240 Stability of various commercial phytase sources. C. K. Jones*[1], M. D. Tokach[1], R. D. Goodband[1], S. S. Dritz[1], D. R. Campbell[2], B. W. Ratliff[3], J. M. DeRouchey[1], and J. L. Nelssen[1], [1]*Kansas State University, Manhattan*, [2]*DSM Nutritional Products, Inc., Parsippany, NJ*, [3]*Enzyvia, LLC, Sheridan, IN*.

A 180-d trial evaluated the effects of environmental conditions on phytase stability. Coated and uncoated products from 3 phytase sources (Ronozyme P, OptiPhos, and Phyzyme) were stored as pure form, in a vitamin premix, or in a vitamin and trace mineral (VTM) premix. Pure forms were stored at −18, 5, 23, and 37°C (75% humidity). Premixes were stored at 23 and 37°C. All treatments were sampled on d 0, 30, 60, 90, and 120. Treatments stored at 23 or 37°C were also sampled on d 180. All factors studied influenced stability (source × form × temperature × coating × time interaction; $P < 0.001$). When stored at 23°C or less, temperature did not influence phytase stability; however, 37°C was detrimental to stability of all phytase sources and forms, with coated OptiPhos being the least affected. Phytase activity of pure products decreased at each sampling period (d 30, 60, 90, 120, and 180) with greater activity remaining on each d for phytase stored at 23°C (>100, >100, 97, 89, and 86%, respectively) than 37°C (72, 50, 46, 39, and 29%, respectively). When stored in pure form at 23°C, phytase activity remaining at d 180 was >84% for all phytase sources except uncoated Ronozyme P (61%). At 37°C, coating increased phytase activity remaining at d 180 for OptiPhos (53 vs. 39%) and Ronozyme P (15 vs. 3%), but not Phyzyme (21 vs. 43%) relative to their uncoated pure form. When added to vitamin premixes and stored at 23°C, coating increased activity remaining on d 180 for OptiPhos (94 vs. 76%), Ronozyme P (94 vs. 73%) and Phyzyme (87 vs. 67%) compared with their uncoated form. The response was similar for VTM premixes with more activity remaining on d 180 for the coated forms (OptiPhos, 70 vs. 43%; Ronozyme P 76 vs. 64%; Phyzyme, 92 vs. 60%). Similar to pure phytase, exposing premixes to 37°C greatly decreased phytase activity on d 180 with coated OptiPhos having more activity remaining (41%) than other phytase sources. In conclusion, pure products held at 23°C or less were the most stable. In premixes, longer storage time and higher temperature reduced phytase activity, but coating mitigated some of these negative effects.

Key Words: enzyme, phytase, stability

241 Dietary calcium and phosphorous and organic and inorganic minerals on mineral digestibility in swine. J. S. Jolliff* and D.C. Mahan, *The Ohio State University, Columbus*.

Calcium and P levels and trace mineral supplements were evaluated for their role in mineral digestibility. Two levels of Ca and P (Ca:P) and 3 trace mineral (TM) treatments (2 × 3 factorial) were analyzed over 6 replicates in growing pigs (55 kg BW). The 2 Ca:P levels were 0.65% Ca and 0.55% P (LOW) and 1.00% Ca and 0.85% P (HIGH). The 3 TM treatments were: 1) No supplemented TM, i.e. all minerals were considered indigenous (BASAL); 2) Organic TM supplied as soy protein chelates (ORG); and 3) Inorganic TM supplied as mineral salts (INORG). Both ORG and INORG supplements added 10 ppm Cu, 150 ppm Fe, 10 ppm Mn, and 140 ppm Zn to the BASAL diet. Following a 14 d acclimation period in metabolism crates, total fecal excretion was collected for 10 d. BASAL diets contained approximately 34% of the TM levels in the ORG and INORG supplemented diets. Apparent digestibility of dietary minerals and total fecal mineral excretion were affected by both Ca:P and TM. LOW Ca:P diets resulted in greater % apparent digestibility of Ca, Cu, Fe, and Zn ($P < 0.01$), but not Mn or P, than the HIGH Ca:P diets. Both Cu ($P < 0.05$) and Mn ($P < 0.05$) had greater digestibility in the ORG diets than the INORG diets. In contrast, Zn was more ($P < 0.05$) digestible in the INORG than the ORG supplemented diets. Fecal excretion of Ca and P was greater ($P < 0.01$) with HIGH Ca:P, but was unaffected by TM source. Total fecal excretion of Cu, Fe, Mn, and Zn was less ($P < 0.05$) when the BASAL diet was fed than the ORG or INORG supplemented diets. There were no Ca:P × TM interactions for either % apparent digestibility or total fecal mineral excretion of macro- and microminerals. Our results indicate that increased Ca:P supplementation reduced micromineral digestibility. Also ORG TM have a greater % Cu and Mn apparent digestibility than INORG minerals while INORG Zn was more digestible. The greater Ca:P levels had similar effects on the digestibility of both ORG and INORG TM supplements.

Key Words: pigs, minerals, digestibility

242 Effects of dietary biotite supplementation and stocking density on growth performance, nutrient digestibility, blood characteristics and fecal odor emission in growing pigs. H. J. Kim*, J. H. Lee, Q. W. Meng, B. W. Yang, and I. H. Kim, *Dankook University, Department of Animal Resource and Science, Cheonan, Choongnam, Korea*.

A 2×3 factorial (biotite supplementation, three regimens of stocking densities; 1.08, 0.81 and 0.65 m2/pig) arrangement was used with 96 crossbreed pigs [(Landrace×Yorkshire)×Duroc, avg. BW 19.60 kg]. The diet was supplemented with 0.3% biotite. The experiment lasted for 42 days. Each treatment had 4 replicates. Average daily gain and average daily feed intake were improved by increasing stocking density ($P < 0.001$). However, G/F ratio had no significant different among treatments. No significant different was observed on nutrient digestibility containing dry matter and nitrogen. In blood characteristics, white blood cell concentration at final sampling period was significantly decreased ($P < 0.01$) by increasing stocking density. Red blood cell concentration at final sampling period was significantly decreased ($P < 0.001$) by supplementing biotite. However, cortisol concentration at final sampling period was decreased ($P < 0.05$) by supplementing biotite. In fecal odor emission, total mercaptans and ammonia concentration at 5 days and 10 days were significantly decreased (5 days total mercaptans and ammonia at 5 days, $P < 0.01$ and $P < 0.05$; total mercaptans and ammonia at 10 days, $P < 0.01$) by supplementing biotite. In conclusion, dietary biotite supplementation improved the immunity of growing pigs as stocking density increased. Likewise, fecal odor emission can be effectively reduced by supplying biotite.

Key Words: biotite, stocking density, growing pigs

243 The effects of fly ash supplementation on growth performance, nutrient digestibility, meat quality and fecal concentration of gases in finishing pigs. L. Yan*, D. L. Han, Q. W. Meng, T. X. Zhou, and I. H. Kim, *Dankook University, Department of Animal Resource and Science, Cheonan, Choongnam, Korea*.

Forty-eight [(Landrace Dankook University × Yorkshire) × Duroc] pigs with an average initial body weight (BW) of 48.47 ± 1.13 kg were used in a 12-week growth trial to investigate the influence of fly ash-based zeolites (FAs) supplementation on growth performance, nutrient digestibility, meat quality and fecal concentration of gases in finishing