Broilers, Log model

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