171 Efficacy of a modified high protein Peptide Plus^{TM} in phase 1 diets for conventionally reared nursery pigs.

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A total of 288 pigs (18 ± .2 d of age) were used in two experiments to evaluate the feeding value of Peptide Plus^{TM} 78 (PP78), a modified Peptide Plus^{TM} (PP) relative to spray-dried plasma protein (SDPP) in phase 1 diets (d 0 to 14 postweaning). Peptide Plus^{TM} is a source of peptides and amino acids made from 100% beef muscle. Pigs were housed in a conventional nursery and allowed to consume diets ad libitum. In each experiment 144 pigs (5.2 kg BW) were penned in groups of three (8 pens/TRT). Treatments (TRT) were: 1) a negative control (NC) phase 1 diet containing 17% soybean meal (SBM) and devoid of SDPP, PP78 or PP, 2) a phase 1 diet containing 4.0% SDPP and 7% SBM, 3, 4, 5) as 2 with PP78 replacing 33, 66, or 100% of the SDPP Lys, respectively, and 6) as 2 with conventional PP replacing 100% of the SDPP Lys. Substitutions in all diets were made on an equal Lys basis at the expense of corn. The diets were equalized in total Lys (1.50%), and lactose (14.7%) content. In Exp. 2 all pigs were fed a common phase 2 diet (1.35% Lys; d 14 to 28 postweaning). In the phase 1 combined analysis, wk 1 ADG for TRT 1 to 6 was 195, 228, 239, 208, 234 and 190 g, respectively (NC vs TRT 2, P < .02; cubic effect of increasing PP78, P < .02; TRT 2 vs TRT 6, P < .01). Gain/feed for TRT 1 to 6 was .90, 1.00, .95, .91, .99 and .91, respectively (NC vs TRT 2, P < .05). During d 0 to 14 postweaning, ADG for TRT 1 to 6 was 271, 302, 319, 291, 303, and 268 g, respectively (NC vs TRT 2, P < .02; cubic effect of increasing PP78, P < .05; TRT 2 vs TRT 6, P < .01). Gain/feed for TRT 1 to 6 was .84, .88, .87, .85, .89 and .82, respectively (TRT 5 vs TRT 6, P < .02). In phase 2 (Exp. 2), pigs previously fed PP78 continued to have improved ADG (quadratic effect of increasing PP78, P < .04). Replacing SDPP in phase 1 nursery diets with PP78 results in improved performance at lower inclusion levels and similar performance at the 100% substitution level.

Key Words: Pigs, Protein Source, Performance

172 Effects of spray-dried animal plasma source on weanling pig performance.

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Five hundred sixty weanling pigs were used in three studies to evaluate the effects of different spray-dried animal plasma (SDAP) sources on pig growth performance. Pigs were fed either a control diet (no SDAP) or one of four diets containing different plasma sources added at 5.0 % of the total diet and replacing soybean meal on an equal lysine basis. In each experiment, a different lot of each of the four plasma sources was utilized. The 28 d growth assays were divided into two phases with the experimental diets (1.4 % lysine) fed from d 0 to 14 and all pigs fed a common diet (1.35 % lysine) from d 14 to 28. In all experiments, pigs (PIC) were blocked by initial BW, equalized for sex, and allotted to one of the five dietary treatments. In Exp. 1, from d 0 to 7, ADG was 16, 79, 91, 126, and 117 g/d for pigs fed the control and plasma sources 1, 2, 3 and 4, respectively. Pigs fed SDAP source 3 had increased ADG compared to pigs fed SDAP source 1 with pigs fed SDAP sources 2 and 4 having intermediate performance. In Exp. 2, from d 0 to 7, ADG was 100, 193, 189, 165, and 188 g/d for pigs fed the control and plasma source 1 through 4, respectively. Pigs fed SDAP had improved (P < .01) ADG and G/F compared to pigs fed the control diet. Pig growth performance was not affected by the source of spray-dried animal plasma used in the diet (P > .10). In Exp. 3, from d 0 to 7, ADG was 39, 108, 78, 66, and 108 g/d for pigs fed the control and plasma source 1 through 4, respectively. Pigs fed SDAP sources 1 and 4 had improved (P < .03) ADG, ADFI and G/F compared to the control pigs with pigs fed SDAP sources 2 and 3 having intermediate performance. In Exps.1, 2 and 3, growth performance, d 14 to 28 and d 0 to 28, was not affected by the diet fed from d 0 to 14. Results of these studies suggest that there are greater differences between lots or batches of SDAP from the same source than between sources. None of the SDAP sources tested consistently provided the best growth performance.

Key Words: Spray-dried animal plasma, Weanling pig, Growth performance

173 Feeding spray-dried plasma (SDP) alters the immunological response of the weaned pig to a lipopolysaccharide (LPS) challenge.

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Previously we reported that pigs fed SDP have a greater HPA axis response (i.e., higher serum ACTH and cortisol) following an LPS challenge than non-SDP fed pigs. The objective of this study was to evaluate the effect of SDP and an LPS challenge on immune function. Twenty pigs (14d, 5 kg) were weaned to an isolated environment and allotted to 1 of 4 treatments in a 2x2 factorial arrangement, with two levels of SDP (0 vs 7%) and 2 i.p. injections (LPS vs saline). Diets, formulated to contain equal ME and digestible essential amino acids, were fed for 7d postweaning. On d7, i.p. injections of either LPS (150 μg/kg BW) or saline were given, followed by blood sample collection at 15-min intervals for 3hr. After 3hr, pigs were sacrificed and tissue was collected for mRNA analysis of IL-1β and IL-6. The serum TNF-α response to the LPS challenge was greater for pigs fed the SDP diet (peak was 15.7 ng/ml at 1.25hr post-challenge) compared to pigs fed the non-SDP diet (peak was 6.3 ng/ml at 1.5hr post-challenge). The serum IFN-γ response 3hr post-LPS was greater in pigs fed the SDP diet (1.75 ng/ml) than pigs fed the non-SDP diet (.24 ng/ml). There were diet by LPS interactions for IL-1β in the adrenal (P<.06), spleen (P<.002) and thymus (P<.023) such that LPS decreased IL-1β expression only in pigs fed the non-SDP diet. SDP fed pigs had lower levels of IL-6 mRNA in the adrenal gland, spleen, and the pituitary (P<.05), but not the hypothalamus or thymus gland. These results are consistent with studies that demonstrate that immunologically naïve mice respond much greater to an LPS challenge than immunologically primed mice. This suggests that feeding SDP may provide immunological protection for weaned pigs under typical production conditions.

Key Words: Plasma Protein, Immune Function, Pigs

174 Effects of water-soluble globulin on the growth performance of weanling pigs fed different diet complexities.

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Weanling pigs (n=360; initially 5.0 kg and 17 d of age; PIC) were used to evaluate the effect of water-soluble globulin (WSG) on growth performance of pigs fed different diet complexities. Pigs were blocked by initial weight and allotted to one of six treatments. Treatments were based on three diet complexity regimens with or without supplemental WSG provided from d 0 to 14 after weaning. The 35-d growth assay was divided into three phases (d 0 to 7, 0 to 14, and 14 to 35) with corresponding dietary lysine levels of 1.6, 1.5 and 1.35%. Soybean meal replaced specialty protein sources and whey products to obtain the three different diet complexities during each phase. From d 0 to 7, pigs were offered WSG in a 3.0% solution through the water source with concentrations reduced to 1.5% from d 7 to 14. There were diet complexity × WSG interactions for ADG (P<.05) and G/F (P<.01) from d 0 to 7. Increasing diet complexity linearly improved ADG for pigs consuming water (41, 91, 122 g/d), whereas the response was quadratic for pigs consuming WSG (86, 127, 122 g/d). Similarly, pigs consuming water had improved G/F as diet complexity increased (.40, .79, 1.02), while diet complexity had little effect on G/F for pigs offered WSG (.95, 1.09, 1.10; adjusted for DM in WSG). From d 0 to 14, pigs fed the simple diet had lower ADG and G/F (P<.01) than pigs fed more complex diets. Pigs offered WSG had decreased (P<.01) ADFI and improved (P<.001) G/F from d 0 to 14. From d 0 to 35, increasing diet complexity improved ADG and ADFI (P<.03) while WSG, offered from d 0 to 14, had no effect on overall performance. These results show increasing diet complexity improves weanling pig growth performance through d 35 postweaning. Supplementing pigs with WSG improves ADG from d 0 to 7 and G/F from d 0 to 14 after weaning. These results also demonstrate that providing WSG allows use of a less complex diet to start pigs on feed the first week after weaning.

Key Words: Weanling pigs, Globulin protein, Diet complexity