

175 Effects of pH level in spray-dried blood meal on growth performance in nursery pigs. J. M. DeRouchey*, J. L. Nelsens, M. D. Tokach, R. D. Goodband, J. C. Woodworth, and D. E. Real, *Kansas State University, Manhattan*.

Two hundred forty pigs (BW of 5.1 kg and 17 ± 2 d of age) were used in a 31-d growth assay to determine the effects of blood meal varying in pH after spray-drying on growth performance in phase II nursery pigs (BW of 7.0 kg). Decreased blood meal pH has been associated with decomposition of the blood meal from processing or prolonged storage. As pH decreases, offensive odors increase and may have a negative effect on palatability. All pigs were fed the same pelleted diets for 10-d post-weaning. Then, pigs were switched to experimental diets which included a control diet (10% spray-dried whey) with no added blood meal or four diets containing 2.5% spray-dried blood meal. The four blood meals were from the same processing facility, but had an initial pH of 7.4, 6.7, 6.4, and 5.9, respectively. Treatment diets were fed in meal form and formulated to contain 1.35% lysine, .82 Ca, and .48 available P. When pigs were fed the common diets from d 0 to 10 after weaning, ADG, ADFI, and G/F were 186 g, 195 g, and .95. For d 0 to 21 of the experiment (d 10 to 31 postweaning), ADG (449 vs 430 g) and ADFI (663 vs 627 g) were increased ($P < .02$) by adding blood meal to the diet compared with control pigs. Feed efficiency was not affected by blood meal addition. The pH of the blood meal did not influence performance with pigs fed all blood meal treatments having similar ADG (450, 446, 450, and 453 g) and gain/feed (.69, .66, .67, and .68, respectively). These results suggest that spray-dried blood meal addition at 2.5% is beneficial in phase II nursery diets, while blood meal pH does not appear to influence nursery pig performance.

Key Words: Pig, Blood Meal, Growth

176 Efficacy of different sources of zinc oxide for young pigs: growth and gut morphology. I. Mavromichalis*, C. M. Peter, T. M. Parr, D. Ganessunker, and D. H. Baker, *University of Illinois at Urbana-Champaign*.

Research in our laboratory indicated that commercial sources of ZnO differ widely in relative bioavailability (RBV) of Zn, but it is not known whether growth-promoting efficacy in young pigs is better with ZnO sources that are high or low in RBV. We compared a common ZnO (74% Zn) with a low RBV (37%) to a feed-grade ZnO (78% Zn) with a high RBV (95%). The low-RBV ZnO (W) manufactured by the Waelz process was greenish-brown whereas the high-RBV ZnO (HS) manufactured by the hydrosulfide method was pale yellow. In Exp. 1, 27 pigs with an average initial weight of 6.5 kg (28 d-of-age) were randomly assigned (3 replicates/treatment and 4 pigs/pen) to receive 0, 1,500, or 3,000 mg Zn/kg from HS in a 21-d growth assay. Growth rates responded linearly ($P < .05$) to incremental doses of Zn. In Exp. 2, 60 pigs with an average initial weight of 6.2 kg (28 d-of-age) were randomly assigned (5 replicates/treatment and 4 pigs/pen) to receive either 0 or 1,500 mg Zn/kg from either W or HS in an 11-d growth assay. Growth rate during the first 6 d was improved ($P < .05$) by the addition of ZnO, and there was a trend ($P < .10$) for greater weight gain in pigs receiving HS than W. During the entire 11 d, however, there was no difference in growth between the two sources of ZnO. In Exp. 3, 60 pigs with an average initial weight of 6.1 kg (28 d-of-age) were randomly assigned (5 replicates/treatment and 4 pigs/pen) to treatments in a 3-wk growth assay. Pigs received the same dietary treatments as in Exp. 2, with the exception that diets did not include any antimicrobial compounds. Growth performance was improved ($P < .05$) by the addition of either source of ZnO. During wk 1, however, pigs receiving HS grew faster ($P < .05$) than those receiving W, but the response difference diminished to a trend during the entire 21-d assay period. Morphology of duodenal, jejunal, and ileal gut sections was examined at d 21 of the assay, but neither source of ZnO had an effect on crypt depth, villus height or villus width.

Key Words: Nursery Pigs, Zinc Oxide, Relative Bioavailability

177 Influence of dietary methionine to methionine plus cysteine ratios on nitrogen retention in growing pigs. A. T. H. Reijmers*, A. M. Gillis, and C. F. M. de Lange, *University of Guelph, Guelph, Ontario, Canada*.

Estimates of the minimum methionine (MET) to methionine plus cysteine (M+C) ratio in diets for growing pigs range between 30 and 70% and may be affected by the dietary amino acid source, body weight, performance level and total M+C intake. The objective of the current study was to establish the minimum dietary available MET to M+C ratio for growing pigs using the nitrogen balance (N-balance) method. Ten gilts between 40 and 80 kg live body weight were fed diets based on corn starch, casein and synthetic amino acids, supplying equal moles of M+C, approximately 0.034 moles/d and supporting a protein deposition (PD) of 80% of the gilts' maximum PD's. The diets were confirmed to be first limiting in M+C. On a weight basis, the target ratios of MET to M+C were 42, 47, 52, 57 and 67% for five dietary treatments. Gilts were fed the experimental diets according to a repeated Latin Square design. Pigs were adjusted to dietary treatments for 5 days prior to a 5 day N-balance period. For the five respective treatments, PD's were 108, 116, 118, 120 and 121 g/d (SEM=1.35). Total nitrogen excretion (urine plus feces) was reduced ($P < .05$) and PD was increased ($P < .05$) when the MET to M+C ratio was increased to 52%. These values did not change ($P > .10$) when the MET to M+C ratio was further increased. Based on broken line-linear plateau regression analysis, a plateau in total nitrogen excretion and PD was achieved when the available MET to M+C ratio was 53.5% on a weight basis, or 49% on a molar basis. When a curvilinear model was used for data analysis, nitrogen excretion was minimized and PD maximized when the available MET to M+C ratio exceeded 57% on a weight basis or 52% on a molar basis.

Key Words: Pigs, Methionine, Cysteine

178 Effects of dietary betaine and methionine on growth performance, carcass characteristics, and plasma metabolites of finishing barrows. S.J. Kitt*, P.S. Miller, A.J. Lewis, and R.L. Fischer, *University of Nebraska, Lincoln*.

The objective of this experiment was to determine whether dietary betaine can partially replace methionine in diets for finishing barrows. Sixty-four barrows (initial BW = 46 kg) were blocked by weight, individually penned, and randomly allotted to receive one of eight dietary treatments. Treatments were two concentrations of betaine (0 or .125%) and four concentrations of methionine (from approximately 82 to 130% of the requirement, formulated on a true ileal digestible basis) in a 2×4 factorial arrangement. Amino acid requirements were predicted using the NRC model and estimated average daily lean growth from pigs with a similar genetic background. Diets were formulated to exceed all nutrient requirements except methionine. There were three phases: 46 to 59 (Phase 1), 59 to 86 (Phase 2), 86 to 112 (Phase 3) kg of BW. Supplemental choline (77 mg/kg of diet) and choline from organic ingredients supplied 587, 556, and 518 mg/kg total choline in Phases 1, 2, and 3, respectively. Blood samples were collected on the final day of each phase and analyzed for plasma urea and methionine concentration. Pigs were slaughtered when final BW was approximately 112 kg. Overall ADG, ADFI, ADG/ADFI, longissimus muscle area, and backfat depth were not affected ($P > .15$) by dietary betaine or methionine concentration. Fat-free lean gain tended ($P < .10$) to be increased by betaine, regardless of dietary methionine concentration. In each phase, plasma methionine concentration increased linearly ($P < .05$) as dietary methionine concentration increased. Plasma urea concentration was decreased ($P < .06$) in pigs fed betaine during Phase 3. The data suggest that methionine intake was not sufficiently deficient to assess the efficacy of betaine as a replacement for methionine in diets for finishing barrows. These data also suggest that current estimates of the methionine requirement of pigs with a similar lean growth potential may be too high.

Key Words: Betaine, Methionine, Pigs