

Effect of dietary lysine concentration on the efficiency of protein retention by weaner pigs given soybean-sugar diets

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Soybean-sugar diets appear to produce superior daily live-weight (LW) gains (750 g (1)) in weaner pigs compared to a wheat-soybean-meat-fish and blood meal diet (600 g (2)). The objective of this paper is to examine the protein utilisation data from study (1), as a possible explanation of the increased growth potential of weaner pigs fed sugar-based diets.

Soybean meal was added to raw sugar to formulate eight diets containing 106 to 292 g crude protein (CP, N x 6.25) and 8 to 22 g of lysine/kg (in 2 g increments). The diets were isoenergetic (15.8 MJ of digestible energy/kg) and contained chromic oxide as an indigestible marker. The experiment was a randomised block design with 48 male piglets (10 to 20 kg LW). The diets were offered ad libitum to piglets kept in individual pens at 26°C. Each piglet was slaughtered at 20 kg LW and the contents of the terminal ileum were removed, freeze dried, ground and analysed for nitrogen and chromic oxide. The carcass, blood and empty viscera were frozen, ground, freeze dried, reground and analysed for nitrogen content.

The ileal digestibility of nitrogen (N_{dig}) varied between 80 and 85%. Ileal digestible protein intake (IDPI) increased with dietary CP up to 292 g/kg. The increase in IDPI above 239 g CP/kg was not significant. Maximum protein retention (Pret) was recorded by piglets consuming 186 g CP/kg or greater. The efficiency of ID protein utilisation (Pret:IDPI) increased to a maximum of 74% at 186 g of dietary CP/kg (or 14 g lysine/kg) and then declined to 59% by 292 g CP/kg. The maximum ID protein utilisation in this experiment was 30% greater (57 vs 74) than the maximum measured by study (2) for piglets offered a wheat-based diet. This suggests that either amino acid balance or supply of energy in the wheat-based diet limited protein accretion and growth potential of their weaner pigs. Further work is required to test this hypothesis.

CP (g/kg)	106	133	159	186	212	239	265	292	SEM ¹
Lysine (g/kg)	8	10	12	14	16	18	20	22	
N _{dig} (%)	80ab	81ab	84a	80b	83ab	85a	80ab	81ab	1.7
IDPI (g/d)	83d	97d	140c	146c	157bc	176ab	187a	195a	7.8
Pret (g/d)	60e	74d	95c	108ab	105bc	111ab	118a	113ab	4.2
Pret:IDPI ²	72abc	76a	68bcd	74ab	67cd	63de	64de	59e	2.2

¹ a,b etc row means with different letter significantly different (P<0.05).

² values x 100.

1. Officer DI. Growth response of weaner piglets given soybean-sugar diets to dietary lysine. Proc Nutr Soc Aust 1994;18:168.
2. Campbell RG, Taverner MR, Rayner CJ. The tissue and dietary protein and amino acid requirements of pigs from 8 to 20 kg live weight. Anim Prod 1988;46:283-90.