

Supplementation of Valine, Isoleucine, and Tryptophan may overcome the negative effects of dietary excess Leucine in corn protein when fed to weanling pigs.

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Abstract

Diets with a high inclusion of high-protein distillers dried grain with solubles (HP-DDGS) or high protein corn protein (HPCP) may have an excess of dietary Leu, and therefore, have a detrimental effect on growth performance of pigs. However, it was hypothesized that the negative effect of using HPCP in diets for weanling pigs may be overcome if diets are fortified with crystalline sources of Val, Trp, and (or) Ile. A total of 320 weanling pigs [body weight (BW): 6.11 ± 0.66 kg] were randomly allotted to one of 10 dietary treatments in a completely randomized design. There were four pigs per pen (i.e., 2 gilts and 2 barrows) and eight replicate pens per treatment. A two-phase feeding program was used with d 1 to 14 as phase 1 and d 15 to 28 as phase 2. Within each phase, a corn-soybean meal diet was formulated, and two diets based on corn and 10% HPCP or corn and 20% HPCP were used as well. Seven additional diets were formulated by adding Val, Ile, Trp, Val and Ile, Val and Trp, Ile and Trp, or Val, Ile, and Trp to the basal diet with 20% HPCP. Phase 1 diets were fed from day 1 to 14 post weaning and phase 2 diets were fed from day 15 to 28. Average daily feed intake (ADFI), average daily gain (ADG), and average gain:feed ratio (G:F) were calculated for each phase and for the overall experiment. Fecal scores were recorded every other day. Blood samples were collected on d 14 and d 28; plasma samples were analyzed for blood urea N, total protein, albumin, peptide YY, and immunoglobulin G. Results indicated that inclusion of 10 or 20% HPCP in diets reduced ($P < 0.05$) final BW on d 28, and reduced ADG and ADFI in phase 2 and for the entire experimental period. However, pigs fed the HPCP diet supplemented with Val, Ile, and Trp had a greater ($P < 0.05$) final BW and ADG in phase 2 and for the overall experiment than pigs fed the other HPCP diets, and results for this diet were not different from the control diet. Fecal scores in phase 2 were reduced ($P < 0.05$) if HPCP was included in the diets. On d 28, pigs fed the diet with 20% HPCP and only Val, Val and Trp, or Val, Trp, and Ile had reduced ($P < 0.01$) blood urea N compared with pigs fed the control diet or the other HPCP-based diets. In conclusion, HPCP may be included in diets for weanling pigs without affecting growth performance or blood characteristics if diets are fortified with extra Val, Ile, and Trp.