132 Effects of Rhizopus oryzae on growth performance, serum IGF-1, energy and nitrogen balance in 10 kg pigs. T. M. Becker

Rhizopus oryzae (RU) is an extract derived from the fungus Rhizopus oryzae that stimulates the endocrine system to improve pig growth performance when added to the diet. Two experiments were conducted to determine if dietary addition of RU improves growth performance, serum IGF-1, energy and nitrogen balance in young pigs. In the first experiment, a total of 140 crossbred pigs were weaned at 35 ± 3 days of age and averaged 13 kg in body weight. Pigs were blocked by weight, litter, and sex, and assigned to one of two experimental diets containing none (control) or 0.5% RU. Both diets contained 7% dry matter. Diets were corn-soybean meal based, and contained 2% dried whey (wk 1 and 2), or no dried whey (wk 3 and 4). Blood samples were collected at 21 days post weaning, and used to determine serum ADP, and G6P. Blood samples were collected by venipuncture on d 0, 14, and 28 from all pigs. Serum was harvested, pooled by pen, and analyzed for IGF-1 levels, and used to determine IGF-1 for radioimmunoassay. The secondary experiment utilized 16 crossbred barrows averaging 10 kg in body weight. Pigs were blocked by weight and litter, placed in individual stainless steel metabolism cages, and assigned to either control or RU diets for 7 experimental and 3 collection period. Pigs were fed at a rate of 2% of initial body weight twice daily. Feed, feces, and urine samples were analyzed for energy using bomb calorimeter. Nitrogen was determined using an elemental nitrogen determinate for feed and feed, and a micro-Kjeldahl procedure for urine. Data were statistically analyzed using GLM procedures for a randomized complete block design. Cumulative ADG for pigs fed the control diet was greater than for pigs fed the RU diet (P < 0.05). Serum IGF-1 levels on d 0, 14, and 28 were higher in control than in RU. Serum IGF-1 levels on d 0, 14, and 28 were not different between control and RU dietary treatments. Furthermore, there were no differences between control and RU dietary treatments for DE, ME, MEn, N retention, net protein utilization, and biological value of protein. These results suggest that RU is effective in stimulating growth and increasing serum IGF-1 levels and energy and nitrogen retention in young pigs.

Key Words: Rhizopus oryzae, Growth, Nutrient Balance


Three 35-d trials were conducted with pigs (14-21 kg initial wt) to determine if 1,25-dihydroxycholecalciferol (D3) improves the utilization of phosphate in low-P diets, as has been shown in chicks. Corn soy diet (0.5% P) was fed to fed to 5 or 6 pigs/pen (1 or 2 pigs/pen) in each trial. In Exp. 1, 7 diets were fed: (1) 15% Ca/50% P, (2, 3, 4, 5, 6, 7) 65% Ca/32% P, 0% P, or 10 μg/kg P, or 50 μg/kg P, or 10 μg/kg Ca, or 50 μg/kg P, or 15 μg/kg P. Growth rate decreased as Ca and P decreased. Growth rate decreased (P < 0.10) when dietary P was reduced (717 vs 573 g/d), but to a lesser extent when Ca also was reduced (649 g/d). Bone (avg. femur and metatarsal) breaking strength was reduced (P < 0.01) by reducing P (148, 72, 69, 83, 75, 81, 70, kg, respectively), but it was not affected by lowering Ca or adding Ca. Added D3 did not affect plasma Ca (11, 10, 12, 12, 13, 11, 12, 11, 14 μg/dl), but it tended to increase plasma P (9.4, 5.6, 5.9, 5.9, 7.0, 7.7, 7.5 μg/dl). In Exp. 2, 8 diets were fed (7, 1) 65% Ca/32% P, (2, 3, 4, 5, 6, 7) 65% Ca/32% P, 0% P, or 10 μg/kg P, or 50 μg/kg P, or 15 μg/kg P. Growth rate decreased (P < 0.05) when dietary P was reduced (581 vs 555 g/d), but to a lesser extent when Ca also was reduced (581 vs 555 g/d). Bone (avg. femur and metatarsal) breaking strength was reduced (P < 0.01) by reducing P (109, 11, 12, 13, 11, 12, 10, 11, 12, 11, 12, 11, 14, 12, 12, 13, 11, 12, 11, 14 μg/dl). In Exp. 3, pigs Exp. 3 were fed: (1) 65% Ca/55% P, (2, 3, 4) 65% Ca/32% P, 0% P, or 100 μg/kg P, or (5, 6, 7) 65% Ca/32% P, or 15 μg/kg P. Growth rate decreased (P < 0.05) when dietary P was reduced (581 vs 555 g/d), but to a lesser extent when Ca also was reduced (581 vs 555 g/d). Bone (avg. femur and metatarsal) breaking strength was reduced (P < 0.01) by reducing P (109, 11, 12, 13, 11, 12, 10, 11, 12, 11, 12, 11, 14, 12, 12, 13, 11, 12, 11, 14 μg/dl).

A total of 80 finishing barrows (PIC 326 bears × C 15 sows with an average initial BW of 70 kg) was used to determine the effects of deleting vitamin and/or trace mineral premixes from diets for finishing pigs. Treatments were: 1) corn-soybean meal-based control with vitamin and trace mineral premixes; 2) Diet 1 with the vitamin premix omitted; 3) Diet 1 with the trace mineral premix omitted; and 4) Diet 1 with the vitamin and trace mineral premixes. The diets were formulated to 7% lysine, 65% Ca, and 55% P. Average daily gain, ADFI, and gain/feed were not influenced (P > 0.14) by dietary treatment. Dressing percentage, 10th rib fat thickness, fat free lean index, muscle depth, and subjective scores for color, firmness, and marbling of the longissimus muscle also were not affected by dietary treatment (P > 0.11). Objective color determinations (Minolta L) before display and at 4 suggested that pigs fed the diet without vitamins had lighter muscle than pigs fed the diet without trace minerals (P < 0.05), but color for all treatments was within normal ranges. Also, the change for meat color to d 3, 5, 10, and 15 was similar for all treatments. Water-holding capacity was not affected by dietary treatment (P > 0.08). Objective color determinations (Minolta L) before display and at 4 suggested that pigs fed the diet without vitamins had higher Warner-Bratzler shearing force than pigs fed the diet without trace minerals (P < 0.02). Thaw loss was not affected by dietary treatment (P > 0.48), and cooking loss for pigs fed the control diet was greater when compared to pigs fed diets without the vitamin and/or trace mineral premixes (P < 0.01). In conclusion, omitting vitamin and trace mineral premixes can be used to decrease diet costs without decreasing performance or meat quality of high-lean pigs.

Key Words: Pigs, Vitamins, Minerals