Increasing Diet Tallow and Dietary Energy Concentration on Performance

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Summary

An experiment was conducted on a commercial farm to examine the response of growing-finishing pigs to dietary energy concentration. Pigs receiving diets with an increased energy concentration grew faster from 37 kg to about 80 kg BW, however overall, from 37 kg to market there was no effect of dietary energy concentration on growth. Dietary energy concentration had modest effects on carcass composition and under current market conditions, the return to feed costs indicated an advantage for the lower energy diets.

Introduction

Energy is the most expensive nutrient in the diet of the pig, and yet, our understanding of energy metabolism, and more specifically, how the pig responds to changes in dietary energy concentration, is limited. This experiment was conducted as a follow-up to a previous experiment conducted at the Prairie Swine Centre, which showed that pigs are able to achieve equivalent performance across diets of quite differing energy concentration (Annual Research Report 2005, p. 22). These results were surprising, and therefore this experiment was conducted to re-evaluate this question, and determine if increasing dietary energy concentration would improve pig performance. The experiment was also designed to evaluate the impact of dietary energy concentration on carcass quality and on the uniformity of growth.

"Under typical market conditions, high energy diets may not result in the highest return over feed cost."

In our previous experiment, feed intake tended to decline and feed efficiency (gain:feed) was improved when oil was added to the diet. Feed intake may be an important factor in the response to dietary energy, and since feed intake can vary by up to 35 % among farms we decided to conduct this experiment at a different facility.

The overall objectives of this experiment were to: 1) determine the response of growing and finishing pigs to increasing dietary energy concentration on a commercial farm 2) to determine if increasing dietary energy concentration will help to reduce variation in pig performance, 3) to determine if net energy is a better predictor of pig performance than the more conventional DE and ME and 4) to improve the net income of pork producers through the development of feeding programs that best balance cost of feed and gross income per pig.

Experimental Procedure

The experiment was conducted in 3 grower and 3 finisher rooms (12 pens, 20 pigs/pen) in a commercial farrow-to-finish operation located in Saskatchewan. A total of 720 animals (initial BW 36.8 kg) were assigned to one of 3 dietary treatments. This represented all available pigs within a farrowing group except the lower 15 % which were moved to an off-site facility as per normal barn protocol. Treatments were 3.20, 3.35 and 3.50 Mcal DE/kg (calculated NE; 2.21, 2.31 and 2.42 Mcal/kg). The diets were formulated for 3 phases of growth. Males remained on phase 1 and 2 for 4 weeks each and on phase 3 until market. Females remained on phase 1 and 2 for 6 and 4 weeks respectively, and on phase 3 until marketing. Increasing energy density in the diet was accomplished by increasing the content of wheat and soybean meal at the expense of barley, and adding tallow. Tallow was restricted to 4.0 % of the diet. A constant digestible lysine: DE ratio was maintained as the concentration of energy increased. The actual energy concentration of the diets was determined at the mid-point of each phase by collecting faecal samples.

Table 1. Performance Impact of Feeding Finishing Pigs Diets, with Increased DE Concentration

	Formulated DE (Mcal/kg)				
	3.20	**3.35**	**3.50**	**SEM**	**P <**
BW (kg)					
d 0	37.4	36.6	36.5	0.87	---
d 21	55.9	57.0	57.8	1.32	0.005
d 42	75.0	78.1	79.2	1.47	0.008
d 57a	93.4	94.6	95.8	1.66	0.07
ADG (kg/d)					
d 0 – 21	0.91	0.96	1.00	0.06	0.003
d 22-42	0.97	1.00	1.06	0.05	0.02
d 43- 57	1.09	1.08	1.05	0.03	0.39
d 57 – market	0.98	0.91	0.94	0.02	0.08
d 0 – 57	0.99	1.01	1.03	0.03	0.10
ADFI (kg/d)					
d 0 – 21	2.07	2.12	2.09	0.08	0.49
d 22-42	2.76	2.72	2.67	0.08	0.11
d 43- 57	3.45	3.39	3.27	0.14	0.30
d 57 – market	3.53	3.34	3.20	0.08	0.02
d 0 – 57	2.68	2.67	2.61	0.09	0.18
FCE (gain:feed)					
d 0 – 21	0.44	0.46	0.48	0.01	<0.001
d 22-42	0.36	0.37	0.40	0.01	0.003
d 43- 57	0.32	0.32	0.33	0.02	0.34
d 57 – market	0.28	0.27	0.29	0.01	0.17
d 0 – 57	0.37	0.38	0.40	0.01	0.003
Tail-enders	48	45	37	---	---
Days to market	81	80	79	---	---

aday 57 = first pull

Results and Discussion

Average daily gain and BW were improved during the initial 6 weeks when diets with an increased energy concentration were fed ($P < 0.05$; Table 1). However overall, energy concentration had no effect on ADG or ADFI. Feed intake was reduced ($P < 0.02$) during the final period (d 57 to market), in groups consuming diets with increased energy concentration. This tendency (non-significant, $P > 0.10$) was observed in all but the first 3 weeks of the experiment. Apparently, as the pigs grew, they became able to compensate for the lower DE concentration with increased feed intake.

Table 2. Economic Impact of Feeding Finishing Pigs Diets, with Increased DE Concentration

Economic Analysis, $/pig			
Scenario #1b			
Gross income	149.93	150.59	151.51
Feed cost	39.55	42.42	43.42
Return c	110.37	108.18	108.08
Scenario #2b			
Gross income	153.04	154.68	154.33
Feed cost	41.38	44.32	44.91
Return c	111.66	110.36	109.42

After about 90 kg body weight, the pigs consuming the low DE diets had increased feed intake such that caloric intake was similar between treatments (data not shown). Feed efficiency was improved overall ($P < 0.003$), the result of slight improvements in gain and decreased feed intake as the DE concentration of the diet increased.

There were fewer tail-enders (those pigs remaining after 8 weeks in finishing) when pigs consumed the diets with increased energy concentration. Dressing percentage and loin thickness tended to increase when pigs consumed the diets with increased DE content ($P < 0.10$; data not shown). No other carcass parameters were affected by diet. However, regardless of the economic scenario employed, return over growout feed costs was improved when pigs were fed the diets with the lowest DE concentration.

Implications

Under typical market conditions, high energy diets do not necessarily result in the highest return over feed cost. Pork producers must frequently evaluate the dietary energy concentrations which maximize net income on their individual operations.

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