The use of glycerol in diets for finishing pigs

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Introduction The production of fuel from renewable energy sources has generated increasing interest in recent years and biofuel production is being encouraged within the United Kingdom. If current government targets are to be met, approximately 2.7 million tonnes of oil seed rape are needed to supply biodiesel which will result in a significant amount of the by-product glycerol. Glycerol may be a useful source of energy in diets for pigs but there is limited research on the optimum level of inclusion, digestible energy (DE) content or on the effect on performance. Research by Mourot *et al* (1994) suggested that glycerol tended to reduce performance but significantly improved meat quality as assessed by drip loss. The aim of this study was to investigate the effect of glycerol inclusion in finishing pig diets on performance and meat quality.

Materials and methods Four experimental diets were produced to contain 0, 40, 80 or 120g/kg glycerol, 185g/kg crude protein, 9.7g/kg lysine and 14.2MJ/kg DE (fresh basis). Glycerol replaced wheat in the diet formulation. The basal diet contained (g/kg) wheat 437, barley 300, soyabean meal 227, vegetable oil 13.6, limestone 9, dicalcium phosphate 3.5, salt 4.1, lysine 0.8 and minerals and vitamins 5. A performance trial was conducted utilising 48 pigs housed in groups of six from 14 weeks of age until slaughter at either 152 or 159 days. Feed was supplied *ad libitum* through electronic ACEMA feeders and individual pig intake, intake per feeder visit, time of visit, duration of visit and number of visits were recorded on a daily basis. Pigs were slaughtered under commercial conditions, coldweight and backfat at the P_2 position recorded and killout percentage (KO%) calculated. A 2-inch chop was taken for meat quality analyses (cooking loss, drip loss, sarcomere length and shear force) (Beattie *et al* 1999).

Results There was no significant effect of glycerol inclusion on feed intake or FCR although average daily gain decreased when glycerol was included at 40 or 120g/kg (Table 1). Feeding behaviour was significantly affected by glycerol inclusion with the number of visits in a 24hr period increasing linearly ($P<0.001$) with increasing glycerol content. However, the total time spent at the feeder (per pig/24hr) decreased linearly ($P<0.01$) as glycerol inclusion increased. There was no significant effect of glycerol inclusion on carcass or meat quality assessments.

Table 1 Effect of glycerol on performance (14-21wks with 14wk weight as co-variate), feeding behaviour and meat quality

	0g/kg	40g/kg	80g/kg	120g/kg	SEM	P	P=Lin
Feed intake (g/d)	2527	2286	2528	2395	119.7	NS	NS
Average daily gain (g/d)	1031[b]	927[a]	995[ab]	905[a]	33.9	<0.05	NS
Feed conversion ratio	2.45	2.47	2.55	2.66	0.103	NS	NS
Total number of feeder visits (pigs/24hr)	4.9[a]	16.0[b]	14.3[b]	20.9[b]	2.80	<0.01	<0.001
Total time at feeder (pig/24hr)	2.82[b]	1.39[a]	1.89[a]	1.34[a]	0.260	<0.01	<0.01
Kill out (%)	74.6	76.8	76.3	76.4	0.79	NS	NS
Backfat at P_2 (mm)	13.8	14.0	13.6	13.6	1.16	NS	NS
Cooking loss (%)	28.8	30.3	28.8	29.1	1.19	NS	NS
Drip loss (%)	4.7	3.8	4.9	4.6	0.64	NS	NS
Sarcomere length (mm)	2.0	1.9	1.9	1.8	0.05	NS	NS
Shear force (kg/cm^2)	3.6	4.1	3.8	3.7	0.19	NS	NS

[a,b] Treatment means with different superscripts are significantly different.

Conclusions Glycerol inclusion significantly affected ADG but the effect was not linear. Feed intake and FCR were not significantly affected by glycerol inclusion but there was a tendency for FCR to become less efficient as glycerol inclusion increased. These findings are in keeping with Mourot *et al* (1994) and suggest that the digestible energy (DE) content of glycerol is lower than for wheat although more work is required to establish the DE content of glycerol. While there was no significant effect of glycerol inclusion on daily feed intake, variability between treatments was high. Glycerol inclusion increased the number of visits to the feeder but decreased the total time spent at the feeder which may be due to reduced palatability (Brief and Davis 1982). The lack of effect on carcass or meat quality parameters is in contrast to the results reported by Mourot *et al* (1994).

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