and low CP diets. Ross X 708 chicks (1280; 64 pens) were sexed; half were vaccinated with Coccivac-D, and placed in floor pens while the other half received Salinomycin. Two low CP corn-soybean meal diets (21% CP and 21% CP containing 2% gelatin) and two high CP diets (23% CP and 23% CP containing 2% gelatin) were fed. Birds that were vaccinated had significantly lower body weight gain (P<.001) and higher feed conversion (P<.001) compared to those that were not vaccinated. However, vaccinated birds with gelatin in their diets had a greater BW gain (P<.05) and lower feed conversion (P<.01) than vaccinated birds with no gelatin in their diets. Gelatin present in diets increased BW gain (P<.05) and greatly lowered feed conversion (P<.001). The growth performance of the broilers was not affected by the amount of crude protein in the diet. The presence of gelatin in diets of vaccinated broilers appears to aid in BW gain and feed conversion during the first three weeks.

Key Words: Crude Protein, Coccidiosis, NEAA

104 Evaluation of isoleucine and valine limitation in diets for heavy high-yield broilers. A. Corzo*[1], M. T. Kidd[1], J. Collier[1], W. A. Dozier, III[2], and D. Hoehler[3], [1]*Mississippi State University*, *Mississippi State*, [2]*USDA-ARS*, *Mississippi State, MS*, [3]*Degussa Corporation*, *Kennesaw, GA*.

Two studies were conducted from 35 to 54 d of age using Ross × Ross 708 males. The first study was composed of three dietary treatments designed to evaluate the impact on performance of broilers when neglecting the Val and Ile nutrient minimums during formulation: a control diet formulated to meet or exceed all critical amino acid needs (0.80% dig Val and 0.71% dig Ile); a diet formulated to meet the minimum needs of all critical amino acids and allowing L-Thr to enter formulation (0.74% dig Val and 0.65% dig Ile); a third diet with no nutrient minimum given to dietary Val and Ile (0.67% and 0.58% dig, respectively). All treatments contained eight replicate pens (12 broilers/pen). The second study was a factorial design with three Ile (61, 64.5 and 68) and three Val (70, 74 and 78) ratios to Lys, for a total of nine treatments, each containing eight replicate pens (12 broilers/pen). Data was analyzed for two-way interactions first, and then main effects. In the first study, feed conversion was minimized (P<0.05) with the control diet when compared to the Val/Ile deficient diet, while the second diet had an intermediate value. The same statistical response was observed when expressing BWG as a function of feed cost. The Val/Ile deficient diet was economically less profitable (P=0.06) than the control diet, while the second diet had an intermediate value. The data from the second study showed that no two-way interactions were observed. A main effect for Ile was observed on BWG, where an increase (P=0.06) in the weight gain was observed as the Ile level increased in the diet. Feed conversion values showed that the Ile/Lys ratio of 61% was poorer (P<0.01) when compared to the other two treatments. No Val main effect was observed for live performance. No main effects for either Val or Ile were observed for carcass traits. It was shown how neglecting critical amino acid needs beyond Thr can be detrimental to performance and profitability. It can also be said that during latter phases critical amino acid needs can be met via feed consumption making it difficult to comprehend the limitation of critical amino acids.

Key Words: Broiler, Isoleucine, Valine

Nonruminant Nutrition: Swine Mineral Nutrition and Metabolism

105 Dietary selenium regulation of the rat liver and kidney selenoproteomes. K. M. Hargrave*, J. K. Evenson, A. M. Rothert, and R. A. Sunde, *University of Wisconsin*, *Madison*.

The rodent selenoproteome consists of 24 selenoproteins. Using microarray analysis, we have identified 8 liver and 5 kidney selenoprotein mRNAs, including glutathione peroxidase-1 (GPX1), that were significantly down-regulated in mice fed a selenium (Se)-deficient diet. Our current objective is to identify the rat liver and kidney selenoproteins expressed, and regulated by dietary Se. We conducted 2 studies; in Study 1, male rats were fed a torula yeast based diet deficient in Se, or containing 0.02, 0.05, 0.075, 0.1, 0.15, 0.2, or 0.3 µg Se/g diet for 28 d following weaning. Total liver and kidney RNA from 3 rats per diet were analyzed by quantitative real-time RT-PCR for the mRNA abundance of the selenoproteins regulated in the mouse. Study 2 was conducted with the addition of diets containing 0.5 and 1.0 µg Se/g diet. Se status of these animals was determined by plasma GPX3 and red blood cell GPX1 activities. In Study 1, rat liver GPX1, Selenoprotein (Sel) H, and SelW were highly down-regulated ($P < 0.001$) by dietary Se, similar to the mouse. In each case, mRNA abundance neared a plateau by 0.075 µg Se/g diet. Furthermore, rat SelK, SelP, and Thioredoxin Reductase-1 (TR1) were moderately and significantly ($P < 0.01$) regulated, whereas, GPX4, SelM, and TR2 were not. In the kidney, GPX1 was highly ($P < 0.05$) and SelW moderately ($P < 0.05$) down-regulated by dietary Se. Unlike in the mouse, kidney SelH, SelM, and GPX3 were not regulated, similar to GPX4. In Study 2, plasma GPX3 and red blood cell GPX1 activities in Se-deficient rats were dramatically down-regulated ($P < 0.001$) compared to Se-adequate levels. In summary, GPX1 mRNA, when assayed by RT-PCR, as well as activity are decreased dramatically in Se-deficient rats, indicating that this is a good model in which to test mRNA regulation of the complete selenoproteome. No selenoprotein tested thus far has exhibited a pattern of regulation different or more dramatic than for GPX1. In the rat model, however, there appears to be fewer selenoproteins under significant dietary Se regulation than previously observed in the mouse (6 vs 8 in the liver and 3 vs 5 in the kidney).

Key Words: Selenium, mRNA Expression, Rat

106 Copper can be absorbed as a Cu-peptide chelate through the PepT1 transporter in the jejunum of weanling pigs. B. E. Aldridge*, K. L. Saddoris, and J. S. Radcliffe, *Purdue University*, *West Lafayette, IN*.

Jejunal tissue was harvested from eighty-four pigs on d 6,8,10 or 14 post-weaning and mounted in modified Ussing chambers to investigate the route of Cu absorption from Bioplex® Cu and $CuSO_4$. Tissues were challenged in a 2 x 2 factorial arrangement with two Cu sources (Bioplex® Cu and $CuSO_4$) with and without an inhibitor (valcyclovir) of the di- and tri-peptide transporter, PepT1. Active ion transport was measured by changes in short circuit current (Isc) following the

addition of Cu to the mucosal buffer. Additionally, Cu disappearance from the mucosal buffer was determined by atomic absorption spectrophotometry following stabilization of the Isc, post-Cu challenge. A Cu source x PepT1 inhibitor interaction (P=0.05) was observed for the change in Isc following Cu addition to the mucosal buffer. The change in Isc was 78% greater when Bioplex® Cu was added compared with $CuSO_4$. However, the addition of valcyclovir, an inhibitor of PepT1 reduced the response by 40% for Bioplex® Cu, but did not affect $CuSO_4$. This indicates that some of the change in Isc after adding Bioplex® Cu was the result of peptide absorption. A Cu source x PepT1 inhibitor interaction (P=0.054) was also observed for Cu concentration remaining in the mucosal buffer. Cu concentration in the mucosal buffer was 20% higher with Bioplex® Cu, in the presence of the PepT1 inhibitor, than without the inhibitor. However, the PepT1 inhibitor had no effects on mucosal buffer Cu concentrations when $CuSO_4$ was added. This indicates that some of the Cu in Bioplex® Cu is absorbed through PepT1.

Key Words: Pig, Copper, PepT1

107 The feeding of low-P diets to weanling pigs stimulates Na^+-dependent phosphate transport by a post-translational mechanism in the jejunum. K. L. Saddoris* and J. S. Radcliffe, *Purdue University*, *West Lafayette, IN*.

Thirty-six crossbred gilts (6.6±0.16 kg BW) were utilized to determine the mechanism of action through which Na^+-dependent P transport is stimulated in weanling pigs fed a low-P diet. Pigs were weaned at 19 d of age and allowed a 10 d adaptation period to a dry diet. Pigs were blocked by BW and randomly assigned to a 0.07 or 0.40% aP diet and injected i.p. once a day for 3d with actinomycin D (0.12 mg/kg BW), cycloheximide (0.40 mg/kg BW), or saline. Pigs were then euthanized and jejunal samples were removed and mounted in modified Ussing chambers for determination of electrophysiolgical properties. Additionally, mRNA expression (quantitative RT-PCR) of NaPi-IIb was determined from jejunal mucosal scrapings. As expected P intake was lower (P≤0.0001) for pigs fed the low-P diet compared to pigs fed the high P diet (125 vs 601 mg/d). Additionally, pigs injected with actinomycin D or cycloheximide had lower P intakes (P≤0.001) and lost a greater amount of BW (P<0.01) during the trial compared to pigs injected with saline. Basal short-circuit current (Isc) and resistance did not differ (P≥0.10) between treatment groups. Na^+-dependent P uptake increased (P≤0.05; 15.48 to 23.39 $\mu A/cm^2$) as the concentration of P in the diet was decreased as measured by the change in Isc. However, no injection or diet × injection effects were observed for Na^+-dependent P uptake despite 2.3-fold decreases in P intake in pigs injected with actinomycin D or cycloheximide compared to pigs injected with saline. Expression of NaPi-IIb gene could not be detected in jejunal samples indicating an 80% decrease in P intake over 3 d failed to induce expression of NaPi-IIb transcript. Overall, consumption of a low P diet stimulates Na^+-dependent transport in the jejunum and this increase is not prevented by administration of either a transcriptional or translational inhibitor and occurs independently of an increase in NaPi-IIb cotransporter mRNA. Therefore, in the jejunum of weanling pigs, regulation of Na^+-dependent P uptake is occurring through a post-translational mechanism.

Key Words: Phosphorus, Intestine, Pigs

108 Dietary supplementation with zinc oxide decreases the expression of the stem-cell factor in the small intestine of weanling pigs. D. Y. Ou[1], D. F. Li*[1], Y. H. Cao[1], X. L. Li[1], J. D. Yin[1], S. Y. Qiao[1], and G. Y. Wu[2], [1]*China Agricultural University*, *Beijing, China*, [2]*Texas A&M University*, *College Station*.

Supplementation of diets with a high level of zinc oxide has been shown to reduce the incidence of diarrhea in weanling pigs, but the underlying mechanisms remain largely unknown. Intestinal-mucosal mast cells, whose maturation and proliferation is under the control of the stem cell factor (SCF), play an important role in the etiology of diarrhea by releasing histamine. The present study was conducted to test the novel hypothesis that dietary supplementation with zinc oxide inhibits SCF expression in the small intestine, thereby reducing the number of mast cells, histamine release, and diarrhea. In Experiment 1, Piglets (28 d) were weaned and fed diet containing 100 or 3000 mg/kg zinc (as zinc oxide) for 10 d (16 piglets/group). In Experiment 2, sixteen piglets (28 d) were assigned randomly to two groups as in Experiment 1, except that the two groups were pair-fed the same amount of feed. Supplementation with a high level of zinc oxide reduced the incidence of diarrhea in weanling piglets. Dietary Zn supplementation reduced the expression of SCF gene at both mRNA and protein levels, the number of mast cells in the mucosa and submucosa of the small intestine and histamine release. Collectively, our novel results indicate that dietary supplementation with zinc oxide inhibits SCF expression in the small intestine, leading to reductions in the number of mast cells and histamine release. These results may have important implications for the prevention of weaning-associated diarrhea in piglets.

Key Words: Zinc Oxide, Mast Cells, Histamine

109 Net portal absorption of inorganic zinc and zinc-amino acid chelates by growing pigs. R. D. Mateo*[1], M. I. Perret-Gentil[2], M. W. Hart[1], R. A. Samford[3], and S. W. Kim[1], [1]*Texas Tech University*, *Lubbock*, [2]*Texas Tech Health Sciences Center*, *Lubbock*, [3]*Albion Advanced Nutrition*, *Clearfield, UT*.

This study was conducted to determine and compare net portal absorption (NPA) of zinc from zinc sulfate, zinc-methionine chelate (Albion Advanced Nutrition), and zinc-amino acid chelate (Albion Advanced Nutrition). Three pigs (21.5±0.7 kg BW) were surgically fitted with catheters into the carotid artery, portal vein, mesenteric vein, and pyloric region of the stomach and allotted to 3 x 3 Latin square design with 3 treatments: Injection of zinc sulfate (ZS); zinc-methionine chelate (ZM); and zinc-amino acid chelate (ZAA) through the pyloric stomach catheter and 3 periods (48-h intervals). Each period was composed of 24-h feeding (0.09 kg x $BW^{0.75}$), 19.5-h fasting, and 4.5-h infusion. A corn-soybean meal based diet with 18.2% CP and 3.35 Mcal ME/kg was fed to pigs before fasting. Para-aminohippuric acid (PAH) was infused (3.2 mg/min) into the mesenteric vein for a 4.5 h period. Zinc (230 mg) from one of the three aforementioned sources was injected into the lumen of the pyloric catheter 60 min after beginning the PAH infusion period. Blood samples (3 mL) were collected simultaneously from the carotid artery and portal vein catheters at -60, -30, 0, 15, 30, 45, 60, 90, 120, 150, and 210 min relative to zinc injection to measure PAH and zinc concentration in the plasma. Zinc NPA was calculated by multiplying the portal vein plasma flow rate by the porto-arterial plasma zinc concentration. Blood flow averaged 1.38±0.23 L/min. Zinc NPA from ZS peaked (P<0.05) at 150 min (0.94 mg/min). Zinc NPA from ZM peaked (P<0.05) at 30

and 120 min (2.40 and 2.24 mg/min, respectively). Zinc NPA from ZAA peaked (P<0.05) at 30 and 150 min (1.59 and 3.12 mg/min, respectively). ZM had greater (P<0.05) zinc NPA than other NPA at 60 min (-0.53 vs. 0.43 mg/min) and ZAA had greater (P<0.05) zinc NPA than other NPA at 150 min (0.94 vs. 3.12 mg/min). This study suggests that zinc from organic sources (ZM and ZAA) is absorbed faster and more than zinc from zinc sulfate.

Key Words: Net Portal Absorption, Zinc Amino Acid Chelate, Pigs

110 The effect of varied levels of E. Coli. phytase on phosphorus balance in weanling pigs. T. C. Tsai*[1], C. R. Dove[1], M. J. Azain[1], and M. Bedford[1], [1]*University of Georgia*, *Athens*, [2]*Syngenta Animal Nutrient*, *RTP, NC*.

The objective of this study was to examine the effect of an E. Coli. phytase on phosphorous (P) balance in weaning pigs. The study was conducted in a 2 x 5 factorial arrangement of treatments. Two levels of P, low-P (LP, 0.13% avail. P, no inorganic P added) and high-P (HP, 0.35% avail. P, with 1.15% dicalcium phosphate) were supplemented with 0, 250, 500, 2500, and 12500 U/kg of E. Coli-derived phytase. All diets were formulated to contain 20% CP, 1.15% lysine and 0.75% calcium (Ca). The study involved a total of 80 pigs (IW =18 kg, 4 wk post-weaning) in 4 replicates of 14 d each (10 d adaptation, 4 d collection). Pigs were housed in metabolism cages and fed twice each day. Growth rate and G:F were lower in pigs fed the LP diet. The addition of phytase improved ADG and G:F (P<0.01), with performance of pigs fed 2500 and 12500 U/kg phytase being similar to that of pigs on the HP-control diet. The improvements in performance were greater in the pigs fed the LP diet. Fecal P (g/d) was reduced as phytase level increased in both diets (P<0.0001), but the magnitude was greater in the LP diet. In the LP diet, apparent total tract digestibility (ATTD) for P was improved by 36, 18, 49, and 76% in pigs fed 250, 500, 2500, and 12500 U/kg, respectively (P<0.0001). In the HP diet, ATTD was improved from 39 to 45% with phytase. Urinary P was less than 5% of total P excretion in pigs fed the LP diet and was not affected by phytase. Urinary P increased with phytase addition to the HP diet and accounted for 30% of the total P excretion on the HP diet with 12500 U phytase. Calcium retention (%) was improved (P < 0.001) by the addition of phytase to both LP and HP diets. Urinary Ca was reduced by phytase (P<0.001) in both diets. These results suggest that E. Coli. phytase addition to a LP diet can efficiently reduce total P excretion and improve growth performance.

Key Words: Phytase, Digestibility, Weaning Pigs

111 Effects of different available-phosphorus levels in diets on nitrogen and phosphorus digestibilities in growing pigs. X. Wu[1], Y. L. Yin[1], G. Y. Wu[1,3], T. J. Li[1], Y. G. Zhang[1], F. Y. Yan[1], R. L. Huang[1], and M. Z. Fan*[4], [1]*Institute of Subtropical Agriculture, The Chinese Academy of Sciences*, *Changsha, Hunan, China*, [2]*Huazhong Agricultural University*, *Wuhan, Hubei, China*, [3]*Texas A&M University*, *College Station*, [4]*University of Guelph*, *Guelph, Ontario, Canada*.

This study was conducted to determine the effect of different available-phosphorus levels in diets on the digestibilities of dietary nitrogen (N) and phosphorus (P) in growing pigs, using a 4x4 Latin square design. Four cornstarch- and soybean meal-based diets were fed to 4 barrows (average initial BW of 52 kg) housed individually in stainless cages. Dicalcium phosphate was used as the major source of dietary inorganic P whose supplemental levels were 0.0, 0.12, 0.24 and 0.36% in Diets 1, 2, 3, and 4, respectively. The corresponding levels of available P in the diets were 0.13, 0.15, 0.17, and 0.19%, respectively. Each experimental period comprised 12 d, including 5-d adaptation and 3-d collection of fecal samples. The results indicated that apparent P digestibilities in Diets 1, 2, 3, and 4 were 20.97%, 25.27%, 37.91%, and 46.15%, respectively (P<0.01) and true P digestibilities were 53.00%, 53.78%, 65.19%, and 68.09%, respectively (P>0.05). Fecal P outputs decreased (P < 0.05) with decreasing dietary P intakes. However, there were no differences (P>0.05) in apparent N digestibilities or fetal N outputs among the different groups of pigs. We conclude that feeding diets containing 0.12% to 0.24% dicalcium phosphate is effective in reducing P excretion from growing pigs.

Key Words: Available Phosphorus, True Digestibility, Growing Pigs

112 Effect of mineral status and calcium (Ca) concentration on phosphorus (P) and Ca utilization in piglets. M. P. Letourneau Montminy*[1], C. Jondreville[2], D. Sauvant[3], M. Magnin[4], C. Pomar[5], and P. Lescoat[1], [1]*INRA UR83*, *Nouzilly, France*, [2]*INRA USC340*, *Vandoeuvre-les-Nancy, France*, [3]*INRA UMR791*, *Paris, France*, [4]*BASF Nutrition Animale*, *Château-Gontier, France*, [5]*Agriculture et Agroalimentaire Canada*, *Lennoxville, Canada*.

Current formulation system may inadequately account for the impact of factors that modify Ca and P utilization by the animal. These factors could be related to the animal (e.g.: mineral status) or to the diet (e.g.: Ca concentration). An experiment was conducted to study the impact of the initial mineral status of animals and of Ca and P dietary supply, with and without phytase on P and Ca utilization by piglets. They were initially weighing 10 kg and fed maize-soybean meal diets providing adequate amounts of all nutrients except P and Ca. This study was divided into two successive periods. The first 10-day period aimed at preparing piglets with two mineral status. Sixty piglets were fed diets providing either adequate (1.42 and 0.80 %, respectively) or low (0.67 and 0.43 %, respectively) amounts of Ca and tP. At the end of this period, 6 piglets from each diet were slaughtered. The 24 remaining piglets from each diet were fed one of the 4 experimental diets for a 24-day experimental period. All four experimental diets displayed similar amounts of tP (0.56%). They contained Ca concentrations and microbial phytase (Natuphos) at (1.0%, 1000 IU), (1.0%, 0 IU), (0.6%, 1000 IU) and (0.6%, 0 IU) respectively. Body weight gain and feed conversion ratio were independent of the initial mineral status (P > 0.05). Femur ash concentration and plasma P decreased while plasma Ca and alkaline phosphatase activity increased with decreased P and Ca dietary concentration (P < 0.05) during the first 10-day period, indicating that two different mineral status could be differentiated. By the end of the 24-day experimental period, femur ash concentration was independent of the initial mineral status of the pigs (P > 0.05). This observation was in accordance with an improved Ca and P digestibility (P < 0.05) in initially depleted pigs compared to pigs with a normal initial mineral status. Lowering dietary Ca increased P digestibility (P < 0.05). Mineral status and lower dietary Ca can improve utilization of P in piglets.

Key Words: Piglets, Phosphorus, Calcium

113 Exogenous glutathione reduces cadmium toxicity to giant freshwater prawns *Macrobrachium rosenbergii*. W. Y. Chu*[1], Y. L. Yin[1], K. Yao[1], T. J. Li[1], R. L. Huang[1], and G. Y. Wu[1,2], [1]*Institute of Subtropical Agriculture, The Chinese Academy of Sciences*, *Changsha, Hunan, China*, [2]*Texas A&M University*, *College Station*.

This study was conducted to test the hypothesis that exogenous glutathione (GSH) can improve antioxidant function and the ultrastructure of hepatopancreas (HP) in cadmium (Cd)-treated freshwater prawns *Macrobrachium rosenbergii*. Data are expressed as means ± SEM. The prawns (BW 11.3 ± 0.13 g and length 104.6 ± 2.4 mm) were fed a pellet diet consisting of 40% groundnut oil cake, 15% soybean meal, 15% fish meal, 28% rice bran, and 2% vitamin-mineral premix. Eighty prawns were assigned randomly into four groups (20 prawns/group). Groups 1 and 2, which were maintained in Cd-free water, received intraperitoneal (i.p.) administration of 0 or 0.21 g GSH/kg BW once daily for 7 d. Groups 3 and 4, which were maintained in water containing 0.06 mg Cd/L, received i.p. administration of 0 or 0.21 g GSH/kg BW once daily for 7 d. On d 3 and 7, HP tissues were obtained from 10 prawns/group for determining total glutathione, the thiobarbituric acid reactive substance, and enzyme activities. Concentrations of total GSH (1.13 ± 0.31 μmol/g tissue) in HP did not alter ($P>0.05$) in prawns not receiving Cd or GSH treatment over a 7-d period. Compared with the prawns not treated with GSH, administration of GSH increased ($P<0.05$) concentrations of total GSH in HP by 2.8- and 4.6-fold on d 3 and 7, respectively. The GSH treatment reduced ($P<0.05$) Cd-induced lipid peroxidation by 61% and increased ($P<0.05$) the activities of superoxide dismutase by 27% and glutathione peroxidase by 67% on d 7. The structural integrality of most organelles (e.g., nucleus, mitochondria, and rough endoplasmic reticulum) in HP was severely damaged in Cd-treated prawns receiving no GSH administration. GSH treatment ameliorated ($P<0.05$) the Cd-induced damage in HP. These results suggest that GSH administration is beneficial for reducing Cd toxicity to HP of the freshwater prawn.

Key Words: Glutathione, Cadmium, Antioxidant Defence

114 Factors affecting phytase activity: implication for assay development. M. F. Isaksen*[1,2] and S. Dalsgaard[1,2], [1]*Danisco Innovations*, *Brabrand, Denmark*, [2]*Danisco Animal Nutrition*, *Marlborough, Wiltshire, UK*.

Phytase is an enzyme used in feed to improve phytate phosphorus digestibility and these effects *in vivo* are dose dependent. The feed industry, therefore, needs an assay which consistently quantifies phytase activity in feed. To get a better understanding of the factors influencing phytase quantification, three different sources of phytase (E.coli, Aspergillus, Peniophora) were assayed using different methods presently used by the feed industry for determining phytase in feed. The study included the AOAC method. The standard unit definition for all assay methods was the same i.e. pH 5.5 and at 37°C, and only minor differences in the assay methodologies were noticeable. Nevertheless, the differences in measured activity between the assays were significant, ranging from no difference to 50% or more for the three phytase sources. The calcium concentration used in the assay was found to have a large effect on the recovery of the three tested phytases, with the E.Coli phytase giving lower than expected recoveries and the Peniophora phytase giving higher than expected recoveries. This study demonstrates that phytases that are quantified in units with the same basic definition, can give very different recoveries in in-feed assays, depending on quite subtle changes in assay methodology. The number of units assayed is dependent on several factors, including calcium concentration in the extraction procedure, assay buffer types and extraction time. Care should therefore be taken when interpreting the results from different phytase products, when using one specific assay method. *In vitro* comparisons should always be linked to in vivo estimations of bio-efficacy.

Key Words: Enzymes, Phytase, Assay

115 Influence of dietary reductions in CP, P, and trace minerals on DM, N, P, and mineral excretion in finishing pigs. M. Lachmann*, S. Carter, J. Bundy, S. Jenkin, and Z. Marable, *Oklahoma State University*, *Stillwater*.

Seventy-six crossbred pigs (28 kg BW) were used to evaluate the effects of reducing dietary CP, P, and trace minerals (TM) on DM, N, P, and mineral excretion during a 110-d finishing period. Pigs were blocked by BW and randomly allotted to dietary treatments. Pigs were housed in an environmentally-controlled building with 4 identical rooms, each room having a shallow pit, pull plug system (19 pigs/room, 2 rooms/trt). The control diet was a fortified corn-soybean meal diet (19.3, 17.2, 15.1 and 13.6% CP; 0.50, 0.46, 0.43, and 0.40% P) with 0.1% inclusion of TM premix for Phases 1 (28-54 kg), 2 (54-82 kg), 3 (82-100 kg) and 4 (100-118 kg). Diet 2 (LPPM) was similar to the control with the exceptions that CP was reduced by 3% units, P by 0.1% units, phytase added (500 FYT/kg), and TM premix reduced by 50, 77, 83 and 100% for Phases 1 - 4, respectively. The TM premix supplied 11, 110, 26, and 110 ppm of Cu, Fe, Mn, and Zn. Diets were formulated on true dig. Lys (0.92, 0.79, 0.65, and 0.56%) and Lys, Met, Thr and Trp were added to LPPM on an ideal basis. Pig weight, feed intake, pit volume, and slurry pH were measured weekly. Feed and slurry samples were collected weekly for DM, N, P, and mineral analyses. Slurry concentrations of N (2,010 vs. 1,438 ppm) and NH_4-N (940 vs. 632 ppm) tended to decrease ($P = 0.06$) with LPPM, while P (472 vs. 259 ppm) and pH (7.07 vs. 6.59) were reduced ($P < 0.05$). Diet did not affect ($P > 0.10$) growth performance (ADG = 839 g, G:F = 0.37). Daily intakes of N (54.4 vs. 45.7 g) and P (9.8 vs. 7.5 g) decreased ($P < 0.05$) with LPPM. Daily DM (293 vs. 260 g), N (33.5 vs. 23.1 g), and P (6.2 vs. 4.1 g) excretion were reduced ($P < 0.05$) for pigs fed LPPM. Excretion of macro- and TM was reduced by more than 11 and 38%, respectively. Cumulative DM (32.2 vs. 28.5 kg), N (3.7 vs. 2.5 kg), and P (0.68 vs. 0.45 kg) excretion per pig were reduced ($P < 0.05$) by 12, 31 and 34%, respectively with LPPM. These results suggest a marked reduction in nutrient excretion for pigs fed LPPM during the finishing period.

Key Words: Pigs, Diet, Nutrient Excretion