

221 The effects of reducing dietary crude protein and adding chicory on composition and odor of stored swine manure. S. M. Hanni*, M. D. Tokach, R. D. Goodband, S. S. Dritz, and J. L. Nelssen, *Kansas State University*.

Our objective was to evaluate the nutrient excretion and odor reducing potential of chicory, a feed ingredient containing inulin, in either a corn-soybean meal diet or a diet formulated to minimize nutrient excretion and odors using crystalline amino acids, phytase, and non-sulfur-containing trace minerals. Treatments were arranged in a 2 x 2 factorial with main effects of diet nutrient excretion potential (low and high) and chicory (0 or 10%). Twelve barrows (initially 59 kg) housed in metabolism crates were fed each of the four diets over four 10-d periods in a replicated 4 x 4 Latin square. Feces and urine were collected from d 4 to 6 to measure N, S, and P intake, excretion, and retention. Feces and urine were collected on d 8 and 9 of each period and mixed into a 7.5% DM slurry for odor analysis. The 7.5% slurries were sampled on d 28 and 56 of storage for measurement of pH, total Solids (TS), total volatile solids (TVS), ammonia, total Kjeldahl N (TKN), H₂S, total sulfur (sum of all sulfur in air and slurry), and Ca, K, Mg, Na, and P. Air samples collected from slurries were measured for H₂S, intensity, and offensiveness. Pigs fed diets formulated to reduce nutrient excretion and odor had a 20% and 34% reduction (P < 0.001) in total N and P excretion, respectively, and 33% reduction in urinary S excretion. Addition of chicory to the diet further reduced (P < 0.002) N and P excretion by 10% and 14%, respectively. Pigs fed the diets formulated to reduce nutrient excretion and odor had lower (P < 0.001) pH, ammonia, S, and TKN in the slurry samples. However, H₂S emission, odor intensity and offensiveness were not affected (P < 0.19) by treatment. These results indicate that formulating a diet to meet the needs of a pig yet lower nutrient excretion by use of synthetic amino acids, phytase, non-sulfur containing trace minerals and the addition of chicory reduce nutrient excretion in swine manure, but do not appear to affect the intensity or offensiveness of odors.

Key Words: Pig, Chicory, Odor

222 Effect of feeding a low nutrient excretion diet on wean-finish pig growth performance, carcass characteristics, manure composition, and building aerial ammonia. R. B. Hinson*, B. E. Hill, M. C. Walsh, D. M. Sholly, S. A. Trapp, J. S. Radcliffe, A. L. Sutton, A. P. Schinckel, and B. T. Richert, *Purdue University*.

One hundred forty-eight pigs were used to determine the effects of feeding a corn SBM based diet (CTRL) or a low nutrient excretion (LNE) diet, formulated with reduced CP plus synthetic amino acids, low phytic acid corn, and phytase on wean-finish growth performance, manure generation and composition, building aerial NH₃ emissions, and carcass characteristics. Pigs (5.95 kg BW) were blocked by sex and BW and randomly allotted to CTRL or LNE diets. Pigs were housed in 4 nursery and 2 grow-finish (G-F) rooms, with individual and identical manure pit and ventilation systems. Pigs were split-sex phase fed, three nursery diets for a 5 wk nursery period and 2 grower and 2 finisher diets for a 16 wk G-F period. Pigs were housed 4 or 5 pigs/pen with 9 pens/trt/sex during the nursery period and 4 pigs/pen with 5 pens/trt/sex in the grower phase and 2 pigs/pen in the finisher phase. On wk 8 and 16, 10 pigs/trt/sex were slaughtered for determination of carcass characteristics. Ultrasonic estimates of backfat depths and loin eye area (LEA), manure depths and samples and aerial NH₃ values were taken at the end of each growth phase. Growth performance was unaffected (P>0.05) by diet during any of the growth phases, except for G:F (P<0.05) during the nursery (CTRL=.67, LNE=.62) and grower phases (CTRL=.45, LNE=.41). Diet had no effect (P>0.05) on final 10th rib carcass characteristics. Nursery and G-F phase manure volumes, pH, and ammonium-N concentrations were reduced by LNE diets. Aerial NH₃ were reduced 60% during the nursery and 46% at wk 8 of the G-F phase by the LNE diet. Feeding a reduced CP and phosphorus diet sustained pig growth performance and ribbed carcass data when fed from wean-finish, while reducing nutrient excretion.

Key Words: Pigs, Nutrient Excretion, Reduced Crude Protein

223 Nitrogen excretion and ammonia emissions from pigs fed reduced crude protein diets. D. Panetta*¹, W. J. Powers¹, H. Xin¹, B. J. Kerr², and J. C. Lorimor¹, ¹Iowa State University, ²USDA-ARS NSRIC.

Two experiments were conducted to quantify the effects of dietary strategies on NH₃ emissions of growing-finishing pigs. In Exp 1, nine pigs (initial BW = 47 kg) were fed corn-soybean meal diets fortified with no amino acids (17.4% CP), Lys (17.0% CP, DM basis), or Lys, Met, Thr, and Trp (14.5% CP). In Exp 2, nine pigs (initial BW = 41 kg) were fed the Lys diet with 0, 62.5 or 125 ppm of yucca extract (Alltech). Two gilts and one barrow were allocated to each of three indirect calorimeters. Four 1-wk feeding periods, with new diets assigned weekly, consisted of a 4-d dietary adjustment followed by 72 h of continuous NH₃ measurement from chamber exhaust. Pigs and feed refusals were weighed, urine and fecal samples collected, and manure pits cleaned after each period. Feed intake (FI) and gain (ADG) were measured each period. Diets, urine, and fecal samples were analyzed for TKN and NH₃-N concentration. In Exp 1 and 2, diet had no effect on FI, ADG, or feed efficiency (P > 0.05). In Exp 1, TKN in feces (3.97, 3.93, 3.72%; P < 0.001) and urine (1.10, 0.94, 0.93%, P = 0.04) decreased with decreasing dietary CP. Fecal NH₃-N decreased with decreasing dietary CP (0.47, 0.47, 0.42%, P = 0.01) while urine NH₃-N increased (0.10, 0.10, 0.20%, P < 0.001). Weekly NH₃-N emissions were 22.25, 19.22, and 11.85 g/chamber (± 8.87 SEM; P > 0.05). The fraction of excreted TKN emitted as NH₃ during the week was 1.68, 1.52, and 0.91% (± 0.60 SEM; P > 0.05). In Exp 2, there was a linear decrease in urine NH₃-N due to increasing yucca content (0.14, 0.13, 0.11%, P = 0.05). Fecal TKN (3.59% ± 0.06 SEM), fecal NH₃-N (0.48% ± 0.03 SEM), urine TKN (0.94% ± 0.07 SEM), NH₃-N emissions (12.02 g ± 2.81 SEM) and the fraction of excreted TKN emitted as NH₃ during the week (1.20% ± 0.24 SEM) were not affected by yucca inclusion (P>0.05). Reducing diet CP and including NH₃-binding agents can be effective in reducing N content of excretions and NH₃ emissions. Less than 2% of excreted N was volatilized as NH₃ during the collection period.

Key Words: Ammonia, Crude protein, Yucca

224 Effect of feeding a reduced crude protein and phosphorus diet on grow-finish pig growth performance, carcass characteristics, manure concentration, and building aerial ammonia. R. B. Hinson*, D. M. Sholly, M. C. Walsh, B. E. Hill, S. A. Trapp, J. S. Radcliffe, A. L. Sutton, A. P. Schinckel, and B. T. Richert, *Purdue University*.

Fifty barrows and forty-eight gilts (Initial BW= 32.0 kg) were allotted by sex and BW to determine the effects of feeding a control (CTRL), corn-SBM based diet or a low nutrient excretion (LNE) diet, formulated with reduced crude protein plus synthetic amino acids, low phytic acid corn, and phytase, on grow-finish (G-F) pig growth performance, carcass characteristics, and building aerial gasses. Pigs were housed 5 pigs/pen and 5 pens/sex/trt during the grower phase (wk 0-8) and three pigs/pen during the finisher phase (wk 8-16) in one of two identical environmentally controlled rooms with separate ventilation and manure storage. Feed was split-sex and phase fed with two grower diets and two finisher diets. Individual pig weights and pen feed consumption were recorded bi-weekly. Manure depths and samples and aerial ammonia values were taken at the end of each growth phase. Pigs were ultrasonically scanned at wks 2, 8, and 16 to determine backfat depths and loin eye area (LEA). Ten pigs/sex/trt were slaughtered at wk 8 and 16 for determination of carcass characteristics. Growth performance was not different between treatments (P>0.05) during the grower, finisher, or overall G-F period, except for grower ADG (CTRL=.87 kg/d, LNE=.83 kg/d). There were no differences (P>0.05) in 10th ribbed carcass data at wk 16. The LNE diet increased wk 2 ultrasound 10th rib backfat, and decreased wk 8 and 16 ultrasound LEA (P<0.05). LNE pigs produced a numerically larger volume of manure per day. However, ammonium-N, nitrogen, and phosphorus excreted per pig per day were numerically reduced when pigs were fed the LNE diet. Average aerial ammonia concentrations were reduced 36.5% by the LNE diet. Feeding a reduced crude protein and phosphorus diet can maintain growth performance and ribbed carcass characteristics, while reducing nutrient excretion in G-F swine.

Key Words: Pigs, Nutrient Excretion, Reduced Crude Protein