

**Feed intake, growth and carcass composition of weaned piglets
receiving varying levels of valine and leucine in their diets**

by

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ABSTRACT

The objective of this experiment was to determine the response of weaned piglets to dietary valine and to quantify antagonistic effects of excess dietary leucine on this response. 72 Large White x Landrace entire male piglets at 13.46 ± 1.18 (mean \pm SD) kg were assigned to one of six dietary valine treatments [11.9 (T1), 10.1 (T2), 8.3 (T3), 6.6 (T4), 4.8 (T5) g/kg and T5 + supplemented valine (T6)] and one of three leucine treatments [standardised ileal digestible (SID) valine: leucine ratio of 0.52, 0.27 and 0.16]. Animals received feed *ad libitum* for a period of 18 days. A dilution technique was used to measure responses in feed intake, growth rate and carcass composition to a series of diets containing different valine and leucine concentrations. The summit diets were formulated to contain all amino acids (AAs) other than valine at 1.3 times the requirement and valine at 1.1 times the requirement. A dilution diet, devoid of protein but similar in all other respects, was used to blend the three summit diets to give three series of decreasing valine concentrations. Summit diet 1 was not supplemented with leucine. Summit diet 2 and summit diet 3 were supplemented with 20 g and 40 g leucine/kg feed respectively to create two diets of moderately and severely imbalanced valine to leucine ratios. Responses in feed intake (FI) and growth rates to varying levels of valine and leucine were observed, but only a response in carcass composition was seen when decreasing dietary valine concentrations were offered to pigs. At normal leucine levels, FI increased as dietary valine concentration decreased. Initially there was an increase in average daily gain (ADG), but as dietary valine concentration dropped, feed conversion efficiency (FCE) decreased and a higher FI did not result in higher ADG. Consequently, body lipid content increased as dietary valine concentration decreased. At moderately excess dietary leucine levels, FI increased initially as dietary valine concentration decreased and dropped sharply as valine content decreased below 8.3 g/kg. ADG initially increased as FI increased, but ADG dropped when FI dropped. FCE dropped and body lipid content increased as dietary valine concentration decreased. At severely excess dietary leucine levels, FI, ADG and FCE dropped and body lipid content increased as dietary valine concentration decreased. In conclusion, leucine did interact with valine and increasing the leucine to valine ratio resulted in poorer growth, but only at low valine concentrations. The depression of FI was not obvious at high valine levels, but the diet with the lowest valine content, which was most severely imbalanced, caused FI and growth to be severely depressed. However, valine supplementation to such an imbalanced diet was found to reverse such a depression of feed intake and growth. This confirms that excess leucine levels, which could often occur in commercial feeds containing

dried distillers grains with solubles (DDGS) and maize gluten, may cause an imbalanced AA pattern which affects growth and feed intake, especially when valine is given in low amounts. When the Reading Model was fitted to the response data for each leucine series, the amount of valine required per kg of body weight for maintenance was found to be 29.4 mg and 67.3 mg per g of protein gain. These coefficients were unaffected by the amount of leucine in the feed. The efficiency of valine utilisation for protein growth was determined to be 73 % and that an intake of around 9 g valine per day will yield maximal protein growth in pigs of the genotype used, and over the period of growth used in this trial.