

## ANIMAL SCIENCE

**Title:** Improving performance of finishing pigs with supplemental Val, Ile, and Trp: Validating a meta-analysis model. **NPB #19-078**

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**Date Submitted:** July 2, 2021

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**Scientific Abstract:** A recent meta-analysis (Cemin, 2019) suggested that increased dietary Val, Ile, or Trp could correct possible amino acid interactions caused by high dietary Leu in diets containing high levels of DDGS. We conducted two experiments to confirm this hypothesis. For Exp. 1, 1,200 pigs (PIC TR4 × (Fast LW × PIC L02); initially 74.0 ± 1.38 lb) were used in a 103-d study. The 6 dietary treatments were corn-soybean meal-DDGS-based diets as follows: 1) low level of Lys-HCl (HSBM), 2) high Lys-HCl and moderate Ile, Val, Trp (NC; AA above NRC 2012 estimates), 3) moderate Lys-HCl and high Ile, Val, Trp (PC), and 4) PC with either increased L-Val (PC+Val), 5) L-Ile (PC+Ile), or 6) L-Trp (PC+Trp). Diets contained 30% DDGS until pigs reached approximately 217 lb, and then were fed diets with 20% DDGS until market. In the grower period, ADG was greater ( $P < 0.05$ ) for the pigs fed HSBM and PC+Val diets than the NC with PC, PC+Ile, and PC+Trp intermediate. Pigs fed HSBM were more ( $P < 0.05$ ) efficient than the NC and PC with PC+Val, PC+Ile, and PC+Trp being intermediate. In the late finisher period, ADG was greater ( $P < 0.05$ ) for pigs fed PC+Ile than that of the NC with HSBM, PC, PC+Val, and PC+Trp intermediate. Pigs fed PC+Val had greater ( $P < 0.05$ ) ADFI than the NC with HSBM, PC, PC+Ile, and PC+Trp being intermediate. However, PC+Ile pigs were more ( $P < 0.05$ ) efficient than PC+Val pigs with HSBM, NC, PC, and PC+Trp being intermediate. Overall, final body weight (BW), average daily gain (ADG), and hot carcass weight (HCW) were greater ( $P < 0.05$ ) for pigs fed HSBM, PC+Val, and PC+Ile diets than the NC with PC and PC+Trp intermediate. Pigs fed the PC+Val diet had greater ( $P < 0.05$ ) average daily feed intake (ADFI) than the NC with pigs fed HSBM, PC, PC+Ile, and PC+Trp intermediate. No differences were detected between treatments for overall F/G or other carcass characteristics. The meta-analysis model was relatively accurate in predicting the performance of the pigs in this study.

In Exp. 2, 1,916 finishing pigs (PIC TR4 × (Fast LW × PIC L02); PIC < Hendersonville, TN, USA; Fast Genetics, Saskatoon, SK, Canada; Initial BW 90.8 ± 0.1) were used in a 106-d growth trial. Pens were assigned to 1 of 4 dietary treatments with 25 replicate pens per treatment. The 4 corn/SBM/DDGS-based treatments were: 1) high SBM and low feed grade AA diet, 2) low SBM and high feed grade with low ratios of Val:Lys, Ile:Lys and Trp:Lys, 3) low SBM and high feed grade AA diet with medium ratios of Val:Lys, Ile:Lys and Trp:Lys, and 4) low SBM and high feed grade AA diet with high ratios of Val:Lys, Ile:Lys and Trp:Lys. In this trial, the low ratio was close to published requirements of pigs, the medium ratio was slightly higher

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These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

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than those typically used to maximize growth performance, and the high ratio was much higher than typical commercial diets. Overall, increasing the ratios of Ile, Val, and Trp tended to increase ADG (Quadratic,  $P = 0.084$ ), ADFI (Linear,  $P = 0.060$ ), and improve (Quadratic,  $P = 0.087$ ) F/G, with the best performance observed from pigs fed the medium ratio treatment. For carcass characteristics, there was a tendency (Quadratic,  $P = 0.080$ ) for reduced Lean% as the ratios of Ile, Val, and Trp increased, but no other impacts on carcass characteristics were observed. The prediction model was relatively accurate in predicting the performance of the medium ratio treatment but overestimated the performance of the high ratio treatment.

Across both trials, this data suggests that increasing Val, Ile, and Trp in high Lys-HCl-DDGS-based diets that have low levels of SBM improved growth performance and final BW. These results demonstrate that the negative effects of high Leu in corn-DDGS-based diets can be overcome by increasing the ratios of Val, Ile, and Trp to Lys and provide a solution to producers to take advantage of lower diet costs without losing performance.