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DIET TO MAINTAIN MEAT CONTENT OF OVERFAT LAMBS ON SLIMMING REGIMES[1]

- by -

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SUMMARY

Downgrading of lamb carcasses is a major source of revenue loss to U.K. sheep farmers due to loss of E.E.C. payments worth up to £20 per head. The two trials by the Scottish Agricultural Colleges, Aberdeen, reported here demonstrate a feeding regime which reduces carcass fat yet increases carcass lean, avoiding down grading.

The feeding regime used was developed by Drs. Ørskov and Hovell at the Rowett Research Institute, Aberdeen, in which they introduce protein beyond the rumen, feed diets below the maintenance energy level, maintaining positive nitrogen balance. (IAFMM Technical Bulletin 'The Role of Fish Meal in Diets for Sheep' by F.D. De B. Hovell and E.R. Ørskov). They subsequently recommend fish meal, high in undegraded (rumen by-pass) high quality protein for this purpose.

In the two trials reported, overfat lambs which had previously been fed on roots plus concentrates were allocated to initial slaughter or barley straw ad lib or fed barley straw ad lib plus fish meal (100g per day) for 14, 28 or 42 days, after which they were slaughtered. Straw intake of the fish meal supplemented lambs was 407 ±139g per day compared with 348g ±120g per day for unsupplemented lambs. Unsupplemented lambs lost significantly more weight than those receiving fish meal ($P<0.001$). Both diets reduced carcass fat from 17% of carcass at start to 12% after 14 days, and 10% after 42 days. However, nine of the unsupplemented lambs had muscle loss whereas only one fish meal fed lamb had muscle loss. The fish meal fed lambs had more lean and less fat.

The financial return from feeding fish meal pellets was very worthwhile. Additional costs of 84p for fish meal gave a total extra return of £5.56, this coming from a higher carcass quality score and partly from the rising seasonal scale from later marketing of the lambs.

[1]Paper presented at the Winter Meeting of the British Society of Animal Production, Scarborough, March 1988.

Downgrading of lamb carcasses for overfatness is a major source of revenue loss to U.K. sheep farmers due to loss of EEC payments worth up to £20 per head. The difficulties of assessing fatness on live lambs by subjective assessment using lumbar palpation and the fact that in live markets the same techniques are used by the MLC graders cause problems to the farmer attempting to avoid overfat lambs. The trial reported here addresses the problem of how to feed lambs identified at live certification as overfat with the objective of reducing fatness but retaining the meat content of the carcass. Work by Hovell, Ørskov, MacLeod and McDonald (1983) using intragastric infusion techniques showed how lambs could maintain positive N balance on diets that were below accepted maintenance levels for energy but had adequate protein.

Experimental

In the first trial 76 Suffolk X overfat lambs previously fed on roots and concentrates outside were allocated to initial slaughter (28) or barley straw ad lib (24) versus barley straw ad lib + 100 g/day fish meal pellets (24). Lambs were slaughtered after 14, 28 or 42 days on trial. Data was collected on the straw intake and liveweight change, but slaughter data was not available.

Experiment 2 was a repeat of Experiment 1 except that there was no initial slaughter group. Carcass weight was determined and individual lambs were processed in a commercial deboning operation by Buchan Meat of Turriff. Excess fat from each boned out joint was removed. Lean meat trimmed from joints was classified as trim. The total weight of meat in boned out joints and steaks was classified as saleable lean.

Results

Feed intake and composition - Daily straw intake in the first, second and third fortnightly intervals were 363, 288, 437 g/day in the first trial and 190, 253 and 505 g/day in the second. Straw intake for fish meal supplemented lambs was 407 ± 139 g/day compared to 348 ± 120 g/day for unsupplemented lambs. Straw had a dry matter of 828 g/kg, CP of 31 g/kg, crude fibre 391 g/kg and ash of 52 g/kg. Energy content of the material consumed was estimated at 6.5 MJ ME/kg DM. Values for dry matter, CP and fibre content of the fish meal pellets (Norvite Feed Supplements) were 910 g/kg, 572 g/kg and 4.95 g/kg. The fish meal pellets contained 85% white fish meal sourced at Fraserburgh with a rumen degradability of 0.3. Energy content was estimated at 9.4 MJ ME/kg DM. No palatability problems were encountered.

Liveweight Changes

Fish meal supplementation considerably reduced liveweight loss on both experiments (see Table 1). Average weight loss for supplemented lambs was 2 g/day vs. 129 g/day in Experiment 1 and 58 g/day vs. 188 g/day in Experiment 2 ($P>0.01$). Lambs on supplemented diets showed small weight gains over the first two periods of Experiment 1, but lambs in both experiments lost weight over the period 28-42 days.

Carcass weight and carcass component changes: - Experiment 2

Carcass weights of lambs reflected the pattern of liveweight change with no significant effects on killing out percentage. Results in Table 2 indicate that fish meal supplementation increased carcass weight by 1.8 kg. ($P>0.01$). Supplementation significantly ($P>0.01$) improved MLC carcass conformation score thus the increased lean content of the carcass had visible effects on carcass shape. The effect on MLC fatness score was less marked (significant at $P>0.01$) fishmeal supplemented carcasses being 0.5 points leaner. Carcass breakdown indicated significant increases in saleable lean meat (+1.4kg) and trim, but no effects on fat, suet or bone. Both diets reduced fat content of the lamb carcasses from an estimated proportion of 0.17 at the start of the trial to 0.12 after 14 days and 0.10 after 42 days equivalent to a reduction in MLC classification from 4H to 3L/3H (see Table 3). All lambs except one overfat female slaughtered at 14 days on the straw diet were certified at slaughter for premium payments. Nine unsupplemented lambs had low scores for conformation but only one supplemented lamb reflecting the different pattern of muscle tissue loss.

Discussion

Energy intakes of supplemented and unsupplemented lambs were calculated as 170 and 107 kJ ME/kgW 0.75 respectively, considerably below maintenance. Estimated amino acid N supplies of 350 mg N/kgLW 0.75 appeared adequate for lean tissue maintenance and growth in supplemented lambs. Ignoring the increase in return from premium payments the return from feeding fish meal pellets was very worthwhile. Additional costs of 84p for fish meal gave carcass benefits worth £4.93. In addition the increase in value which comes from the rising seasonal scale was worth £1.47/head giving a total return of £5.56.

TABLE 1

Experiments 1 and 2

Effects of supplementation with fish meal on liveweight changes

	Daily weight change over 14 day periods			Mean	SED of means for treatments	Levels of significance
Treatment	0-14	14-28	28-42			
Experiment 1:	g/d	g/d	g/d	g/d	g/d	
Straw	-100	-96	-191	-129	26	***
Straw + fish meal	+13	+44	-65	-2		
Experiment 2:						
Straw	-208	-121	-235	-188	29	***
Straw + fish meal	-121	0	-53	-58		

TABLE 2

Experiment 2

Effects of fish meal supplementation on carcass weights and carcass components of lambs on a diet of straw

Combined results of slaughter after 14, 28 and 42 days	Straw + fish meal	Straw	SED of means	Level of significance
Carcass weight (kg)	21.97	20.17	0.341	***
Killing out proportion	0.478	0.472	0.007	NS
MLC carcass grade for conformation +	1.64	2.47	0.164	***
MLC carcass grade for fatness + +	3.37	3.84	0.245	NS
Saleable Lean (kg)	12.51	11.13	0.244	***
Bones (kg)	5.04	4,89	0.098	NS
Kidney (g)	95.00	84.00	4.2	*
Trimmed tissue (kg)	1.41	1.25	0.066	*
Fat (kg)	2.18	2.27	0.149	NS
Suet (kg)	0.48	0.39	0.064	NS
Saleable lean as a proportion of carcass dissected	0.58	0.56	0.007	**

\+ MLC grades: 1-U, 2-R, 3-0, 4 Rej. (poor conformation)

\+ + MLC grades: 1-LF, 2-2, 3-3L, 4-3H, 5-4L, 6-Rej. (overfat)

TABLE 3

Effect of time on trial on carcass components

	Initial Slaughter Group (Expt. 1)	Days on Trial (Expt. 2) 14	28	42
Carcass proportions:				
Saleable meat	0.492	0.564	0.567	0.572
Trim	0.081	0.065	0.059	0.066
Kidney	0.004	0.004	0.004	0.004
Suet	0.016	0.019	0.024	0.018
Fat	0.172	0.120	0.103	0.096
Bones	0.235	0.228	0.240	0.247