
One hundred four-forty, high-health, high-lean growth barrows (Newsham) were used to determine the dietary lysine requirement to maintain growth performance from 18 to 34 kg. The experiment was designed as a randomized complete block, with blocks established on initial BW. Pigs were segregated early-weaned at 7 d of age and fed high nutrient density diets from weaning to 11 kg. At 11 kg, pigs were segregated into dietary lysine levels of 15, 18, 20, 22, 24, 26, 28, 30, 32, 34, and 36 g lysine per kg diet. This was continued throughout the experiment. Pigs were placed into each of six dietary treatments in Exp 1 and five treatments in Exp 2. Dietary treatments were fed at a 21 d period. Pigs were approximately 45 of age and weighed 18 ± 3 kg at the initiation of the experimental period. Digestible lysine levels were 75, 85, 95, 105, 115, and 125% of the 115% lysine requirement for pigs fed 14 kg. All diets were corn-soybean meal-based, and formulated to meet or exceed current recommended estimates. Lysine HCl was included at 115% of the lysine and soybean meal was adjusted to increase dietary lysine concentrations. Pigs were housed in pens of four with six replicates per treatment. Pig weight and feed disappearance were collected on d 7, 14, and 21 of the experiment to calculate ADG, ADFI, and feed efficiency (G:F). Pigs were bled on d 7 to evaluate serum N (PUN) concentrations. From d 0 to 7, ADG and G:F improved (linear, P < 0.1) with increasing digestible lysine (Table 1). Pigs fed the 125% lysine diet had 20% higher ADG and G:F than pigs fed the lowest level of digestible lysine (which is close to the current NRC 1988 estimates) increasing digestible lysine improved ADG and G:F (quadratic, P < 0.01) from d 0 to 14 and for the overall trial (d 0 to 21) with a maximum observed for both response criteria at approximately 125% lysine level (105 ± 1.5% digestible lysine). However, ADFI was not influenced (P > 0.10) by dietary lysine at any point during the experiment. Increasing digestible lysine decreased then increased (quadratic, P < 0.01) PUN concentrations on d 7 based on the fed intake observed in this study, high-lean growth barrows that were fed a segregated early weaned to improve health status, require at least 12 to 14 d digestible lysine (16 to 17 g/kg of total lysine) from 18 to 34 kg to maximize ADG and G:F.

Impact of immune system activation on lysine and sulphur amino acid needs of 6 to 16 kg pigs. N.H. Williams*, T.S. Stably, Iowa State University, Ames.

Pigs from a single genotype and source of origin were reared via a medicated-early-weaning or conventional-weaning scheme to evaluate the impact of a low and high level of immune system (IS) activation, respectively, on dietary lysine (L) and sulphur amino acid (SAA) needs of pigs. At 26 d of age (6 - 11 kg), pigs were placed on a corn-soy diet and fed until 137 g/kg of crystalline lysine and amino acids (essential and nonessential) to provide a minimum of 100% of the ideal ratios of digestive amino acids relative to L. Within each IS group, five littermates in each of 12 litters were randomly allotted to the basal diet limiting in digestible L (60, 80, 10, 1, 2, 14, 2%) or 14% SAA (33, 45, 57, 69, 29%). The dietary L and SAA levels were achieved by substituting crystalline L-lysine or D/L- methionine for corn starch in the basal diet (1.4% digestible L; 82% digestible SAA). Pigs were penned individually in facilities maintained at 27°C and were offered ad libitum access to both feed and water. Data were analyzed as a split-split-plot design with IS level representing the whole plot, limiting amino acid representing the subplot, and level of limiting amino acid level representing the sub-subplot. Low IS pigs consumed more feed (DF) and gained weight faster (DF) and more efficiently (GF) than high IS pigs (P < 0.10). A higher dietary level of L was required (P < 0.01) to optimize DF and G:F in the low versus high IS groups, however, the level of SAA relative to L tended to optimize G:F and G:F was lower in the low IS group (.57) versus the high IS group (.57) . Based on these data, minimizing the pig’s level of IS activation enhances body weight growth, increases dietary L needs and alters the ‘ideal’ ratio of SAA relative to Lysine.

Key Words: Pigs, Immune system, Amino acids


Three experiments, using 344 weaned pigs, were conducted to evaluate the influence of β-glucan on growth performance, neutrophil and macrophage function, haptoglobin production, and resistance to Salmonella typhimurium challenge in weanling pigs. In Exp 1, 144 pigs were used to evaluate the influence of 1% dietary β-glucan in a soybean meal or milk-protein based diet on growth performance and neutrophil function. Exp 2 was a 28 d growth assay on a commercial nursery and pigs were fed a high nutrient density diet with or without 1% β-glucan containing 7.5% spray-dried plasma protein and 25% dried whey from d 0 to 14 postweaning. Pigs were then fed corn-soybean meal-based diets containing 2.5% spray-dried blood meal and 10% dried whey. Exp 3 was a 279 d growth assay to evaluate neutrophil and macrophage function, and plasma haptoglobin concentration. Pigs were challenged on d 28 postweaning with intranasal S. aureus. In Exp 3, pigs were fed the similar high nutrient density diet as fed to pigs in Exp 2 which contained 0, 0.25 or 0.5% β-glucan. Dietary β-glucan at inclusion rates of 0.5% and 1.0% did not influence neutrophil or macrophage function and did not increase overall growth performance. Similarly, 0.5% β-glucan did not alter neutrophil or macrophage hemato-cectic activity or production of superoxide anion. However, pigs fed diets containing 0.5% β-glucan had increased (P < 0.05) ADG and ADH and were heavier (P < 0.05) on d 28 postweaning No statistical differences were observed between pigs fed 0.25% or 0.5% β-glucan. Postweaning body weight and body weight gain were not different between groups.

Key Words: pigs, β-glucan, growth


Weaning places sufficient stress on the pig to predispose it to disease caused by colonization of pathogenic bacteria in the large intestine. FOS has been found to stimulate growth of indigenous microflora to prevent enteric colonization by pathogenic microorganisms. An experiment was conducted to evaluate the effectiveness of FOS for protection of neonatal pigs from infectious challenge with Escherichia Coli. K88 (E. coli). Sixteen pigs(7d, 3.9Kg b.w.) were removed from sows not vaccinated against E. coli and adapted to a no-mediated milk replacer diet(approximately 75ml per feeding/3 feedings/day) for 6 days. Eight pigs received milk replacer only and 8 received milk replacer plus 1g FOS per feeding. On day 7 pigs were challenged with oral administration of E. coli (5ml X 108). Pigs were monitored for visible symptoms and fecal samples analyzed for E. coli, Clustridium, Bifidobacteria and total anaerobic flora. Within 36 hours 6 of 8 pigs in the control group developed symptoms of anorexia, pyrexia, dehydration, and diarrhea. One FOS pig developed diarrhea for 12 hours with remaining FOS pigs showing no visible symptoms. Three pigs with severe symptoms in the control group were euthanized resulting in a survival rate of 62.5%, compared to a survival rate of 100% in FOS pigs. Bacterial counts were analyzed on day 0, 2, 4, and 10 with results indicating a shift in microbial population . E. coli were decreased(>P<3) in FOS pigs at 9.4 X108 compared to control pigs having a count of 6.4 X 109. E. coli were increased (>P<0.05) in FOS pigs at 1.8 X 109 compared to 2.9 X 109 in control pigs. Clustridium population changes were not different between groups. These results demonstrate that FOS can increase Bifidobacteria in the large intestine of the pig which provides protection from infectious E. coli.

Key Words: E. coli, pig fructooligosaccharide.