Effects of soy Protein Concentrate Replacing Animal Protein Supplements on Modulation of Mucosa-Associated Microbiota in Relation to Intestinal Health of Nursery Pigs. Zixiao Deng¹, Marcos Elias E. Duarte¹, Sung Woo Kim¹, 'North Carolina State University

Abstract: This study aimed to investigate the effects of soy protein concentrate (SPC) replacing animal protein supplements on modulation of mucosa-associated microbiota in relation to intestinal health of nursery pigs. Weaned pigs (n = 56; 6.4 ± 0.6 kg BW) were allotted to 5 treatments in a randomized complete block design (RCBD) with initial BW and sex as blocks and fed for 35 d in 3 phases (P1/2/3 for 10/12/13 d, respectively). Dietary treatments were NC (n = 12): a diet with fish meal 4/2/1%, poultry meal 10/8/4%, and blood plasma 4/2/1% for P1/2/3, respectively; RBP (n = 12): NC with SPC replacing fish meal; RPM (n = 12): NC with SPC replacing poultry meal; RBP (n = 12): NC with SPC replacing blood plasma, and PC (n = 8): NC with SPC replacing all animal protein supplements. All diets were formulated to meet the nutrient requirements by NRC (2012). On d 35, pigs were euthanized to collect jejunal mucosa to evaluate intestinal health and microbiota. PC increased (P < 0.05) Lactobacillaceae (1.04 to 8.15%), and tended to increase (P = 0.073) Prevotellaceae (7.48 to 18.94%), whereas it decreased (P < 0.05) Chao1 index (81.3 to 15.8), Helicobacteraceae (27.95 to 3.02), and tended to reduce (P = 0.099) Campylobacteraceae (2.95 to 0.13). RPM tended to increase (P = 0.090) Prevotellaceae (7.48 to 17.16%) and reduced (P < 0.05) Helicobacteraceae (27.95 to 11.02%) without affecting Chao 1. Decreased Chao 1 was correlated to reduced feed intake and therefore, weight gain of pigs. In conclusion, the use of SPC replacing all animal proteins in nursery diets benefited the composition of the jejunal mucosa-associated microbiota, whereas feed intake and weight gain were reduced. The use of SPC replacing only poultry meal, however, benefitted the composition of the jejunal mucosa-associated microbiota without affecting feed intake and weight gain of nursery pigs.

Keywords: intestinal health, mucosa-related microbiota, nursery pigs, soy protein concentrate

Effect of Isoleucine and Added Valine on Performance, and gut Microbiota Composition of Pigs fed with Very low Protein Diets.

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Abstract: Very low protein (VLP) diets decrease the nitrogen excretion from pigs, but these diets depress the performance even when the first four limiting amino acids (FFL; i.e. Lys, Met, Thr and Trp) are added. Supplementation of Val above and Ile at NRC (2012) levels has shown promising effects on performance of pigs fed with VLP diets. The objective of this study was to investigate the effect of a mixture of Val above and Ile at NRC levels on growth and gut microbiota in pigs fed with VLP diets. Three-week-old, weaned piglets (n = 40) were assigned to: 1) positive control (PC): normal protein diet; 2) negative control (NC): VLP diet with FFL at NRC levels; 3) VA: NC with Val above NRC; 4) IL: NC with Ile at NRC level; 5) VAIL: NC with Val above and Ile at NRC levels. Following 5 weeks of data collection, colon contents were collected. The data were analyzed by GLM procedure followed a t-test with Benjamini-Hochberg correction (SPSS). Pigs fed with NC had decreased average daily gain (ADG) and average daily feed intake (ADFI), compared with PC (P< 0.05). VAIL had less ADG than PC, but that tended to have greater ADG than NC (P< 0.1). Further, VAIL had a similar ADFI as PC (P>0.05) and tended to have greater ADFI than NC (P< 0.1). Compared with PC and NC, pigs fed with VAIL had a higher thermal radiation (P< 0.05). Relative to PC, the colon content of NC was enriched in Pasteurellaceae while those fed with VAIL had a greater abundance of Bacillus, Brevibacillus, Enterococcus, Actinobacteria, which might contribute to improved performance of pigs fed with VAIL diets. Overall, supplementation of a mixture of Val greater than NRC and Ile at NRC into the VLP diets partially improved the performance, which is likely linked with alterations in gut microbiota composition.

Keywords: growth performance, valine and isoleucine, very low protein diet