affect growth performance. Also, both electron beam and gamma ray irradiation demonstrated similar results in performance.

Key Words: Pig, Blood meal, Irradiation

166 Effects of irradiation processing of specialty protein products on nursery pig performance. J.M. DeRouchey*, M.D. Tokach, J.L. Nelssen, R.D. Goodband, S.S. Dritz, J.C. Woodworth, M.J. Webster, B.W. James, and D.E. Real, *Kansas State University, Manhattan*.

Recent research from Kansas State University has shown improved growth performance of nursery pigs fed diets containing irradiated animal plasma (AP) or blood meal compared to nonirradiated forms. In this 14-d growth assay, 300 weanling pigs (initially 6.1 kg and 20 ± 2 d) were used to determine the effects of irradiation processing of other speciality protein products. All diets were fed in pelleted form and formulated to contain 1.50% lysine, 0.90 Ca, 0.80 P, 0.46 Na, and 0.57 Cl. In addition, 2.50% fishmeal and 0.15% L-Lysine HCl were added to all diets with other crystalline amino acids included (if necessary) to maintain similar ratios of amino acids related to lysine. Treatments included a control diet or the control with 5% AP (American Protein Corp., AP 920); animal plasma, dried egg product, animal serum, serum albumin, and serum globulin combination (DuCoa L.P., ProtiOne^{TM}); dried porcine digest (Nutra-Flo Protein Products, DPS 30); liquefied and spray-dried beef muscle (Esteem Products Inc., Peptide Plus^{TM}); and spray-dried whole egg (California Spray Dry). All specialty products were either fed irradiated or as-is, and originated from the same lot for each source. Since all specialty products were included in the diet at a fixed amount, and not on a nutrient profile basis, direct comparisons between these products were not made, nor was it an objective of this experiment. Overall, irradiation of AP and Peptide Plus^{TM} resulted in increased (P<.05) ADG compared to pigs fed the nonirradiated form. Irradiation of Peptide Plus^{TM} also improved (P<.05) G/F compared to its nonirradiated form. The other specialty protein sources were not influenced by irradiation. Bacteria levels varied widely, but irradiation decreased bacteria for every source. Because the two protein sources that responded to irradiation had the highest (AP) and the lowest (Peptide Plus^{TM}) bacteria level, the growth improvements from irradiation do not appear to be solely from a decrease in bacteria.

Key Words: Pig, Protein source, Irradiation

167 Ileal mucin output in growing pigs fed semipurified diets with different protein sources. D. M. Albin*, M. R. Smiricky, J. E. Wubben, and V. M. Gabert, *University of Illinois, Urbana*.

Crude mucin was isolated from ileal digesta collected from ileally-cannulated growing pigs (BW = 35 kg) fed semipurified diets. Corn starch-based diets were fed, and contained soybean meal (SBM), soy protein concentrate (SPC) or casein as the sole protein source. The diets containing SBM and SPC were formulated to contain 17% CP. A low-protein casein diet was used to estimate endogenous secretions. Chromic oxide was included in all diets at 0.5%. Feed intake was equalized in each period. After adapting to a new diet for 5 d, ileal digesta were collected continuously for 12 h on d 6 and 7. For each diet, crude mucin was isolated from ileal digesta collected from four pigs. The crude mucin isolation procedure obtained the water soluble-ethanol precipitable fraction of ileal digesta. This procedure has also been shown to isolate nonmucin protein and carbohydrates. However, contaminating substances from the diet were present in relatively low quantities, and these substances have been shown to be highly digestible at the terminal ileum. Also, THR, SER and PRO are present in high quantities in purified mucin, and the crude mucin isolate contained significant quantities of these amino acids (approximately 25%). Crude mucin contributed significant quantities of amino acids (from 5 to 46%) to the total amino acids lost at the ileum. The type of diet fed affected (P < 0.05) crude mucin output. The use of a semipurified diet to estimate endogenous secretions of amino acids underestimated the contribution from mucin. Feeding diets with SPC, and especially SBM, increased (P < 0.05) crude mucin output. When correcting for endogenous losses from mucin only, apparent ileal digestibility coefficients were significantly increased (P < 0.05). The apparent THR digestibility for the diet containing SBM was increased from 70.8 to 81.1% when corrected for mucin only. In conclusion less-refined protein sources increased ileal crude mucin output, which is an important source of endogenous amino acid losses, in pigs.

Key Words: Pigs, Amino acids, Mucin

168 True digestible lysine requirements of PIC barrows over the growing-finishing period. R. Wei* and D. R. Zimmerman, *Iowa State University, Ames*.

Five experiments were conducted to estimate the true ileal digestible lysine requirements of PIC barrows at approximately 30, 50, 70, 90, and 110 kg of BW, respectively, by using plasma urea nitrogen (PUN) as a rapid response criterion. Pigs were individually-penned and had free access to feed and water. The dietary treatments were a set of five true digestible lysine concentrations, which were 0.732%, 0.807%, 0.882%, 0.957%, and 1.032% in Exp. 1, 0.527%, 0.602%, 0.667%, 0.752%, and 0.827% in Exp. 2, 0.430%, 0.510%, 0.590%, 0.670%, and 0.750% in Exp. 3, 0.354%, 0.434%, 0.514%, 0.594%, and 0.674% in Exp. 4, and 0.313%, 0.393%, 0.473%, 0.553%, and 0.633% in Exp. 5, respectively. Corn, wheat, soybean meal and crystalline AA were used to formulate the basal diets containing the lowest lysine levels, and the other four lysine levels in each set were achieved by lysineHCl supplementation. Exp. 1 and 2 used 20 PIC barrows with an initial BW of 19.1 kg. The pigs were blocked on litter and initial BW to form four blocks in randomized complete block designs with five dietary treatments. In Exp. 3, 4 and 5, 20 PIC barrows with an initial BW of 59.0 kg were used in completely randomized designs with five dietary treatments. The dietary treatments started when pigs reached about 30 kg in Exp. 1, 50 kg in Exp. 2, 70 kg in Exp. 3, 90 kg in Exp. 4 and 110 kg in Exp. 5, respectively. Each experiment lasted for 5 d and the pigs were bled at 0700 to 0800 for the last 2 d of the period. Pretreatment PUN was used as a covariate to correct the PUN variation not related to lysine adequacy. By fitting the corrected PUN responses to dietary lysine concentrations into a two-slope, broken-line regression model, the estimated true digestible lysine requirements were 16.5 0.2, 17.8 0.8, 20.2 1.2, 16.7 0.8, and 14.4 6.7 g/d for PIC barrows at 33, 52, 72, 93, and 113 kg of BW, respectively. Because of the large variance of PUN concentration and the small sample size, the confidence in the lysine requirement estimates was low.

Key Words: Growing-finishing barrows, Lysine requirement, PUN

169 Optimum threonine:lysine ratio for pigs in the 90 to 120 kg phase. M.E. Johnston*[1], R.D. Boyd[1], C.E. Fralick[2], and J.L. Usry[3], [1]*PIC USA Inc., Franklin, KY,* [2]*Swine-Tek Research and Consulting, Van Wert, OH,* [3]*Heartland Lysine Inc., Chicago, IL*.

The objective was to determine the optimum threonine:lysine ratio for pigs fed from 92.0 to 115.8 kg BW using corn-soy diets. PIC337 x C22 castrates and gilts (45 pens, 8 to 10 pigs/pen) were sorted by weight and randomly allotted to one of nine diets (92.0±1.0 kg, 44 pigs/diet). Positive (1) and negative (2) control diets contained corn and soy as the only amino acid sources (0.61 and 0.56% true ileal digestible lysine (TID Lys), respectively). Diet 3 contained 0.225% added L-lysine (0.56% TID Lys). Diet 4 contained 0.34% added L-lysine (0.56% TID Lys), 0.02% L-tryptophan, 0.045% L-isoleucine, and 0.045% L-valine. Diets 5, 6, 7, and 8 were the same as diet 4 except corn was replaced by L-threonine at rates of 0.03, 0.06, 0.095, and 0.125%, respectively. Diet 9 contained 0.34% added L-lysine and 0.095% added L-threonine. Feed intake was unaffected (P>.60) by dietary treatment. There was a numerical decrease (P=.13) in feed conversion (GF) when pigs were fed diet 2 vs diet 1 suggesting that TID Lys was limiting in diet 2. The addition of 0.225% L-lysine (diet 3) resulted in further decline (P=.20) in GF compared to the negative control diet (0.30 vs 0.31). The addition of L-tryptophan and L-isoleucine (diet 4) did not bring (P<.01) ADG or GF to the same level as in diet 2 (0.78 vs 0.91 kg/d and 0.26 vs 0.31, respectively). The addition of L-threonine to the diet in increasing amounts (diets 5, 6, 7, 8) resulted in a linear improvement (P<.01) in ADG and GF compared to diet 4. Daily gain and GF (0.89 kg/d and 0.30) were maximized for pigs fed diet 7 which had a TID Thr:Lys ratio=68%. Removing added L-tryptophan, L-isoleucine, and L-valine (diet 9) and leaving 0.34% added L-lysine and 0.095% added L-threonine in the diet, caused ADG and GF to decrease (0.83 kg/d and 0.28, P<.05) compared to pigs fed diet 7 suggesting L-tryptophan, L-isoleucine, and(or) L-valine were limiting. Based on these data, the optimum TID Thr:Lys ratio for pigs in the 90 to 120 kg phase is 68%.

Key Words: Pigs, Lysine, Threonine