A two-phase trial was conducted to study the effects of a strawberry flavor (flavor) and a high intensity sweetener (HIS) in drinking water and feed on the performance of weanling pigs. Eighty 21-day-old Landrace piglets (6.6 ± 1.40 kg) were distributed in 24 pens with three or four pigs, each provided with an independent water container. In phase I, all pigs were offered the same unflavored diet for a period of 14 days but four treatments were administered in the water: either with no additions (C), or with flavor (A), with HIS (S) or both flavor and HIS (AS). In phase II (day 14 to 27), the animals in each treatment were divided into two groups receiving unflavored water but offered either flavored or unflavored feed. At the end of phase I, average water intake was 618, 681, 642 and 645 g/p/d, and weight gain was 168, 199, 189 and 180 g/p/d for groups C, A, S and AS, respectively. Thus, group A compared to C showed 10% (P > 0.1) and 18% (P < 0.1) higher water intake and weight gain, respectively. In addition, feed to gain ratio during the same period was better (P < 0.05) for A (1.37) than that for C (1.63) and intermediates for S (1.45) and AS (1.50). No differences in feed intake were observed. Statistics of phase II suffered from a low number of replicates. Nevertheless, it seems relevant (P < 0.01) that the group receiving flavor+HIS through water in phase I followed by flavor+HIS through feed in Phase II increased body weight gain by 18% over those receiving flavored water in Phase I and unflavored feed in Phase II. Thus, in phase II, the withdrawal of flavor in water together with not adding flavor in feed resulted in the lowest performance. Overall, these results suggest that water intake after weaning is encouraged with the use of flavor, and that this has beneficial effects on piglet performance. After the withdrawal of flavor in water, improving piglet performance might be linked to flavoring also the feed. The interaction between flavoring drinking water and flavoring feeds at weaning merits further studies.

Key Words: Water Intake, Piglet Weaning, Flavor

### Nonruminant Nutrition: Additives and Supplements

**M85** A strawberry flavor in drinking water and feed improves water intake and growth of pigs at weaning. E. Roura*, D. Solà-Oriol, and D. Torrallardona. 1 LUCTA SA, Barcelona, Spain, 2 IRTA, Centre Mas Bové, Reus, Spain.

The aim of this work was to evaluate the effect of herbal extracts (HE) used as growth promoters. The pigs were distributed into 24 pens (three or four pigs/pen and six pens/tx). A randomized complete block design with covariable (initial weight) was used for the data analysis. The blocking factor was the week of weaning. The experimental unit was the pen for DFI and FC; and the pig for LW and DWG. Phase I lasted 14 days after weaning and Phase II for 21 days. The PC had higher LW (P < 0.001) compared with NC150, NC300 and NC (14.5 vs. 13.0, 12.5 and 11.9 kg, respectively). On week two of phase II, NC150, NC300 and PC showed higher DWG (P < 0.05) compared with NC (516.2, 477.9 and 525 vs. 398.8 g, respectively). The DFI for PC in both phases were higher (P < 0.05) compared with the rest of experimental groups. FC was lower (P < 0.005) for the NC300 and PC groups compared with NC and NC150 (2.0, 1.7 vs. 2.4 and 2.5, respectively) during phase I. In phase II, FC was lower (P < 0.005) in NC150, NC300 and PC compared with NC (1.3, 1.3, 1.4 vs. 1.6, respectively). The use of herbal extracts in young weaned pigs statistically imitates some of the parameters achieved when the antibiotic-origin growth promoter, carbadox, is used in the fed.

Key Words: Herbal Extracts, Growth Performance, Weaned Pigs

### M86 Effect of oregano, cinnamon and chili pepper herbal extracts as growth promoters on growth performance of young pigs. G. Velázquez*, A. G. Borbolla*, G. Mariscal-Landin, T. Reis de Souza, and A. Pinelli*. 1 Universidad Nacional Autonoma de Mexico, Mexico City, Mexico, 2 UNIFAP CENID Fisiología, Ajuchitlan, Queretaro, Mexico, 3 Universidad Autonoma de Queretaro, Queretaro, Mexico, 4 Centro de Investigación en Alimentación y Desarrollo A.C., Mexico City, Mexico.

The aim of this work was to evaluate the effect of herbal extracts (HE) used as growth promoters on live weight (LW), daily weight gain (DWG), daily feed intake (DFI) and feed conversion (FC) of pigs weaned at 19 days of age during 35 days (weaned stage) after weaning (divided into two feeding phases). Eighty-four pigs were randomly assigned to four treatments (tx): negative control (NC), diet with no growth promoter added; positive control (PC), diet with carbadox as growth promoter; negative control + 300 ppm of HE (NC300), diet with the addition of 300 ppm of HE. The pigs were distributed into 24 pens (three or four pigs/pen and six pens/tx). A randomized complete block design with covariable (initial weight) was used for the data analysis. The blocking factor was the week of weaning. The experimental unit was the pen for DFI and FC; and the pig for LW and DWG. Phase I lasted 14 days after weaning and Phase II for 21 days. The PC had higher LW (P < 0.001) compared with NC150, NC300 and NC (14.5 vs. 13.0, 12.5 and 11.9 kg, respectively). On week two of phase II, NC150, NC300 and PC showed higher DWG (P < 0.05) compared with NC (516.2, 477.9 and 525 vs. 398.8 g, respectively). The DFI for PC in both phases were higher (P < 0.05) compared with the rest of experimental groups. FC was lower (P < 0.005) for the NC300 and PC groups compared with NC and NC150 (2.0, 1.7 vs. 2.4 and 2.5, respectively) during phase I. In phase II, FC was lower (P < 0.005) in NC150, NC300 and PC compared with NC (1.3, 1.3, 1.4 vs. 1.6, respectively). The use of herbal extracts in young weaned pigs statistically imitates some of the parameters achieved when the antibiotic-origin growth promoter, carbadox, is used in the fed.

Key Words: Herbal Extracts, Growth Performance, Weaned Pigs
addition of garlic to the diets of grower-finisher pigs reduced feed intake and improved FCR while the addition of rosemary had no beneficial effects on growth performance and carcass characteristics.

Key Words: Essential Oils, Weaned Pigs, Digestive Functions


This study was conducted to investigate the effects of dietary Animinun Powder® on the egg quality characteristics, blood components and nutrient digestibility in laying hens. A total of two hundred seventy laying hens were randomly allocated into three treatments with fifteen replications for eight weeks. Dietary treatments included: 1) CON (Control), 2) AM1 (Control + 0.1% Animinun Powder®) and 3) AM2 (Control + 0.2% Animinun Powder®). During the period of 0-4 weeks, the birds fed the AM1 diet showed a statistically improved egg production rate compared to the birds fed the CON (P < 0.05). During the period of 4-8 weeks, the birds fed AM1 diet showed a statistically improved egg production rate compared to the control treatment (P < 0.05). The concentrations of RBC and WBC in the AM treatments tended to increase but there were no significant differences (P > 0.05). The results suggest that dietary Animinun Powder® can improve egg production rate, egg yolk color and haugh unit.

Key Words: Herb Products, Egg Quality, Blood Components
M92 Dietary nucleotides supplementation alleviates villus atrophy and improves immune response of early weaned piglets. D. Martínez-Puig1*, E. Borda1, E. G. Manzanilla2, C. Cheriti1, and J. F. Pérez1, 1BIOIBERICA S.A., Palafolls, Barcelona, Spain, 2University Autònoma Barcelona, Barcelona, Spain.

Transition from sow’s milk to a solid food in the early weaned pigs is associated with a variable period of anorexia and the withdrawal of some microminutrients contained in milk. Dietary nucleotides are known to have an important role in cell division, cell growth and modulation of the immune system. As a first step, we studied the nucleotide composition in the milk from five 21-day lactating sows. The nucleotide content of the five milk samples analyzed was 102.8 ± 9.16 μmol/100 mL. Pyrimidines, in the form of 5’UMP and 5CDP, represented 85% of the total free nucleotides. A product based on this composition (Nucleoforce®) was administered to 36 early weaned piglets (21 d) dosed at 0, 1,000 and 2,000 ppm. On day 7 after weaning six animals per group were euthanized, and samples of jejunal mucosa were processed for histological measurements. Another group of six unweaned piglets were euthanized on day 27 of lactation as a positive control for histological measurements. No differences were found among treatments on average daily feed intake. Villus height was higher in the nursing pigs (448 µm) than in the control group (275 µm). The Nucleoforce® supplemented groups showed intermediate (P < 0.001) villous heights, 351 and 378 µm with the doses of 1,000 and 2,000 ppm, respectively. Similar results were observed in the measurement of the total surface area of the villi (P < 0.001) but no changes on crypt depth were observed between weaned and unweaned piglets or with the nucleotide supplementation. The absolute number of intraepithelial lymphocytes per villus increased (P < 0.001) with the doses of 1,000 ppm (12.7) and 2,000 ppm (14.9) compared with the control diet (10.2), showing a close relationship with the height of the villi. The overall results suggest that dietary supplementation of Nucleoforce® appears to alleviate postweaning villus atrophy.

Key Words: Nucleotides, Piglet, Villus Atrophy

M93 Effect of blended organic acids on growth performance and intestinal microflora of post weaning piglets. V. Bontempo*, R. Maiorano, A. Agazzi, B. Tonini, and G. Savoini, Dept Veterinary Sciences and Technology for Food Safety, Milan, Italy.

Organic acids have been investigated for many years as a potential alternative to prophylactic use of feed antibiotics in order to reduce post weaning lag and improve the performance of nursery pigs. However, their effects have been often found to be variable and more studies are necessary to evaluate the possible mechanism of action. The aim of this study was to determine the effect of dietary supplementation of blended organic acids on growth performance and intestinal equilibrium of post weaning piglets. One-hundred and sixty weaning piglets averaging 28 d of age and 8.9 ± 1.4 kg initial BW were fed one of two dietary treatments for 49 d after weaning: 1) Control diet (C), and 2) Control diet + organic acids blend (OA). Organic acids blend (Ascor acid, butyric acid, acetic to propionic acid ratio, and acetic + butyric to propionic acid ratio were linearly increased in all GA treatments (P < 0.001). Ammonia in fermentation liquor was flushed with CO2 and dispensed into five glass syringes and five vessels for treatment, containing predigested diet. Syringes and vessels were incubated at 39°C for 24 h. There were 6 treatments: control diet, or control diet with GA added at 2,000, 4,000, 6,000, 8,000, and 10,000 ppm. Gas production was measured recording the cumulative volume of gas produced every 30 min. Samples of fermentation fluid were collected from each vessel at time 0, 4, 8 and 24 h for ammonia and at time 24 h for short-chain fatty acids (SCFA) determination. During the 24 h caecal in vitro fermentation, total gas production and maximum rate of gas production were increased by all GA concentrations in a dose-dependent manner (P < 0.001). Ammonia in fermentation liquor was reduced by GA at 2,000 (26%; P < 0.01) and 4,000 ppm (17%; P < 0.05) after 4 h and at all concentrations (P < 0.001) after 8 h and 24 h, with the only exception of GA at 2,000 ppm. After 24 h of fermentation, total SCFA, acetic acid, butyric acid, acetic to propionic acid ratio, and acetic + butyric to propionic acid ratio were linearly increased in all GA treatments (P < 0.001). This study showed that GA can positively influence the activity of the swine caecal microflora controlling the proteolysis during the 24 h of fermentation moreover implementing the production of butyric acid which maintains the mucosal health status.

Key Words: Resistant Starch, Short-Chain Fatty Acids, Growing Boars

M94 Large bowel fermentation of resistant starch and conventional fiber supplements in the growing boar. T. C. Rideout*1, Q. Liu1, and M. Z. Fan1, 1University of Guelph, Guelph, Ontario, Canada, 2Agriculture and Agri-Food Canada, Guelph, Ontario, Canada.

We investigated the production of short-chain fatty acids (SCFA) and amino acid metabolites in the large intestine of pigs in response to the consumption of three varieties of resistant starch (RS) in comparison to conventional fiber supplements. Forty-two grower boars (initial BW, 30 kg) were fed an atherogenic basal (control) diet or the basal diet supplemented with 10% of resistant starch (Novelose®^330; Novelose®^240; and Avebe potato starch), guar gum (GG), or cellulose (Cell) for a period of 36 d according to a completely randomized block design. Consumption of GG enhanced the cecal production of isobutyric, butyric, isovaleric, and hexanoic acid and resulted in a higher (P < 0.05) total cecal SCFA concentration (104.24 ± 9.73 mg/dM) in comparison to the control (64.11 ± 7.36 mg/dM) and the Novelose 240 group (56.29 ± 9.73 mg/dM). Pigs consuming Novelose 330 had a higher (P < 0.05) cecal concentration of butyric acid in comparison to the control group (11.89 ± 0.99 vs. 4.98 ± 0.84 mg/dM). Cecal indole production was lower (P < 0.05) in pigs consuming Novelose 330 (0.04 ± 0.02 mg/dM), Novelose 240 (0.04 ± 0.02 mg/dM), and Avebe potato starch (0.02 ± 0.02 mg/dM) in comparison to the control group (0.12 ± 0.01 mg/dM). Consumption of the dietary fiber supplements did not (P > 0.05) affect SCFA or amino acid metabolite concentrations in the colon. In conclusion, the source and physiochemical properties associated with unique dietary fiber preparations differentially affect microbial fermentative activities in the cecum of pigs.

Key Words: Resistant Starch, Short-Chain Fatty Acids, Growing Boars

M95 Effect of gluconic acid on swine in vitro caecal fermentation. A. Piva1, E. Grilli, G. Biagi, and G. Casadei, University of Bologna, Bologna, Italy.

Gluconic acid (GA) derives from the incomplete oxidation of glucose by some Gluconobacter strains. When fed to monogastric animals, GA is poorly absorbed in the small intestine and can reach the lower gut where it is fermented to butyric acid. This study investigated the effect of GA on in vitro growth response and proteolytic state of swine caecal microflora. A diet for pigs (CP, 15.8%; DE, 15.0 MJ/kg) was predigested in vitro to simulate ileal digestion and later used as the substrate in the in vitro fermentation. Caeal content was collected from six pigs, diluted with buffer and used as inoculum. The inoculum was flushed with CO2 and dispersed into five glass syringes and five vessels per treatment, containing predigested diet. Syringes and vessels were incubated at 39°C for 24 h. There were 6 treatments: control diet, or control diet with GA added at 2,000, 4,000, 6,000, 8,000, and 10,000 ppm. Gas production was measured recording the cumulative volume of gas produced every 30 min. Samples of fermentation fluid were collected from each vessel at time 0, 4, 8 and 24 h for ammonia and at time 24 h for short-chain fatty acids (SCFA) determination. During the 24 h caecal in vitro fermentation, total gas production and maximum rate of gas production were increased by all GA concentrations in a dose-dependent manner (P < 0.001). Ammonia in fermentation liquor was reduced by GA at 2,000 (26%; P < 0.01) and 4,000 ppm (17%; P < 0.05) after 4 h and at all concentrations (P < 0.001) after 8 h and 24 h, with the only exception of GA at 2,000 ppm. After 24 h of fermentation, total SCFA, acetic acid, butyric acid, acetic to propionic acid ratio, and acetic + butyric to propionic acid ratio were linearly increased in all GA treatments (P < 0.001). This study showed that GA can positively influence the activity of the swine caecal microflora controlling the proteolysis during the 24 h of fermentation moreover implementing the production of butyric acid which maintains the mucosal health status.

Key Words: Gluconic Acid, Microflora, Pig

Trans-10, cis-12 conjugated linoleic acid (CLA) has been shown to reduce body fat accretion in several species. In this study, we fed CLA to female broiler breeders and assessed the effects on growth rate, body fat and liver fatty acid composition. Thirty-two female Ross 308 parent stock 1-d old chickens were individually caged and fed either a standard control diet incorporating 3.5% soybean oil (n = 16) or a diet incorporating 3.5% CLA (Luta CLA-60; 30% ε, t11 CLA and 30% t10, c12 CLA; n = 16). Birds were reared under a modified version of the Ross parent stock management regime to maintain a growth rate in excess of the standard recommended regime. Experimental diets were fed from d 0 to d 49 during which time birds were weighed at weekly intervals and feed intake recorded so that feed conversion efficiency (FCE) could be calculated. At d 49 of age eight Control and eight CLA birds were slaughtered and body fat and liver fatty acid composition determined. The remaining eight Control and eight CLA birds were housed on a single floor pen and placed on a standard rearing diet with feed intake of 10-15% above the standard controlled intake regime until slaughter at 133 d of age. During CLA feeding (0 to 49 d) there was no difference in growth rate or FCE between the two groups. At d 49 there was no difference in total body fat (CLA, 9.4 ± 0.3%; Control, 9.6 ± 0.4%). However, there were significant treatment effects on liver fatty acid composition with elevations (P < 0.001) in 16:0 and 18:0 as well as ε9 t11 CLA and t10 c12 CLA and reductions (P < 0.001) in 18:2 n-6, 20:2 n-6, 20:3 n-6, 20:4 n-6, 22:5 n-3 and 22:6 n-3 in the birds fed CLA. At d 133, after birds had all been fed the same diet, those previously fed CLA were significantly smaller than those fed the Control Diet (CLA, 2.63 ± 0.05 kg; Control, 2.83 ± 0.07 kg; P < 0.05). However, there was no difference in body fat (CLA, 6.9 ± 0.5%; Control, 6.2 ± 0.4%) or liver fatty acid composition. The results suggest that feeding of CLA during early life can affect subsequent growth through a mechanism that may not involve differences in body fat.

Acknowledgements: CLA was donated by BASF AG Ludwigshafen, Germany and chickens by PD Hook, UK.

Key Words: Conjugated Linoleic Acid, Chickens, Growth


The objective of this study was to determine the effects of feeding a diet containing n-3 fatty acids during late gestation and/or lactation on sow reproductive performance. The study was designed as a 2 x 2 factorial arrangement with main effects of feeding n-3 fatty acids in the Gestation diet (G) and/or Lactation diet (L). Diets were corn-SBM based diets such that the G diet was calculated to contain 1.4% 18:1 n-9, 0.6% 20:4 n-6, and 0.7% ω-6 fatty acids (ω-6:3). However, the ω-6:3 ratio was 2.5:1 in the G diet. Sows were fed the Gestation diet from d 60 of gestation to delivery. In the G or L diet, respectively, 1.4% 18:1 n-9, 0.6% 20:4 n-6, and 0.7% ω-6 fatty acids (ω-6:3) were fed. In conclusion, supplemental inulin improved blood pCO2 and increased blood pH and HCO3. However, the increase in pH and HCO3 was not significant.

M98 Blood analytes and performance of lactating sows fed diets added with NaHCO3. J. Cruz*, A. G. Borbolla**, J. Bouda‡, and G. Mariscal‡. ¹Universidad Nacional Autonoma de Mexico, Mexico City, Mexico, ²INIFAP CENID Fisiologia, Aguacatlan, Queretaro, Mexico.

Thirty-six primiparous sows were used to determine the effect of NaHCO3 on productive performance and blood analytes during 21 days of lactation. The sows were randomly distributed in three treatments (n = 12): the control diet (C); the control diet containing 0.5% of NaHCO3 (0.5%); and the control diet with 1% of NaHCO3 (1%). At farrowing and lactation, the body weight (BW), backfat thickness at 10th and 13th rib, and the size (LS) and weight of litter were recorded. On 3rd, 12th, and 21st days of lactation, the concentrations of glucose, urea, total proteins, albumin, free fatty acids, electrolytes (Na+, K+, Cl-) and creatine kinase in blood serum were determined. The values of pH, blood pCO2, HCO3, and base excess were determined in heparinized blood between the 10th and 12th days of lactation. The results were analyzed using the multivariate analysis of variance for the repeated measures and a randomized complete model to determine the effect of experimental diets on blood analytes, acid-base status, and productive performance. The BW of sows and the LS were used as covariables. The use of NaHCO3 in the diet increased (P < 0.001) the daily feed intake (DFI) (5.21, 5.02, and 4.28 kg for treatments 0.5%, 1% and C, respectively) without affecting other variables of the productive performance. Blood pH was also increased (P < 0.02) in sows with the addition of 1% NaHCO3 in diet compared with the C (7.41 vs. 7.36). The addition of NaHCO3 tended (P < 0.08) to decrease the blood pCO2, but the values of base excess and HCO3 were not affected. The biochemical analyses of serum did not show changes of tissue mobilization; however, the free fatty acids indicated a higher (P < 0.01) mobilization of lipids in the C diet compared with the other experimental diets (0.617, 0.074, and 0.127 mmol/L for groups C, 0.5% and 1%, respectively). The addition of NaHCO3 in sow diets is an alternative for the DFI stimulation in primiparous sows, and it may have a possible role in decreasing fat tissue mobilization.

Key Words: Lactating Sows, NaHCO3, Feed Intake


Inulin is a blend of fructan chains found in nature as plant storage carbohydrates and may exert nutritional and health-promoting effects in the large intestines. The objective of this study was to determine if supplemental inulin improved bioavailability of iron from a corn-soy based diet to young pigs. A total of 14 weanling pigs (7.63 kg BW) were divided into two groups and fed the corn-soy based diet (without inorganic iron added, total iron = 61 mg/kg) or the diet supplemented with 4% inulin (Raftline HP, Orafti, Tienen, Belgium) for 6 weeks. Weight gain, blood hemoglobin concentration, and hematocrit of individual pigs were measured weekly. Daily feed intake of individual pigs was also recorded. Compared with those fed the basal diet, pigs fed the inulin-supplemented diet had 17% higher (11.6 vs. 13.6 g/dL, P < 0.01) final blood hemoglobin concentration and 17% greater (18.9 vs. 22.2%, P < 0.03) overall hemoglobin repletion efficiency. Growth performance and hematocrit were similar between the two treatment groups. In conclusion, supplemental 4% inulin in the corn-soy diet improved dietary iron utilization by young pigs.

Acknowledgements: Supported in part by a grant from Harvest-Plus, International Food Policy Research Institute, Washington, D.C.

Key Words: Inulin, Iron, Pigs
M100 Efficacy of pantothenic acid as a modifier of body composition in a porcine model of obesity development. C. A. Baldwin* and T. S. Stahly, Iowa State University, Ames.

Pantothenic acid (PA) in amounts above that needed to maximize body growth has been determined at our station to effectively reduce fat tissue accretion in growing pigs. In the current study, the efficacy of PA to minimize fatty tissue accretion in a porcine model of obesity development was determined. Heavy weight pigs (154 kg BW, 27% body fat) were allotted to one of four dietary regimens (17 individually penned barrows/treatment) consisting of a basal diet (8 ppm PA) supplemented with 0, 80, 800, 8,000 ppm added PA. The basal diet consisted of a dietary nutrient mix representative of the American diet (34% of calories from fat), and was provided at daily caloric intakes equivalent to 1.8 times each animal’s maintenance needs for 144 days. A state of obesity development occurred over the duration of the study. Specifically, pigs accrued 73 kg of body weight, of which 48% was fat tissue (determined by DEXA analysis). BW gains and BW gain/feed ratios were not altered by PA additions. Fat tissue content of BW gain responded quadratically to increasing PA additions. Specifically, fat tissue content was reduced by 3.2 percentage units by a ten-fold addition of PA (80 ppm) but was increased by 2.2 and 1.4 percentage units by 100- and 1,000-fold additions (800 and 8,000 ppm) of PA, respectively. The 80 ppm addition is equivalent in dosage (mg PA ingested/kcal of dietary energy expended) to that observed to reduce body fat accretion in growing pigs fed a high starch diet ad libitum. Hepatic ACO, ACC, and FAS mRNA expression (six pigs/treatment) did not differ between the 0 and 8,000 ppm supplemented PA diets. Based on these data, PA is not an efficient modifier of body composition in a porcine model of obesity development induced by a high fat dietary regimen.

Key Words: Pantothenic Acid, Pigs, Obesity

Nonruminant Nutrition: Mannan-Oligosaccharides, Yeast Culture, and Probiotics


One hundred and twenty newly-weaned piglets (15-19 days old; four pigs per pen; six pens per treatment) were used to investigate the effect of feeding galactomannan oligosaccharides (GMOS; from sesbania gum, containing 20% galactose and 15% mannose) on growth performance, immune response and intestinal microflora. Five dietary treatments were: basal diet (control diet), medicated diet (control + 110 ppm lincomycin), and three dietary inclusion levels of GMOS (control + 0.1%, 0.2%, or 0.3%). The inclusion of lincomycin in the diet did not influence any of the response criteria (P > 0.10), except for intestinal microflora. During week 1 post-weaning, ADG (80 vs. 45 g/d on control vs. 0.3% GMOS; SE, 28) decreased linearly (P < 0.05) with increasing dietary GMOS level. After week 1 and over the 4-week experimental period, ADG (290 vs. 286 g/d on control vs. 0.3% GMOS; SE, 43) and ADFI (448 vs. 412 g/d on control vs. 0.3% GMOS; SE, 47) did not differ between treatments (P > 0.10). On day 4 post-weaning, blood serum levels of IgA (70 vs. 87 mg/dL on control vs. 0.3% GMOS; SE, 5.6), IgG (285 vs. 401 mg/dL on control vs. 0.3% GMOS; SE, 12.5), and IgM (155 vs. 273 mg/dL on control vs. 0.3% GMOS; SE, 13.6) increased linearly (P < 0.01) with dietary GMOS level. On day 14 post-weaning, serum IgA levels were not influenced by feeding GMOS (P > 0.10). Based on PCR-DGGE analysis, diversity of microflora in ileal digesta was increased by feeding GMOS and reduced by feeding lincomycin compared to the control. These results indicate that dietary GMOS increases humoral immunity and microbial diversity in the ileum of newly-weaned pigs but reduces feed intake and growth performance during the first week post-weaning.

Key Words: Piglet, Galactomannan Oligosaccharides, Immune Response

M102 Effect of adding a mannanoligosacchride product on performance of nursery pigs fed diets with or without antibiotics. H. Yang*, J. Less*, T. Shipp3, T. Radke1, M. Cecava1, and D. Holzgraefe1, 1ADM Alliance Nutrition, Quincy, IL, 2ADM Specialty Feed Ingredients, Decatur, IL, 3ADM Animal Health and Nutrition, Quincy, IL.

The objective of this study was to evaluate the effect of a mannanoligosaccharide (MOS) product (CitriStim™) on performance of nursery pigs fed diets with or without antibiotics (AB). Weanling pigs (n = 144; 4.56 kg BW) were blocked by initial weight and assigned to one of four dietary treatments (trt), with six pigs per trt and six pigs per pen. The trts were a 2 x 2 factorial arrangement, with two levels of MOS (0 vs. 0.2% CitriStim™) and two levels of AB (0 vs. 0.3% Carbadox). ADG, ADFI and G/F were measured throughout four phases ending at d 7, 14, 28, and 41. Feeds were pelleted in the first two phases and meal thereafter. No interactions (Int) of ADG and ADFI were observed between MOS and AB (P > 0.05), indicating they could have an additive effect. MOS improved ADG (P < 0.05) and ADFI (P < 0.05) from d 0 to 14 and numerically improved ADG and ADFI from d 0 to 41. Although AB did not affect performance from d 0 to 14 (P > 0.10), it improved overall ADG (P < 0.10) and ADFI (P < 0.05). AB did not have a significant effect on G/F from d 0 to 14 and d 0 to 41 (P > 0.55). However, MOS dramatically improved G/F in medicated diets but had minimal effects on G/F in non-medicated diets, resulting in an interaction for overall G/F (P < 0.10). In summary, MOS and AB improved ADG and ADFI and an interaction of G/F might exist between MOS and AB.

Key Words: Pigs, Mannanoligosaccharide, Antibiotics

M103 Effect of dietary mannanoligosaccharides and/or organic zinc on growth performance and prevalence of post-weaning diarrhoea in piglets. M. Castillo*, G. Ferrini2, E. G. Manzanilla1, J. Roquet3, J. A. Taylor-Pickard2, J. F. Pérez1, and S. M. Martín-Orúe1, 1Departamento de Ciencia Animal i del Aliments, Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain, 2Probasa, Barcelona, Spain, 3Alltech Biotechnology Centre, Summerhill, Narwyn, Ireland.

The efficacy of Mannanoligosaccharide (MOS) and organic zinc (Zn) to enhance performance and prevent diarrhoea in early-weaned pigs was evaluated. A total of 128 piglets, weaned at 20 ± 2 days were housed in 32 pens following a complete randomized design. Animals received four dietary treatments: a control diet (CT) to which 0.2% of a commercial source of MOS (Bio-Mos®6th Alltech Inc, USA; BM), 0.08% organic Zn (Bioplex-Zn® Alltech Inc, USA; BP) or both additives (BMP) were added. The experiment lasted for 5 weeks including a pre-starter period of two weeks and a starter period of three weeks.