The Effect of Dietary Energy Concentration and Lysine: Energy Ratio on the Growth Performance of Weaned Pigs.

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Summary

Amino acids should be included in the diet in proportion to energy content to ensure adequate intake. The results of this experiment indicate the optimum ratio for pigs growing from 7.5 to 22 kg is 4.65 g total lysine/Mcal DE. This is higher than most previous recommendations. Increasing dietary energy did not improve pig performance. The most economical diet for weanling pigs will change as market prices and ingredient costs change.

Introduction

Improvements in lean growth potential and health status of pigs has greatly increased expected pig performance. Hence a re-evaluation of amino acid requirements is needed. There is no consensus on the lysine requirement and the ratio of lysine/DE for weaned pigs. For example, current recommended ratios vary from 2.8 to 5.0 g total lysine/Mcal DE. The optimum level of lysine may differ from the maximal, depending on economic circumstances in the pork industry at any point in time.

Experimental Procedures

Two levels of digestible energy (DE); low energy (LE, 3.4 Mcal DE/kg) or high energy (HE, 3.6 Mcal DE/kg), at five lysine:DE ratios (3.7, 4.0, 4.3, 4.6, and 4.9 g total lysine/Mcal, DE) were investigated. Each of the 10 diets were fed to six pens of four pigs each (two barrows and two gilts) for four weeks starting one week after weaning at 20 days of age. The total lysine in the diets ranged from 1.25 to 1.66% for LE diets, and from 1.35 to 1.76% for HE diets . Body weight and feed disappearance were measured weekly.

Regression analysis was conducted to determine the relationship between lysine:DE ratios and pig performance.

Results and Discussion

Average daily gain increased with increasing lysine:DE ratio (quadratic, $P < 0.10$) and ranged from 515 to 554 g/d (d 0 to 28; Figure 1). Feed efficiency was improved with increasing lysine:DE ratio and DE ($P < 0.01$; Table 1). We concluded that the total lysine:DE ratio that maximized ADG was 4.65 g/Mcal DE. This is equivalent to 1.6% total lysine in the diet, if the diet contains 3.45 Mcal DE/kg, typical of the commercial industry. Increasing diet DE content had no effect on average daily gain ($P > 0.10$), but did reduce feed intake by 4%.

Weaning pigs responded to lysine levels up to 1.6%, however the optimal ratio will depend on market conditions.

Implications

The lysine level selected for commercial use will depend on economic conditions. If pork market prices are above $1.75/kg, the ratio that is economically most advantageous for commercial production would be 4.3 g/Mcal, equal to 1.5% of the diet. If the market price is very weak, the optimum lysine:DE ratio would fall to 3.8 to 4.1, equal to 1.3% or 1.4% of the diet.

As found in previous experiments, ADG was unaffected by DE. As expected, increasing DE lowered feed intake and thus slightly ($P < 0.01$) improved feed efficiency. Given that the cost of increasing dietary DE from 3.4 to 3.6 Mcal/kg is currently $25/tonne, reducing the DE content of a starter diet from the higher to the lower DE level would reduce feed cost from $8.73 to $7.83 per head, a savings of $0.90 per head.

Acknowledgements

Funding for this project was received from the National Sciences and Engineering Research Council of Canada and Agriculture and AgriFood Canada Matching Grants program. Strategic program funding provided by Sask Pork, Alberta Pork, the Manitoba Pork Council and the Saskatchewan Agriculture and Food Development Fund.

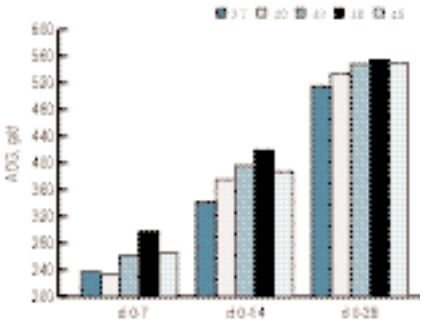

Figure 1: *The effect of lysine/DE ratio on ADG of young pigs growing from 7.5 to 22.5 kg ($P < 0.05$; all periods).*

Table 1. The effect of DE concentration and lysine/DE on body weight, feed intake and feed efficiency

	DE, Mcal/kg		Lysine/DE, g/Mcal					SEM
	3.4	3.6	3.7	4.0	4.3	4.6	4.9	
Initial Wt, kg	7.47	7.47	7.45	7.48	7.43	7.55	7.46	0.07
Final Wt, kg [1]	22.49	22.57	21.84	22.16	22.71	23.13	22.82	0.21
ADG	539	540	515	533	548	554	549	10.0
ADFI, g/d [2]	856	826	842	857	850	839	817	10.0
Gain:Feed [1]	0.63	0.66	0.61	0.61	0.65	0.66	0.67	0.01

[1] Effect of lysine/DE ratio ($P < 0.01$)

[2] Effect of DE concentration ($P < 0.01$)