Slimming diets for overfat lambs

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ABSTRACT

Overseas data suggest that feeding low energy/high protein diets can increase carcass weight (and muscle mass) while reducing fat content. The potential application of this technique to maximise the returns from overfat lambs in New Zealand was studied.

One hundred and sixty ewe lambs, assessed as being overfat, were allocated on a liveweight basis to one of seven treatment groups. These comprised an initial slaughter group, 2 groups offered pasture at approximately maintenance allowance, 2 groups offered pasture at approximately half maintenance plus 200g/d of a high protein pellet and 2 groups held on a bare paddock and offered *ad lib* straw plus 200g/d of a high protein pellet. One group from each treatment was slaughtered after 3 weeks and the second after 5 weeks of controlled feeding. Liveweight change, carcass weight and carcass fatness were monitored.

All groups lost liveweight (88-195g/d) and estimated carcass weight (37-89g/d) over the experiment. Corrected to a common carcass weight of 15.25kg decreased GR from 11.6mm for the initial slaughter group to 9.7 and 9.2mm after 3 and 5 weeks, respectively, of maintenance pasture feeding. Corresponding GR's of the supplemented groups were 9.3mm (both groups) after 3 weeks and 8.1 and 7.5mm after 5 weeks for straw and pasture based diets respectively.

Supplementation with a high protein diet was effective in reducing carcass GR measurement after 3 weeks of supplementation with a further decrease after 5 weeks. However, unsupplemented lambs also showed a decrease in GR after 3 weeks, which was not significantly different from supplemented lambs. The length of feeding required to effect a change negated the advantage of decreased GR, although economic returns could be achieved if the pellets were more readily accepted.

Keywords Lamb, overfat, fishmeal, lean, carcass, GR.

INTRODUCTION

The production of overfat lambs incurs serious financial penalties to prime lamb producers and lowers the value of lambs for the processor. Even when overfat lambs can be identified prior to slaughter the options for dealing with them are limited to semi or complete starvation. Apart from the animal welfare aspects of this practice, starvation not only reduces fatness but also reduces total carcass weight and the lean (protein) content of the carcass. Similar problems overseas have encouraged the development of specialised feeding systems to maximise the quality and returns from overfat lambs (Vipond *et al.*, 1989). These developments arose from the observation that lambs fed entirely by intragastric infusions could maintain a positive nitrogen balance while being in a negative energy balance (Hovell *et al.*, 1983) and further experimental work by Fattet *et al.*, (1984). This observation has been supported in practise by the experiments and commercial experience of Vipond (*et al.*, 1989) where carcass weight was maintained or even increased at the same time as carcass fatness was reducing.

This paper reports an experiment which examined the response of overfat lambs to a specially formulated 'slimming' diet, to determine the potential practical applications under New Zealand conditions

MATERIALS AND METHODS

Animals

One hundred and sixty ewe lambs were sourced from 2 farms where they had been assessed as overfat, i.e. to have a GR measurement greater than 12mm. They were allocated on a liveweight basis to one of 7 groups, being an initial slaughter group (N = 20) and three treatments, each with a 3 and 5 week measurement period.

Treatments

The 3 treatments comprised pasture only (offered at approximately maintenance allowance; PO, n = 20 per group), pasture (offered at approximately half maintenance) plus 200g/d of a high protein pellet (PP, n = 25 per group) and straw (offered *ad lib*) plus 200g/d of a high protein pellet (SP, n = 25 per group). The pellet was predominantly fishmeal (74%), mixed with broll (10%), molasses (15%) and a commercial vitamin and mineral premix (1%). The diet was pelleted at Farm Products Ltd, Hastings and had very acceptable binding properties.

Measurements

Liveweight was measured weekly and following an 18 h fast immediately pre-slaughter. Individual hot carcass weight (HCW; kg) and carcass GR (mm; measured by a commercial grader) were recorded at slaughter.

Analysis

The relationship between hot carcass weight and GR was analysed by regression analysis. Logarithmic regressions yielded a better fit (higher coefficient of correlation than linear regressions in all cases) and were subsequently used for treatment analysis. Regression equations of the form Log_e GR = a + bHCW were derived for each of the seven slaughter groups. Statistical differences in Log_e GR, at a common HCW of 15.25kg (the average HCW for all lambs), were analysed by t-test, using the variance of the regression coefficient.

RESULTS

The high protein pellet contained 88.8% dry matter and 58% crude protein on a dry matter basis. Pellet intake was low initially and this was not helped by adverse weather conditions which led to disintegration of the pellets within 2 hours of feeding out. Intake gradually increased but complete consumption was only achieved after 15 days. Even then several lambs showed no, or only sporadic, interest in the pellets and approximately 10% of lambs had very low or no pellet intake for the entire experiment.

All groups lost weight over the experimental period, being most marked during the first 3 weeks and this was reflected in reduced carcass weights (table 1). GR also decreased on all treatments even after correction to a common carcass weight. After 3 weeks GR was lower on all treatments with no significant differences between treatments (P>0.1). After 5 weeks of supplementation the GR of supplemented groups was on average 1.4mm lower than the PO group (corrected to 15.25kg HCW; P<0.05). Using the regression coefficients obtained from the logarithmic regressions (range 0.12 - 0.16) the advantage in carcass weight at a GR of 12mm which could have been achieved by supplementation would have been between 0.6 and 1.4kg after 5 weeks of supplementation.

TABLE 1 Hot carcass weight (HCW; kg), GR (mm) and GR adjusted to a common HCW of 15.25kg (A-GR) of lambs grazing pasture only (PO), pasture plus high protein pellets (PP), or straw plus high protein pellets (SP) for 3 or 5 weeks along with the initial slaughter group.

	INITIAL	PO 3	PO 5	PP 3	PP 5	SP 3	SP 5
HCW	16.7	15.2	14.5	14.8	14.7	15.6	15.4
GR	14.2	10.2	8.7	9.2	7.7	10.1	8.8
A-GR	11.6[a]	9.7[b]	9.2[b]	9.3[b]	7.5[c]	9.3[b]	8.1[c]

DISCUSSION

The reduction in carcass fatness achieved in the present experiment is in agreement with previous results overseas (Fattet *et al.*, 1984; Vipond *et al.*, 1989) and shows that the reduction can be measured using GR as a measure of carcass fatness. Although the difference was apparent after 3 weeks of supplementation, GR also decreased in unsupplemented lambs and supplementation did not lead to a significantly reduced GR. This may have been due to the comparatively long time taken for the lambs to adapt to pellet feeding in the current experiment. In the overseas experiments, 3 weeks was considered to be the optimum length of supplementation as the additional reduction in fatness with longer feeding periods was lower and unlikely to be economic (Vipond *et al.*, 1989). However, the lambs in those studies were either confined in metabolism crates or were housed and fed in intensive conditions, thereby giving the lambs less opportunity to avoid contact with the pellets. Also, supplementary feeding of ewes is common practice in the United Kingdom so lambs would have been exposed to supplementary feeding as young lambs, a practice which may have improved the acceptance of supplementary feeds in later life. Had earlier acceptance of the pellets been accomplished in the present study a greater reduction in carcass fatness may have been achieved by 3 weeks of supplementary feeding.

Both restricted pasture allowance and *ad lib* straw feeding were effective in reducing energy intake to a level which permitted the high protein pellets to modify carcass fatness. The technique will only be effective if energy intake is restricted to a level which is below maintenance requirements (Fattet *et al.*, 1984). In the present experiment the objective was to restrict energy intake to approximately 300-350 kJ ME/kg$^{0.75}$ while supplying 3g CP/kg$^{0.75}$ in a highly rumen undegradable form. This should have led to marked reductions in body fat content while increasing lean mass (Fattet *et al.*, 1984). Straw feeding is the preferred method of doing this as it is physically very difficult for lambs to consume sufficient to provide maintenance energy requirements. Pasture, on the other hand, must be severely restricted to prevent lambs consuming too much energy, thereby obtaining sufficient energy to maintain fat reserves and negate the advantage of feeding the high protein ration.

No accurate value could be placed on the experimental ration, although a value of $600/tonne would be realistic, based on the components, pelleting, bagging and transport costs. At this value the cost of feeding a lamb would have been $2.52 and $4.20 for 3 and 5 weeks respectively. Therefore, the potential gain in carcass weight of approximately 1.0kg would not cover the cost of the supplement given present lamb schedule values.

ACKNOWLEDGEMENTS

P. Catley and C. Minehan for the supply of lambs. Progressive Meats Ltd, Hastings for processing the lambs and allowing access to the chain.

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