

Yorkshire × Duroc) pigs (43.5 ± 3.8 kg) allotted by sex and weight, were randomly allocated to one of four dietary treatments in a 2 × 2 factorial, with the factors being MOS (0 or 0.05%) and BMD (0 or 33 ppm). A Basal sorghum-SBM diet was formulated to meet the NRC 1998 standards for swine, and had no addition of pharmacological levels of cooper sulfate. The trial was conducted for 63 days during the summer (av. temperature 29.7°C, and relative humidity 62%). Results were analyzed with the General Linear Model of SPSS, and means were compared using the Duncan test. Average daily gain (0.775 kg/d), ADFI (2.414 kg/d) and F:G (3.12:1) were not affected (P>0.05) by the level of MOS or BMD. Pigs fed the diet added with both MOS and BMD, had higher ADG (P<0.05) than those fed the other three diets (0.855 vs 0.749 kg/d). By adding none or both of the additives, pigs had higher (P<0.05) carcass length at slaughter (75.1 vs 73.2 cm), than animals fed diets containing either MOS or BMD (Interaction MOS × BMD P<0.05). Pigs receiving BMD had higher (P<0.05) average fat depth than pigs with no BMD in their diet (30.3 vs 26.8 mm). Diets containing MOS alone had no effect on growth performance or carcass characteristics of growing/finishing pigs. Health condition of pigs was not affected by treatments. In conclusion, withdrawing BMD from the diet of growing/finishing pigs had no effect on performance or carcass characteristics. Adding MOS had a positive effect on ADG only if BMD was also provided in the diet.

Key Words: Pigs, Antibiotics, Mannan Oligosaccharides

T221 Effect of a dry organic acid blend on lactating sow feed intake and performance. J. Zhao^{*1}, R. J. Harrell¹, L. L. Greiner², X. Wang³, G. L. Allee³, F. Navarro¹, and C. D. Knight¹, ¹Novus International Inc, St. Louis, MO, ²Innovative Sow Solutions, Carthage, IL, ³University of Missouri, Columbia.

A total of 112 mixed parity (1, 2, or 3) lactating sows (PIC C22) were used to investigate the impact of a dry organic acid blend (DOAB) (ACTIVATE[®] Starter DA, registered trademark of Novus International, Inc., St. Louis, MO), containing 2-hydroxy-4-(methylthio) butanoic acid calcium, benzoic acid, and fumaric acid, on sow feed intake, wean to estrus interval, and litter growth performance. Sows were blocked by parity and randomly assigned to either a non-medicated basal corn-soybean diet, or the basal diet supplemented with 0.2 or 0.4% DOAB upon entry into the farrowing house. Sows were fed via a HOWEMA automatic feeding system 1.8, 2.7, and 3.6 kg for the day of farrowing, d 1 and d 2 post-farrowing, respectively, and ad libitum until weaning at 17±1 days of lactation. Daily feed intake was higher from 3 to 5 d post-farrowing with 0.4% DOAB supplementation (P < 0.05) compared to 0.2% or controls. Sows consumed 6.3, 6.3, and 7.2±0.3 kg/d feed from 3 to 5 d post-farrowing for the control, 0.2, and 0.4% DOAB, respectively. Feed intake was not affected by DOAB supplementation for the remainder of the study (P = 0.83). The wean to estrus interval was linearly reduced with DOAB supplementation (P < 0.05), with 9.2, 7.7, and 5.5±1.2 days for the control, 0.2, and 0.4% DOAB, respectively. Sow fecal E. Coli and C. perfringens counts (10 sows/treatment) on d 3 and 10 post farrowing was not different among treatments (P > 0.26). No differences were observed between treatments on litter weights, number weaned, or number of fall behinds (P > 0.31). In summary, DOAB supplementation improved feed intake during 3-5 days postfarrowing and shortened the return to estrus interval.

Key Words: Organic Acid, Sow, Reproduction

Nonruminant Nutrition: Poultry Nutrition II

T222 Broiler performance and yield observed with enzyme supplementation and a corn matrix adjustment for energy. X. Sun^{*1}, C. Troche¹, A. McElroy¹, J. Remus², E. Wong¹, and C. Novak¹, ¹Virginia Polytechnic Institute and State University, Blacksburg, ²Danisco Animal Nutrition, Carol Stream, IL.

Two studies were conducted to investigate the effect of a corn matrix adjustment and enzyme supplementation on broiler growth and performance from 0 to 49 days of age. A 2 × 2 factorial treatment design was used testing two corn matrix (CME) values for energy (actual ME vs. corn A with matrix increase of 138 kcal ME/ kg – trial 1; corn B with matrix increase of 125 kcal ME/ kg – trial 2) with or without enzyme supplementation (0.5 % Avizyme 1502 – AZ). For each trial, 1,440 Ross 708 male chicks were randomly assigned to one of four dietary trts (9 reps/trt and 40 chicks/ rep) on d 1. Body weight (BW) and feed intake (FI) were recorded at feed changes (d 14, 28, 37) and d 7 and 49. At d 28, subsets of birds were transferred to Petersime batteries to determine feed passage rate. At d 50 and 51, 54 birds per trt were processed to evaluate meat yield. Using corn B, an interaction was observed evaluating BWG with improvements noted when supplementing AZ with no matrix adjustment while reduced with a matrix adjustment to 35 d. The opposite was true using corn A. BWG was similar across trts from d 35 to 49 using either corn. FI followed BWG data using corn B. Using corn A, feeding matrix adjusted diets increased FI as compared to non adjusted diets from 37

to 49 days of age. Additionally, FI of broilers fed the AZ supplemented/ non adjusted diet ate less as compared to broilers fed the adjusted/ with AZ or non adjusted diet from 28 to 37 days of age. Overall, FCR in birds consuming non adjusted diets (corn A and B) was better (P ≤ 0.05) as compared to birds fed CME adjusted diets. Feeding corn A, percent tender was increased (P ≤ 0.05) with enzyme supplementation (4.80 vs. 4.62%). Additionally, percent fat pad was reduced (P ≤ 0.05) with a matrix adjustment for energy using corn A. In conclusion, decisions regarding matrix adjustments to utilize additional energy released with enzyme supplementation are dependant on corn source.

Key Words: Broiler, Enzyme, Matrix Energy Corn Source

T223 The effect of chitosan and natural mineral complex supplementation on egg production and egg characteristic in laying hens. J. S. Yoo^{*1}, Y. J. Chen¹, J. H. Cho¹, J. H. Lee², B. C. Park², and I. H. Kim¹, ¹Dankook University, Cheonan, Choognam, Korea, ²CJ Feed Inc, Incheon, Gyeonggi, Korea.

This study was conducted to investigate the effects of dietary natural mineral liquid complex(NMLC) on egg production and egg characteristic in laying hens. NMLC is made of *Aretmisia princeps*

pinus, densiflora sieb and Biotite. In Exp 1, a total of two hundred fifty two laying hens were randomly allocated into seven treatments with six replications for six weeks. Dietary treatments included 1) CON(control), 2) M1 0.25(CON+1% chitosan+0.25% NMLC), 3) M2 0.25(CON+2% chitosan+0.25% NMLC), 4) M2 0.50(CON+2% chitosan+0.50% NMLC), 5) M3 0.25 (CON+3% chitosan+0.25% NMLC) and 6) M3 0.50(CON+3% chitosan+0.50% NMLC). During the experiment period, dietary NMLC treatments could improved in egg production, egg shell strength, egg shell thickness, yolk color, haugh unit and mineral ingredients of blood and yolk compared to CON($P<0.05$). In conclusion, chitosan 3% showed higher egg production, egg shell strength and yolk color compared others($P<0.05$). Also, NMLC 0.5% was more improvement than NMLC 0.25%. In Exp. 2, a total of two hundred forty birds were randomly allocated into four treatments with eleven replications for six wk. Dietary treatments included 1) CON(control) 2) M0.5(CON+3% chitosan+0.5% NMLC), 3) M1.0(CON+3% chitosan +1.0% NMLC) and 4) M1.5(CON+3% chitosan+1.5% NMLC). For overall period, M1.5 had improved egg production compared to others ($P<0.05$). However, M0.5 showed higher egg weight compared to other treatments($P<0.05$). M1.5 showed a statistically improved egg shell strength and thickness compared to CON($P<0.05$). Haugh unit was increased in CON and M1.0 compared to M1.5($P<0.05$). Ca and Fe concentrations of blood was increased in M1.5 compared to CON($P<0.05$). M1.5 improved K concentration of yolk compared to CON($P<0.05$). In conclusion, 3% chitosan + NMLC supplementation in layer hen diet improved egg production, egg shell strength, egg shell thickness, Ca and Fe concentrations in blood and K concentration in yolk.

Key Words: Natural Mineral Liquid Complex, Egg Characteristics, Layer

T224 Effects of dietary delta-aminolevulinic acid supplementation on egg production, egg quality and blood parameters in laying hens. Y. J. Chen^{*1}, J. H. Cho¹, H. J. Kim¹, J. S. Yoo¹, Q. Wang¹, Y. Hyun², and I. H. Kim¹, ¹Dankook University, Cheonan, Choongnam, Korea, ²Easy Bio System, Inc, Cheonan, Choongnam, Korea.

Effects of dietary delta-aminolevulinic supplementation on egg production, egg quality and blood parameters were examined in a laying hens feeding trail. Two hundred forty (Hy-line brown, 21 wk old) layers were randomly assigned to four dietary treatments with 10 replications (six layers in adjacent three cages). Dietary treatments were: 1) CON (basal diet), 2) ALA1 (CON + ALA 5 ppm), 3) ALA2 (CON + ALA 10 ppm), 4) ALA3 (CON + ALA 15 ppm). All diets were formulated to meet or exceed NRC (1994) recommendation for laying hens. Egg production and egg weight were not influenced by the ALA supplementation ($P>0.05$). Egg shell thickness and breaking strength were also not affected by the treatments ($P>0.05$). Egg yolk index was higher in ALA3 treatment than that of the CON treatment ($P<0.05$) at the end of 4 and 8 wk. Haugh unit was increased in ALA3 treatment compared with CON and ALA1 treatments at the end of 8 wk ($P<0.05$). However, yolk color unit was not affected by the ALA supplementation ($P>0.05$). Serum iron concentration was increased in the ALA2 added treatment compared with CON treatment ($P<0.05$). Similarly, total iron binding capacity was also higher in the ALA2 treatment than that of the other dietary treatments ($P>0.05$). The difference of total protein between 8 and 0 wk was higher in ALA2 treatment than CON treatment ($P<0.05$). No significant effects were observed on Hb, albumin, WBC, RBC and lymphocyte concentrations ($P>0.05$). In conclusion, dietary

ALA supplementation can positively affect egg yolk index, haugh unit and serum iron concentration.

Key Words: Delta-Aminolevulinic Acid, Egg Quality, Laying Hens

T225 Effect of dietary lipids and time of feeding on immune tissue n-6 and n-3 fatty acid distribution during lipopolysaccharide challenge in broiler chickens. D. Gonzalez*, A. S. Abd El-Hakim, M. P. Goeger, and G. Cherian, *Oregon State University, Corvallis.*

Due to the distance of shipment or delays in shipment, newly hatched chicks are often subjected to a 48 to 54 hr delayed access to feed and water. Delayed access to feed has been reported to reduce growth and development of the small intestine, reduce organ weights and a lower final body weight. The current study investigated the effect of early vs. late access to feed and dietary lipids on lipopolysaccharide (LPS)-induced alterations in fatty acid metabolism in broiler birds. A total of sixty chicks were used for the study. The chicks were fed a high or low n-3 diet within 5 hrs of hatching (early) or after 24 hrs of hatching (late). LPS injection led to a decrease in total n-6 fatty acids in the liver and spleen when compared with non-injected birds ($P<0.05$) in all treatments. Feeding high n-3 diets resulted in an increase in n-3 fatty acids in the spleen and liver tissue when compared to low n-3 when exposed to LPS challenge ($P<0.05$). Time of feeding significantly influenced different parameters in chicks exposed to challenge. When fed late, lower n-6 fatty acid was observed in liver tissue of both high and low n-3 diets than early-fed birds ($P<0.05$). Plasma non-esterified fatty acids were lowest in high n-3 diet birds fed early ($P<0.05$). The spleen tissue total fat content was highest in low n-3 birds fed late ($P<0.05$). There was no difference in the final body weight or organ weights of birds ($P>0.05$). During inflammation, lipid substrates for the activated immune system are provided by fatty acids. Therefore, dietary and management strategies directed at attenuating immune tissue lipid content may prove beneficial in reducing inflammatory responses and in increasing production performances in broiler chickens.

Key Words: n-3 Fatty Acid, Inflammation

T226 Fiber component type and level affect DDGS nutrient digestibility. M. K. Manangi^{*1}, C. N. Coon¹, E. E. M. Pierson², and M. Hruby², ¹University of Arkansas, Fayetteville, ²Danisco, St. Louis, MO.

Due to the increase in production of ethanol from corn, there has been an increase in the availability of distillers dried grains with solubles (DDGS) in US poultry feeds. Globally, the usage of DDGS in poultry feeds is also increasing. In many cases, the practical inclusion of DDGS has been less than science-based recommendations because of the possible impact of its batch-to-batch nutrient variability on poultry performance. A study was conducted to quantify the in vitro characteristics of various samples of DDGS with NIR measurements and correlate these with determined in vivo assays. Each of the seven DDGS samples originated from the same lot of corn. Samples were subjected to proximate, fiber and mineral analyses. Additionally, all DDGS samples were precision-fed to 7 market-age broilers per treatment and total excreta collected during a 48 hours post-feeding

period. There was a strong positive correlation ($r = 0.86$; $P < 0.05$) between DDGS dry matter (DM) digestibility and TME. Of the fiber components analyzed, the order of strength for correlations of their in vitro determination with dry matter digestibility (from highest to lowest) was for NDF ($r = -0.86$; $P < 0.05$), crude fiber ($r = -0.81$; $P < 0.05$), hemicellulose ($r = -0.79$; $P < 0.05$) and ADF ($r = -0.02$; $P > 0.05$). This information could allow for a more reliable DDGS screening when evaluating nutrient digestibility and ME of this ingredient.

Key Words: DDGS Digestibility, Fiber, TME

T227 Extraction of saponins from guar meal. R. Kakani*, O. Gutierrez, A. Haq, and C. A. Bailey, *Texas A&M University, College Station.*

Two different methods were evaluated for extracting saponins from guar meal. In one method 25 grams of guar meal were placed in cellulose extraction thimbles and refluxed with 250 ml methanol for 24 hrs using Soxhlet extraction apparatus. In the second method, 25 grams of guar meal was refluxed directly for 3.5 to 4 hrs in equal volumes of water and absolute ethanol (125 ml of each). A roto-evaporator was used to evaporate the methanol extract to dryness and then approximately 100 ml of distilled water was added back. After filtering the solids from the ethanol-water extract, the ethanol was evaporated with the roto-evaporator leaving a volume of approximately 100 ml. The extracts were transferred to separatory funnels, equal volumes of n-butanol added and after vigorous shaking the solutions were left to partition overnight. The upper, saponin-rich n-butanol fractions were collected separately and the remaining aqueous fractions were partitioned two more times with n-butanol. The pooled n-butanol fractions were next evaporated to dryness, a little water added and then either freeze dried or immediately subjected to preparative reverse phase C-18 (octadecylsilyl coated silica) flash chromatography. The average yield of the freeze dried n-butanol partitions (4 replicates) was 7.34% and 4.91% for the methanol and ethanol methods respectively. These extracts were next evaluated for hemolytic activity using serial dilutions of 3 mg freeze dried extract per ml isotonic saline. Chicken RBCs (100 μ l whole blood) were added to 2 ml of the serial diluted isotonic saline and allowed to sit at room temperature for 2 hrs. Both the extracts were hemolytic at concentrations greater than 750 μ g/ml.

Key Words: Guar Meal, Saponins Extraction and Yield, Hemolysis

T228 Effects of corn-, wheat-, and flax-based broiler diets with or without enzyme supplementation on proliferation of *Clostridium perfringens*: In vitro study. X. Wang*, G. Blank, and B. A. Slominski, *University of Manitoba, Winnipeg, Canada.*

Clostridium perfringens is the major predisposing factor for necrotic enteritis in broiler chickens. In this investigation the individual growth of five *C. perfringens* strains was examined using supernatants prepared from either digested or non-digested corn or wheat-based diets mixed with thioglycollate broth and supplemented with or without exogenous carbohydrase enzymes. Following incubation at 40°C for 6 h increases in growth were determined. Overall, compared to the control which consisted of thioglycollate broth plus inocula, the level of vegetative

growth was higher with the supernatants. However, among the five strains evaluated no clear pattern emerged with regards to vegetative growth in any of the supernatants regardless of enzyme supplementation. Spore germination of a cocktail consisting of three *C. perfringens* strains was similarly investigated. In all supernatants near complete germination of spores was evident within three hours. Germination was followed by vegetative growth which appeared lowest in the corn-based diet supernatant. Growth following 6 h at 40°C of a five strain cocktail of *C. perfringens* in digesta obtained from broilers fed corn-soya, wheat-barley or flax diets was also investigated. In all cases vegetative growth was not observed. Instead, populations were observed to decrease gradually; the highest and lowest survival occurred with the flax and corn-soya based digesta, respectively.

Key Words: *Clostridium perfringens*, Broiler Diets, Enzyme

T229 Influence of processing conditions of fish meal on digestibility of dietary components in broilers at 21 days of age. A. de Coca-Sinova, A. P. Bonilla, E. Jiménez-Moreno, R. Lázaro, and G. G. Mateos*, *Universidad Politécnica de Madrid, Spain.*

Bacterial contamination, in particular Salmonella spp. contamination, limits the use of fish meal (FM) in prestarter diets for broilers. In consequence, FM by-products are generally processed under severe heat conditions (100° C for 120 min) to reduce bacteria load. We studied the effect of processing FM under different time and temperature conditions on total tract apparent retention of nutrients (TTAR) and AME_n of diets in broilers at 21 d of age. There were six dietary treatments that differed in the type of FM used to replace 5% of the crude protein of the diet. There were a control diet (SFM) that included 8.0% of standard FM (100° C for 120 min) and a positive control diet (FMLT) that included 7.1% of a spray dried FM (70° C). In addition, there were four extra diets in which the rendered FM was steam-processed according to a factorial combination of temperature (80° C vs. 90° C) and time (50 vs. 90 min). Each treatment was replicated eight times (10 chicks caged together). The experimental design was completely at random and data were analysed by using a protected t-test and two non-orthogonal contrasts; 1) FMLT vs. SFM and 2) influence of temperature (80 vs. 90° C) and time (50 vs. 90 min) and their interaction. The TTAR of DM, organic matter, nitrogen (N), and AME_n of the diets were determined at 21 d of age. Digestibility was best in broilers fed FM LT or FM processed at 80° C for 50 min. Time but not temperature reduced TTAR ($P \leq 0.01$). The TTAR of all dietary components and AME_n of the diets were higher for FM heated for 50 min than for FM heated for 90 min (69.2% vs. 65.4% for N and 3,041 vs. 2,976 kcal/kg for AME_n, respectively; $P \leq 0.01$). We conclude that digestibility of dietary components is best for spray dried fish meal and that increasing processing time from 50 to 90 min to reduce microorganism load and Salmonella spp. counts might reduce the quality of fish meal in prestarter broiler diets.

Key Words: Fish Meal Digestibility, Processing Conditions, Broiler Chick

T230 Use of activity staining for monitoring site of β -glucanase activity in the gastrointestinal tract of broiler chickens. A. A. Sadeghi*¹ and P. Shawrang², ¹*Islamic Azad University, Tehran, Iran,*

Ninety day-old broilers were selected and randomly allocated to diet based soybean meal-corn without or with β -glucanase supplementation. At 3 and 6 wk of age, fifteen chickens from each treatment were slaughtered and the crop, gizzard, duodenum, jejunum and ileum contents were emptied and collected for electrophoresis and activity staining. The normal spectrophotometer method for β -glucanase was conducted on collected samples of all treatments. Proteins extracted from the various digesta samples were resolved using SDS-PAGE using 12.5% and native-PAGE using 7% polyacrylamide in the running gel. After SDS-PAGE, the gel was stained with Coomassie blue R-250 and destained. After native-PAGE, the gel related to β -glucanase activity stain was dipped into Lichenan (1.0 g/L solubilized with heat in 100 mM sodium acetate buffer, pH 5.0) and incubated at 50°C for 10 h. β -glucanase activity in native-PAGE gel was detected by overlaying the gel with 2% agar dissolved in above buffer, containing 0.3% congo red for 30 min. Fixation was completed with dilute acetic acid (1:9 v/v with water) for 15 min. Data were analyzed as a completely randomized design using the GLM procedure of SAS (1996). The normal spectrophotometer method failed to detect exogenous β -glucanase activity in the diet as well as in the digesta of crop, proventriculus, gizzard, duodenum and jejunum of broiler chickens fed the β -glucanase diet. Exogenous β -glucanase protein was detected by SDS-PAGE in the enzyme diet as well as in the digesta. Enzyme activity was detected by the activity stain native-PAGE assay in the enzyme diet and the digesta collected from the crop, gizzard and duodenum with the exception of jejunum and ileum. β -glucanase activity in digesta from the crop and proventriculus was higher than that from gizzard and small intestine ($P < 0.05$). No activity detected in the small intestine. The result of the study suggests that the activity stain assays allow the detection of low levels of exogenous β -glucanase activity in the diet as well as in the digesta collected from the gastrointestinal tract of the broiler chicken.

Key Words: Native-PAGE, β -glucanase Activity, Broiler Chickens

T231 Differential developmental gene expression of nutrient transporters in the small intestine of male and female chickens from lines selected for high or low juvenile bodyweight. C. R. Miller*, P. B. Siegel, K. E. Webb, Jr., and E. A. Wong, *Virginia Polytechnic Institute and State University, Blacksburg.*

The objective of this study was to evaluate the developmental gene expression of nutrient transporters in the small intestine of male and female chickens from lines that had undergone long term selection for high (HWS) or low (LWS) 8-wk body weight. Nutrient transporters investigated were the peptide transporter PepT1, amino acid transporter EAAT3, and monosaccharide transporters GLUT5 and SGLT1. Chicks were reared in batteries with ad libitum access to feed and water. Chicks were weighed and killed on embryonic d 20 (e20), d of hatch (DOH with no access to feed), and d 3 (D3), d 7 (D7), and d 14 (D14) post hatch. RNA was extracted from duodenum, jejunum, and ileum from four males and four females from each line and time point except female D7 (n=2). Expression of nutrient transporters was assayed by real time PCR using the relative quantification method. There was a sex x age interaction in PepT1 gene expression with peak PepT1 expression at a younger age in females than males ($P = 0.0002$). Expression of SGLT1 was higher in females than males ($P < 0.0001$)

with a sex x age interaction ($P < 0.0001$). Females induced SGLT1 gene expression on DOH which was maintained through D14. In contrast, SGLT1 gene expression in males gradually increased through D7 and then decreased to DOH levels by D14. Gene expression of EAAT3 and GLUT5 was not different in males and females. These results indicate that expression of PepT1 and SGLT1 are differentially expressed in male and female chickens regardless of selection for high or low juvenile body weight. These results also show a sexual dimorphism in the capacity to absorb peptides and glucose from the intestine, which has implications for the poultry industry with regard to diet formulations for straight-run and sex-separate grow-out operations.

Key Words: Chicken, Nutrient Transporters, Small Intestine

T232 Effect of main cereal of the diet and particle size of the cereal on productive performance and egg quality of brown laying hens in early phase of production. H. M. Safaa^{1,2}, E. Jiménez-Moreno¹, B. Vicente¹, R. Lázaro¹, X. Arbe³, and G. G. Mateos^{*1}, ¹*Universidad Politécnica de Madrid, Spain*, ²*Animal Production Department, Faculty of Agriculture, Cairo University, Egypt*, ³*Cantos Blancos, S.L, Guadalajara, Spain.*

A total of 960 Lohmann Brown laying hens was used to study the effect of the main cereal (corn vs. wheat) of the diet and mean particle size (MPS; hammer milled to pass through a 6-, 8- or 10-mm screen) of the cereal on productive performance and egg quality from 20 to 48 wk of age. The six diets were isonutritive and were based on soybean meal, sunflower meal, soy oil, and either corn or wheat. They contained 2,750 kcal AME_n/kg, 16.5% CP, 0.80% total lysine, and 0.40% total methionine. The experimental design was completely at random with six treatments arranged factorially (two cereals and three MPS). Each treatment was replicated eight times (20 hens per replicate). Productive traits were recorded every four weeks and egg quality was measured at 48 weeks of age. Mean particle size of the experimental diets were 935, 1,126 and 1,411 μ m for the corn diets and 1,078, 1,262 and 1,335 μ m for the wheat diets, ground at 6, 8, and 10-mm, respectively. For the entire experiment the only significant effect on productive traits observed was for feed intake ($P \leq 0.001$) that was greater for hens fed coarse ground cereals (10-mm) than for hens fed fine ground cereals (8- or 6-mm). Also, from 45 to 48 weeks of age hens fed corn had higher proportion of large eggs (≥ 63 g) than hens fed wheat (84.5 vs. 79.4%; $P \leq 0.05$) but no differences were detected in any other period. Dietary treatment did not affect percentage of broken, shell-less, and dirty eggs ($P \geq 0.10$). Percentages of shell, yolk, and albumen, and albumen and shell quality were similar for all treatments ($P \geq 0.10$). We conclude that neither type of cereal nor particle size affect productive performance or egg quality of young hens, except for feed intake that was increased with the coarser particle size.

Key Words: Cereal, Particle Size, Laying Hen Performance

T233 Evaluation of additives in chicks challenged with necrotic enteritis. J. L. Shelton*, A. R. Garcia, and D. W. Giesting, *Cargill Animal Nutrition, Elk River, MN.*

Two experiments (EXP) were conducted at the Cargill Animal Nutrition Innovation Center to determine the effect of additives on growth

performance in chicks challenged with Necrotic Enteritis (NE). Both EXP were conducted using battery cages and chicks (6 per pen) were housed from hatching to 21 d (EXP 1) or 28 d (EXP 2). Initial and final body weights (BW) were 40 g and 774 g for EXP 1 and 39 g and 1,248 g for EXP 2. Feed intake and BW were measured weekly for determination of gain and feed efficiency. Chicks had ad libitum access to feed and water. Chicks were inoculated through the feed with coccidia (*E. acervulina*, *E. maxima*, and *E. tenella*) on d 9 and then with *Clostridium perfringens* on d 14, 15, 16, and 17. In both EXP, the treatments included an unchallenged negative control (NC, no additives), a challenged NC, and a challenged positive control (with added virginiamycin, Vm). The additives that were tested in these EXP were *Bacillus* (B), a plant extract (PE), mannan oligosaccharide (M), a prebiotic added at a high (PREH) and a low (PREL) level. In both EXP, adding Vm to the diet of challenged birds improved growth performance relative to those fed the NC. In EXP 1, during the challenge period chicks fed B, B+PE, M, or B+PE+M had increased gain:feed ($p < 0.05$) relative to those fed the NC. The 3-way combination of B+PE+M produced numerical increases in ADG and gain:feed relative to B or M fed alone or the 2-way combinations of B+PE or B+M. In EXP 2, during the challenge period chicks fed B, PREL, PREH, B+PREL had increased ($p < 0.05$) ADG relative to those fed the NC. Also, chicks fed the PREL and B+PREL had increased ($p < 0.05$) gain:feed relative to those fed the NC. For the overall growth period, chicks fed the combination of B+PREH+PE had increased ($p < 0.05$) gain:feed relative to those fed the NC diet. Results from these studies indicate that combining additives of different types could improve performance in chicks challenged with NE, but it is important to choose additives with complementary modes of action.

Key Words: Necrotic Enteritis, Probiotic, Plant Extract

T234 Effects of dietary genistin on performances, organ weight and bone development in young male chicks. G. D. Kim*, J. H. Han, and K. M. Chee, *Korea University, Seoul, Korea.*

Genistin together with genistein, daidzin and daidzein is one of the isoflavones (ISF) in soybean meal, a major dietary protein source for poultry. ISF are diphenolic compounds and naturally occurring phytoestrogens. Some of the phytoestrogenic effects of the ISF include anabolic influence on bone metabolism in ovariectomized rats, and growth promoting in pigs. Present study was conducted to investigate effects of dietary genistin, a glucosidic form, on growth performances, bone development, organ weight and secondary sexual development in male chicks. One hundred and twenty eight, d-old male chicks (Hy-Line) were distributed at random in 4 replicates of 8 birds per treatment. A purified-type basal diet consisting of soy protein concentrate (low in ISF) as the only protein source, was supplemented with 4 levels (0, 250, 450, and 650 ppm) of genistin (purity 85%). Dietary Ca level was limited to 50% of the NRC to find out any effects of the genistin on bone development. Feed intake, body weight gain, and feed/gain ratio of the birds during the 3 wk feeding period were not affected by the genistin intake. Average weights of comb, liver, thymus, and F-sac expressed as % body weight at 7th day of the feeding were not different among the dietary groups. However, testicle weights of the birds fed the diets containing the genistin 450 and 650 ppm were significantly lighter (22 & 26 mg) compared to that (32 mg) of the control birds, although the difference disappeared later. Thymus weight of the birds fed the 450 ppm genistin diet for 3 wks was significantly lighter ($P < 0.05$) than that of the control (387 vs. 529 mg). Serum alkaline

phosphatase activity tended to increase as more genistin intake was consumed. In conclusion, the genistin in purified form seems to have some biological effects in male chicks without changing the overall growth performances.

Key Words: Genistin, Performance, Testicle Weight

T235 Dietary persimmon peel powder and its tannin extract reduce the content of hepatic lipids in laying hens. C. W. Kang*¹, Y. K. Shin², S. J. You¹, and B. K. An¹, ¹*KonKuk University, Seoul, Korea,* ²*MK Bioscience Co. Inc., Suwon, Korea.*

The persimmon peel, which is a by-product of dried fruit and juice, has been known as a good source of nutritional antioxidant vitamins, polyphenols and dietary fibers. This experiment was undertaken to evaluate the dietary effects of persimmon peel powder (PP) and its soluble tannin extract (ST) on laying performance, egg quality and physiological characteristics in laying hens. A total of two hundred, 60-wks-old, Hy-Line Brown layers were divided into 5 groups and fed the each experimental diet containing PP 0.15%, PP 0.50%, ST 0.075%, or ST 0.25%, respectively, for 6 wks. There were no significant differences in the egg production, daily egg mass and feed intake among the groups. The yolk color and eggshell color were significantly improved by the addition of PP and ST into layer diet. Haugh units in PP and ST groups were significantly ($P < 0.05$) higher during a week of storage. The concentrations of hepatic total cholesterol, triacylglycerol and phospholipid in hens fed the diet containing PP or ST tended to be reduced as compared to those of the control. The profiles of serum lipid fractions and intestinal microflora were not affected by dietary either PP or ST. In conclusion, the feeding of PP and ST improved the yolk and eggshell colors and Haugh unit during storage. The results also suggested that PP and ST can be used as valuable feed additives for reducing hepatic lipid contents without harmful effects on overall productive performance and physiological responses in laying hens.

Key Words: Persimmon Peel Powder, Soluble Tannin Extract, Hepatic Lipid Contents

T236 Efficacy of a bacillary probiotic in broilers. M. I. Gracia¹, E. Esteve-García², P. Cachaldora³, T. Marubashi⁴, E. McCartney⁵, and P. Medel*¹, ¹*Imasde Agropecuaria, S.L., Pozuelo de Alarcón, Spain,* ²*IRTA, Constantí, Spain,* ³*COREN, Ourense, Spain,* ⁴*Calpis Co Ltd., Tokyo, Japan,* ⁵*Pen&Tec Consulting, Sant Cugat del Vallès, Spain.*

Four experiments involving 5,524 male broilers in 126 replicates evaluated the efficacy of a bacillary probiotic (Calsporin[®], Calpis Co Ltd.) containing 1×10^{10} viable spores of *Bacillus subtilis* C-3102 per g. A completely randomized design was applied in each study using two experimental treatments: 1) basal diet (control), and 2) basal diet with 50 mg/kg of probiotic (supplying 5×10^5 CFU per gram feed) in both starter and grower phases. Two studies used mash feeds and two studies used pelleted feeds. The experimental data were tested for homogeneity, pooled and combined in a meta-analysis. Parameters selected were body weight (g) at 21 and 42 d of age, mortality (%), weight gain (g/d), feed intake (g/d) and feed efficiency (feed/gain) at 1-21, 22-42 and 1-42 d of age, and European Production Efficiency Factor (EPEF) at 1-42 d of age. Probiotic supplementation and

experiment were considered as main effects. At 21 d of age, the broilers fed probiotic weighed 3.2% more than controls (806 vs 832 g; $P < 0.01$), and 1.6% more at 42 days of age ($P = 0.056$). Mortality was considered normal (mean 6.4%) in the experimental models used (feeds without coccidiostats and antibiotics, broilers in two studies bedded on once-used litter) and was unaffected by treatment. From 1 to 21 d, the probiotic increased growth (36.4 vs 37.6 g/d; $P < 0.01$) and feed intake (59.2 vs 60.4 g/d; $P < 0.05$). From 22 to 42 d probiotic supplementation decreased feed to gain ratio (2.02 vs 1.96 feed/gain; $P < 0.05$). Over the global period, broilers fed the probiotic grew faster (61.2 vs 62.2 g/d; $P = 0.055$), converted better (1.90 vs 1.85 feed/gain; $P < 0.05$), and showed better EPEF values (303 vs 317; $P < 0.01$) than controls. No interaction between probiotic supplementation and experiment was found, indicating that the effect of the probiotic was homogeneous across trials. In conclusion, these data provide evidence that this probiotic improves broiler performance at a dose of 50 mg/kg.

Key Words: *Bacillus subtilis*, Probiotic, Broilers

T237 Expression profiling of the solute carrier gene family in chicken intestine. H. Li^{*1}, E. R. Gilbert¹, Y. Zhang², O. Crasta², D. Emmerson³, K. E. Webb Jr¹, and E. A. Wong¹, ¹Virginia Polytechnic Institute and State University, Blacksburg, ²Virginia Bioinformatics Institute, Blacksburg, VA, ³Aviagen, Huntsville, AL.

The members of the solute carrier (SLC) family are membrane-associated transporters that facilitate the passage of solutes across cell membranes and play an important role in absorption and distribution of nutrients across the small intestine. Compared to humans, little information is available on the developmental expression of SLC gene family members in chickens. The objective of our research was to determine the mRNA expression profile of the entire SLC gene family in the chick small intestine from late embryogenesis until 2 wk posthatch using Affymetrix chicken genome microarrays. Small intestines from 84 male chicks were collected on embryonic d 18 (e18) and 20 (e20), d of hatch, and d 1, 3, 7, and 14 posthatch. There were 162 SLC genes belonging to 41 SLC families expressed in the chicken small intestine. Fifty-nine SLC transporter genes showed at least a two-fold change ($P < 0.01$) in expression between e18 and d14, of these 26 showed at least a five-fold change ($P < 0.01$). The majority of transporters (103/162) showed less than a two-fold change in expression from e18 to d14 posthatch. Forty eight SLC genes showed upregulation ($>$ two-fold) and 11 SLC genes showed downregulation ($>$ two-fold) between e18 and d14. The glucose transporter SLC2A2 showed the greatest upregulation (104-fold) and the organic cation transporter SLC22A13 showed the greatest downregulation (16.5-fold) from e18 to d14. These results enhance our understanding of the relationship between SLC gene expression and the changes in chicken intestinal absorptive function at hatch as the chick shifts from nutrition based on a lipid-rich yolk to exogenous carbohydrate-rich feeds.

Key Words: Solute Carriers, Chicken Intestine, Microarrays

T238 Effects of Versazyme™ on ileal micro-architecture in young broilers as measured by histomorphometrics and scanning electron microscopy. C. C. Chiang¹, M. Chichlowski², R. Qiu^{*2}, J. Croom², L. Daniel², and J. Shih², ¹National Chung Hsing University, Taiwan, ²North Carolina State University, Raleigh.

Versazyme™, a microbial keratinase preparation (400,000 U/g) that enhances protein digestion in poultry, has been previously found to alter intestinal muscle thickness when fed as a supplement to young broilers. To further investigate the effects of Versazyme™ on intestinal structure, 30 male broiler chicks were fed a standard starter diet (22% CP; CON) and 30 fed the starter diet plus 0.1% Versazyme™ (VZ) for 20 d. At hatch (day 0) and at days 3, 6, 14 and 20 post-hatch, six birds from each treatment group were euthanized and sections of the ileum were fixed and embedded in paraffin, sectioned and stained with hematoxylin and eosin in preparation for histomorphometric analysis using a computerized microscopic image analyzer. Histological parameters measured included villus height, villus perimeter, mid-villus width, crypt depth, external muscle layer thickness and height of enterocytes at mid villus. Adjacent pieces of tissue were fixed in glutaraldehyde and osmium tetroxide and examined for surface changes on villi, enterocytes and goblet cells using scanning electron microscopy (SEM). Although changes in histological parameters varied with age ($p \leq 0.05$), no VZ or age x treatment changes were noted ($p \geq 0.05$). SEM observations demonstrated several differences in the villi surface between CON and VZ. The surface of villi from VZ birds exhibited highly undulating surfaces with large and deep clefts as compared to CON villi. Furthermore, the surface of VZ villi contained large numbers of crater-like spots or pits, found on the surface of enterocytes or cells adjacent to enterocytes. It is unclear whether these craters are the site of mucus secretion by goblet cells or represent structural erosion of the epithelial surface. Other changes noted were VZ villi microvilli numbers appeared greater than those of CON. Additionally, VZ villi appeared to have less mucus and mucus-associated bacteria than CON. Although Versazyme™ did not alter the dimensions of major histological features in the ileum of growing broilers in the present study, it did alter the surface characteristics of the villi.

Key Words: Keratinase, Versazyme, Intestinal

T239 Effect of a direct fed microbial on oxidative stress in the ileal and cecal epithelia of broilers. R. Qiu^{*1}, C. Ojano-Dirain², W. G. Bottje², C. Chiang³, M. Chichlowski¹, J. Croom¹, L. Daniel¹, and M. Koci¹, ¹North Carolina State University, Raleigh, ²University of Arkansas, Fayetteville, ³National Chung Hsing University, Taiwan.

Two trials were conducted to elucidate the effects of broiler supplementation with Primalac®, a direct-fed microbial supplement (DFM), on cellular oxidative stress in the ileum and cecum. In Trial 1, eighteen broiler chicks (6 chicks per treatment) were fed either a starter pullet diet (17.4% CP; CON), CON + salinomycin (50 ppm; SAL) or CON + Primalac® (0.3%; DFM) for 21 days. At d21, broilers were euthanized and ileal mucosa was sampled. No treatment effects on mitochondrial oxidative stress as measured by increased carbonyl (CARB) concentrations (an index of protein oxidation) were found in ileal mucosa. Trial 2 was conducted as Trial 1 with the following changes. Chicks were fed a broiler starter diet (22% CP). Treatments were CON and DFM (6 chicks per treatment) and at d21, whole ileal tissue, ileal mucosal and cecal epithelial membrane lipid oxidative stress were estimated by malondialdehyde (MDA) concentrations. No differences in MDA were noted in mucosal preparations. DFM decreased whole ileal MDA concentrations by 69% ($p = 0.02$; .06 and .22 $\eta\text{mol}/\mu\text{g}$ protein, respectively) as compared to CON. Cecal MDA concentrations increased 124% with DFM as compared to CON ($p = .02$; 0.068 vs. 0.152 $\eta\text{mol}/\mu\text{g}$ protein, respectively). These

data suggest that the DFM, Primalac®, has selective antioxidant and pro-oxidative effects on the membranes of ileal enterocytes and cecal epithelial cells. The DFM effects on ileal enterocytes and cecal epithelia may be due to the extent of fermentation activity occurring in digesta at these sites within the digestive tract.

Key Words: Oxidative Stress, Direct Fed Microbial, Gastrointestinal

T240 Influence of *in ovo* feeding on turkey poult quality. J. E. de Oliveira*, P. R. Ferket, M. J. Wineland, and E. O. Oviedo-Rondon, *North Carolina State University, Raleigh.*

The quality of day old turkey poults is critical to their survival during the first few days after hatch. Tona et al. (2003) proposed a quality scoring method based on external characteristics like activity, appearance, retracted yolk, eyes, legs, navel, remaining membrane and remaining yolk, believed to describe poult quality. Leg shank relative asymmetry, a measure of early bone development that could influence the incidence of subsequent leg problems, is another indicator of poult quality. *In ovo* feeding (IOF), shown to promote hatchling development, may improve poult quality and thus reduce the number of culls and early mortality. Two hundred and fifty Nicholas turkey eggs of similar egg weight (82.5±10g) were incubated in a single-stage incubator set at 38C. At 24 days of incubation, half of the eggs were injected into the amnion with 0.4 ml of a nutritive solution, while the other half served as untreated controls. At day of hatch, percent hatchability was recorded, and then poult quality score, body weight (BW), remaining yolk sac (RY), yolk free body weight (YFBW), poult length (PL) and shanks relative asymmetry (RA) were determined on all hatched poults. There were no significant treatment effects on % hatchability, BW, RY, YFBW and PL. The IOF-treated poults had leg shanks significantly more symmetric than the controls (RA of 0.90 vs. 2.13, $p < 0.01$), indicating better skeletal development. The IOF-treated hatchlings also had a significantly higher average poult quality score than the control poults (63.0 vs. 77.88, $p < 0.05$). Even though the IOF poults may not always positively affect body weight at hatch, improved poult quality score and relative asymmetry indicate that IOF will likely improve the chances of post-hatch survival.

Key Words: In ovo Feeding, Poult Quality, Relative Asymmetry

T241 Bioavailability of zinc-amino acid chelates to zinc nitrate in broiler chickens. S. O. Rao*¹, S. J. Park¹, R. A. Samford², and S. W. Kim¹, ¹*Texas Tech University, Lubbock*, ²*Albion Advanced Nutrition, Clearfield, TX.*

Relative bioavailability of zinc-glycine chelate I (26.2% Zn, Albion Advanced Nutrition), zinc-glycine chelate II (22.3% Zn, Albion Advanced Nutrition), and zinc-arginine chelate (12.8% Zn, Albion Advanced Nutrition) to zinc nitrate (24.3% Zn) was determined using 447, 1 d old, broiler chickens. Fifteen birds were killed at d 0 and ground for carcass sampling. Remaining 432 birds were allotted to four dietary treatments: CON (with 40 ppm Zn from Zn nitrate), TA (with 40 ppm Zn from Zn-glycine I), TB (with 40 ppm Zn from Zn-glycine II), and TC (with 40 ppm Zn from Zn-arginine). There were six replicates per treatment with initially 18 birds per stainless steel brooder cage with the heater. Birds had feed and water ad

libitum during 21 d feeding period. Body weight and feed intake were measured on d 1, 3, 5, 7, 14, and 21. Groups of three birds were randomly selected and killed at d 1, 3, 5, 7, 14, and 21, ground together for each day, sampled, and analyzed for Zn. The ADG of birds were 32.0, 35.6, 35.6, and 35.9 g for CON, TA, TB, and TC respectively during the entire 3 wk period. The ADFI of birds were 42.6, 46.2, 45.7, and 46.1 g for CON, TA, TB, and TC respectively during the entire 3 wk period. However, ADG and ADFI were not different among the treatments. Content of Zn (mg/bird) in bird carcass was the same among the treatments until d 5. However, Zn content was greater ($P < 0.05$) in TA (3.08 mg) than CON (1.89 mg) at d 7 but Zn content was greater ($P < 0.05$) in TC (19.12 mg) than other treatments (13.24, 13.42, and 14.28 for CON, TA, and TB, respectively) by the end of 21 d feeding period. This study indicates that Zn from Zn-arginine is more bioavailable than Zn from inorganic source by broiler chickens during the first 3 wk of their age.

Key Words: Zinc Amino Acid Chelate, Broilers, Bioavailability

T242 The interactive effects of wheat middlings, citric acid, and phytase in a corn soybean meal diet on broiler growth performance. T. O'Connor-Dennie* and J. L. Emmert, *University of Arkansas, Fayetteville.*

Previous research conducted during the broiler starter, grower and finisher phases suggested that there was an interaction among wheat middlings (WM), citric acid (CA) and phytase when supplemented to corn soybean diets; combining all three supplements released more P than any supplement alone. In the present experiment the interactive effects among WM, CA, and phytase on daily gain (g/c), daily feed intake (g/c), feed efficiency, adjusted bone strength (kg/mm²), and bone ash percentage was investigated in the grower phase. Broilers were placed on a P-adequate diet from d 0 to 20; on d 20 birds were weighed and allotted to 15 treatments with 5 replicate pens each containing 20 male chicks. The dietary treatments were 1) a corn soybean diet with calculated levels of 0.8% Ca and 0.13 % available P with no supplemental inorganic P (iP), 2) as diet 1 with 0.04% iP, 3) as diet 1 with 0.08% iP, 4) as diet 1 with 0.12% iP, diets 5 to 15) as diet 1 with phytase (300 or 600 FTU/kg), CA (3%), or WM (10%), alone or in combination. At the end of the grower phase 5 birds per pen were killed by carbon dioxide inhalation and right tibias collected for subsequent determination of bone strength and ash analysis. The inclusion of supplemental iP increased gain ($P < 0.05$) and had a tendency to increase feed efficiency. Overall, inclusion of phytase and WM increased gain and feed efficiency, whereas the inclusion of CA only increased feed efficiency ($P < 0.05$). Combining phytase with WM or WM and CA increased gain and feed efficiency compared to diets 1 and 4, or to any supplement alone ($P < 0.05$), and combining all three supplements resulted in the best feed efficiency ($P < 0.05$). Combining WM and CA resulted in gain values greater ($P < 0.05$) than the negative control and equal to diets containing phytase. Results from this experiment confirm the additive effects of phytase with WM and CA, and the combination of all supplements appears to increase P utilization beyond the amount released by the supplements alone.

Key Words: Phytase, Citric Acid, Wheat Middlings

T243 Performance of modern vs 1970's heritage broilers fed drug free recommended and low protein diets. T. A. Woyengo¹, A. Golian², W. Guenter¹, C. Bennett³, and H. Muc¹, ¹University of Manitoba, Winnipeg, Manitoba, Canada, ²University of Ferdowsi, Mashhad, Iran, ³Manitoba Agriculture, Food and Rural Initiative, Winnipeg, Manitoba, Canada.

A study was conducted to compare the performance of a modern broiler breed (Ross; RS) with those of two 1970's heritage broiler breeds (HB1 and HB2) fed drug free recommended protein (RP; 22% CP) and low protein (LP; 19% CP) diets from 1 to 63 d of age. Six hundred mixed sex old chicks from each of the three breeds were divided into ten groups of equal weight and randomly placed in 30 floor pens. Five replicates pens of each breed were randomly assigned to the RP and LP starter (1-16 d of age) and grower (16-30 d of age) diets, respectively. The LP grower diet was used to feed all birds from 31-63 d of age. The BW gain (BWG) and feed intake (FI) of the RS birds were higher ($P < 0.05$) than those of the two heritage breeds at 16, 30, 35, 49 and 63 d of age. Among the heritage breeds, the BWG

and FI of HB1 birds were higher ($P < 0.05$) than those of HB2 birds at all the measured periods. For the entire experimental period, the BWG and FI of RS birds were higher than those of HB1 and HB2 birds by 35.6 and 53.4%, and 21.7 and 37.5%, respectively. The feed conversion ratio (FCR) was also better ($P < 0.05$) for RS birds than for HB1 and HB2 birds. The HB1 and HB2 birds were, however, similar ($P > 0.05$) in FCR. The BWG and FCR of all the three breeds were depressed ($P < 0.05$) when they were fed LP starter and grower diets up to 30 d of age, but not ($P > 0.05$) when they were fed a common finisher diet from 30 to 63 d of age. Regarding FI, a significant depression ($P < 0.05$) of a LP diet on the same was only observed for RS birds from 1 to 35 d of age. For the entire experimental period, the LP starter and grower diets only negatively affected BWG of the RS birds (3992 vs 3771 g/bird). The results show that the modern RS broilers compared with the 1970's heritage breeds have superior performance, but are more sensitive to dietary protein level.

Key Words: Broiler, Breed, Performance

Physiology & Endocrinology - Livestock and Poultry: Estrus Synchronization

T244 Evaluation of 5-day versus 7- day CIDR treatment on reproductive performance of beef cows using a timed AI protocol. D. Gunn¹, J. B. Glaze, Jr.², R. Findlay³, D. Falk⁴, and A. Ahmadzadeh⁴, ¹University of Idaho Extension, Fort Hall, ²University of Idaho, Twin Falls, ³University of Idaho Extension, Pocatello, ⁴University of Idaho, Moscow.

The objective of this experiment was to determine the effect of reducing the length of CIDR exposure in a CIDR-based timed AI synchronization protocol (CIDR-PGF_{2α}-GnRH and AI) on conception and pregnancy rates in multiparous, suckled beef cows. British cross-bred cows ($n = 138$) were stratified by days postpartum (dpp), age and body weight (BW) and were randomly assigned to one of the following two treatments: 1) cows ($n = 68$) received CIDR (d -7) for 7 days, PGF_{2α} (25 mg) at CIDR removal (d 0), GnRH (75 μ) 56 h after CIDR removal and immediate AI (d 3; **7-d CPG**); or 2) cows ($n = 70$) received CIDR (d -5) for 5 days, PGF_{2α} (25 mg) at CIDR removal (d 0), GnRH (75 μ) 56 h after CIDR removal and immediate AI (d 3; **5-d CPG**). Cows were exposed to bulls 19 days after timed-AI. Pregnancy status was determined by ultrasonography 35 and 68 days after AI. Treatment had no effect on conception to AI (54.41% and 55.71% for 7-d CPG and 5-d CPG, respectively). Pregnancy rate was also unaffected by the treatment protocols (79.41% and 77.14%) for 7-d CPG and 5-d CPG, respectively). Age, BW, and BCS did not have an effect on conception percentage and pregnancy rate. However, dpp had a significant effect ($P < 0.01$) on conception to AI (30% for < 60 dpp vs 80% for >60 dpp) and overall pregnancy rate (50% for < 60 dpp vs. 82% for >60 dpp). Results from this study indicate that reducing the length of CIDR treatment (5 days vs. 7 days) in a CIDR-based timed AI synchronization protocol did not influence conception to AI and pregnancy rate in suckled beef cows.

Key Words: Cattle, CIDR, Timed AI

T245 Effect of reusing CIDRs on the pregnancy rate of beef cattle. M. L. Borger* and W. A. Greene, *The Ohio State University, Wooster.*

The main objective of this study was to determine the effect of reusing CIDRs, as a part of a synchronization program, on pregnancy rates (PR) in beef cattle. One hundred-fourteen animals were allotted to two similar groups, new CIDR (N) and used CIDR (U), based upon breed, age, postpartum interval, and postpartum cyclicity (as determined by ultrasonography). All cattle received 100 μg GnRH i.m. on d 0. Also on d 0, cattle in the N group received a new intravaginal releasing device (CIDR), containing 1.38 g progesterone, while U group cattle received a CIDR previously used for 7 d. On d 7, jugular blood samples were collected for plasma progesterone (P4) analyses, CIDRs were removed, and all animals received 25 mg PGF_{2α} i.m. Each removed CIDR was evaluated for signs of vaginal infection and scored from 1 to 5 (1= clear, 5=heavy pus). Animals were observed for estrus 0700 and 1900 and were artificially inseminated (AI) 11-13 h after estrus was observed. If estrus was not observed, animals were timed AI (TAI) and received 100 μg GnRH i.m. 70-72 h after PGF_{2α}. Following the synchronization period, repeat breedings were done until d 61. Cows were pregnancy diagnosed by ultrasonography on d 88. N and U groups had similar ($P > .05$) estrus detection rates [EDR] (47.4 and 59.7%), PR to synchronization (52.6 and 57.9%) and overall PR (86.0 and 93.0%). Cycling ($n=91$) and anestrous animals had similar ($P > .05$) EDR (55.0 and 47.8%), PR to synchronization (58.2 and 43.5%), and overall PR (89.0 and 91.3%). Cattle with high vaginal scores (4 & 5, $n=76$) and low vaginal scores (1, 2, and 3) had similar ($P > .05$) PR to synchronization (55.3 and 55.3%) and overall PR (85.5 and 97.4%). The N group had more ($P < .05$) high vaginal scores than the U group (77.2 and 56.1%). Mean P4 levels (ng/ml) were similar ($P > .05$) for N (1.9 ± 1.2) and U (1.9 ± 1.4) cattle. P4 levels were higher ($P < .05$) at CIDR removal for cycling (2.0 ± 1.3) than anestrous (1.4 ± 1.0) cattle. There were no noticeable differences between synchronizing beef cattle with previously used CIDRs and new CIDRs.

Key Words: Synchronization, CIDR Reuse, Progesterone