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Maize gluten and rapeseed meal as protein supplements to silage in the finishing rations for Scottish Blackface lambs

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Introduction

Voluntary intake of silage by lambs is generally low and partly as a result of this the performance of finishing lambs on grass silage is often poor. Studies have shown that a mixture of barley (B) and fish meal (FM) has proved a successful supplement to silage in the finishing ration of hill lambs. Both rapeseed meal (RSM) and maize gluten (MG) are possible alternative protein sources which potentially could reduce the cost of the finishing ration. Two experiments studied the effect of protein source on the performance of finishing hill lambs given a basal diet of baled silage.

Material and methods

Scottish Blackface wether lambs were used. In experiment 1, 200 lambs, mean live weight 29·9 kg, were allocated to one of four finishing diets and in experiment 2, 100 lambs, mean live weight 30·5 kg, were allocated to one of two finishing diets. Blocking in both experiments was on the basis of live weight and body condition score of the lambs. The formulation and chemical composition of the diets are shown in Table 1.

In both experiments baled silage was offered *ad libitum* and supplement at the rate of 300 and 500 g

Table 1 *Composition and chemical analysis of diets*

	Experiment 1				Experiment 2	
	B/FM	B/RSM	B/MG	MG	B/FM	B/RSM
Ingredients (g/kg fresh matter)						
Barley (B)	870	820	485		870	820
Fish meal (FM)	100				100	
Rapeseed (RSM)		150				150
Maize gluten (MG)			485	970		
Minerals	30	30	30	30	30	30
Chemical analysis (g/kg DM)						
Dry matter	845	844	874	911	824	823
Crude protein	163	160	167	190	160	159
Metabolizable energy (MJ/kg DM)	12·4	12·1	11·7	11·1	12·9	12·8

Table 2 *Experiment 1: effect of protein source† on lamb performance*

	B/FM	B/RSM	B/MG	MG	s.e.d.
Silage intake (g DM per head per day)	525	522	532	521	
Total food intake (g DM per head per day)	865	862	892	891	
Daily live-weight gain (g/day)	86[a]	79[ab]	75[b]	73[b]	5·31
Food conversion ratio (kg DM intake per kg weight gain)	10·1	11·5	11·1	12·3	

† For diet codes see Table 1.

Table 3 *Experiment 1: effect of protein source† on lamb slaughter traits*

	B/FM	B/RSM	B/MG	MG	s.e.d.
Days on trial	90·6[a]	94·6[ab]	93·6[ab]	95·6[b]	2·29
Final live weight (kg)	37·4	37·1	36·7	36·7	0·49
Carcass weight (kg)	16·3	16·1	16·0	16·1	0·20
Killing-out proportion	0·435	0·434	0·436	0·437	0·014

† For diet codes see Table 1.

per head per day during a 6-week holding period and 4 to 6 week finishing period respectively. Lambs were selected for slaughter at an estimated common level of finish (fat class 2 and 3L). Group mean silage dry matter (DM) intakes, lamb performance and carcass data were recorded.

Results and discussion

Mean silage analysis was: DM 449 and 383 g/kg fresh weight, digestible organic matter 595 and 648 g/kg DM, crude protein 116 and 95 g/kg DM, metabolizable energy 9·5 and 10·3 MJ/kg DM, for experiments 1 and 2 respectively.

Lambs supplemented with B/FM grew significantly faster ($P < 0·05$), achieved slaughter condition (Table 3) on average 5 days earlier ($P < 0·05$) and were more efficient food converters (Table 2) than lambs supplemented with MG. Lambs given the B/FM diet grew significantly faster than those supplemented with B/MG ($P < 0·05$).

There was no significant treatment effect on lamb performance in experiment 2.

In both experiments there was no significant treatment effect on lamb live weight at slaughter, carcass weight and killing-out proportion (Tables 3 and 5).

Both the B/RSM and B/MG diets appeared to be satisfactory alternative protein supplements to baled silage in finishing rations for hill lambs.

Table 4 *Experiment 2: effect of protein source† on lamb performance*

	B/FM	B/RSM	s.e.d.
Silage intake (g DM per head per day)	494	497	
Total food intake (g DM per head per day)	813	818	
Daily live-weight gain (g/day)	91	90	5·42
Food conversion ratio (kg DM intake per kg weight gain)	9·1	9·3	

† For diet codes see Table 1.

Table 5 *Experiment 2: effect of protein source† on lamb slaughter traits*

	B/FM	B/RSM	s.e.d.
Days on trial	80·4	81·4	2·02
Final live weight (kg)	38·6	37·7	0·63
Carcass weight (kg)	16·5	16·2	0·29
Killing-out proportion	0·428	0·428	0·036

† For diet codes see Table 1.

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