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Leanness of young sheep that lost weight after shearing

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ABSTRACT

Shearing immediately followed by underfeeding reduced carcass fatness in sheep aged 10 to 14 months. When compared with woolly, growing sheep at the same weight a combination of shearing and mild underfeeding lowered GR measurements by 1.5 to 6.3mm in 3 experiments. Although this practice is 1 of only a few management procedures that have been shown to consistently lower GR measurements at a given carcass weight it is not recommended as a routine production practice because of potential effects on animal health and welfare and meat quality.

Keywords Lamb; carcass weight; leanness; shearing; nutrition.

INTRODUCTION

In recent export price schedules for New Zealand lamb the value of carcasses has increased with weight until acceptable fatness levels are exceeded. Overfat lambs are heavily penalised so methods of producing heavy carcasses of acceptable leanness have been sought.

Genetic improvements in leanness can be achieved by selection of appropriate breeds and individuals within breeds (Clarke *et al.*, 1984; Fennessy *et al.*, 1987). Leanness is also influenced by a number of management practices through non-genetic means (Kirton, 1983; Thatcher, 1984) although many of these effects are mediated by an influence on slaughter weight. When allowance is made for differences in weight (Black, 1983) few management options have been shown to consistently reduce fat levels.

Bray *et al.* (1985) reported that changes in leanness due to shearing of growing lambs, or to underfeeding of lambs, could be accounted for by differences in weight. However, when shearing was followed by restricted feeding, carcasses were leaner than expected for their weight. This paper reports further evidence for the effectiveness of the combination of shearing and underfeeding.

MATERIALS AND METHODS

Experiment 1

Coopworth cryptorchid lambs aged 10 months with a mean carcass weight of 16.9kg were randomly allocated within liveweight classes to 4 groups of 50. Two feed allowance levels (4 and 0.8kg dry matter (DM)/lamb/d) and 2 shearing treatments (shorn and not shorn at the start of differential feeding) were employed in a factorial design. One quarter of each daily feed allowance was

fed as meadow hay and three quarters as grazed pasture. The hay was fed each day and fresh breaks of pasture were fed every second day. Shearing took place at the commencement of the experiment on 24 July 1987. Carcass weight and GR measurement (total soft tissue depth over the 12th rib, 11 cm from dorsal midline) were recorded for each carcass 0.5 to 1.5 h after slaughter 20 d later. Treatments were compared by analysis of variance using individual animals as replicates. Carcass weight was employed as covariate to compare the leanness of carcasses at the same weight.

Experiment 2

Coopworth rams and wethers aged 13 months were randomly allocated within castration and liveweight classes to 6 groups of 30. One group slaughtered at the start of the experiment on 31 October 1986 had a mean carcass weight of 18.6kg and GR measurement of 6.1mm. The other 5 groups were allocated to 2 growth paths. On 1 path lambs were fed pasture to maintain weight for 40 d while on the other they were fed to gain weight for 11 d then to lose weight for 29 d before slaughter. One group on each path was shorn and another remained woolly. A third group on the gain-loss pathway remained woolly till shorn at the start of the weight loss phase. Carcass weight and GR measurements were recorded 0.5 to 1.5 h after slaughter. Statistical analysis was conducted as for Experiment 1.

Experiment 3

Coopworth rams and wethers aged 14 months were randomly allocated within liveweight classes to 3 groups of 30. After 1 group was slaughtered on 5 November, the remainder were offered a generous allowance of pasture until a second group was

TABLE 1 Carcass weight and GR measurements (Experiment 1).

| Pasture allowance (kgDM/lamb/d) | Shearing treatment | Carcass weight(kg) | GR (mm) | Adjusted GR ¹ (mm) |
|------------------------------------|-----------------------|-----------------------|------------|----------------------------------|
| 4 | Woolly | 17.5 | 8.3 | 7.5 |
| | Shorn | 17.2 | 7.2 | 6.7 |
| 0.8 | Woolly | 16.1 | 6.2 | 6.7 |
| | Shorn | 15.6 | 4.7 | 5.5 |
| | LSD ² | 0.2 | 0.7 | 0.7 |

¹ Adjusted to mean carcass weight of 16.6 kg by covariance.² Least significant difference ($P=0.05$).

slaughtered on 23 December 1985. The third group was shorn on 16 December 1985 and placed on a submaintenance diet of pasture until slaughter on 7 February 1986. Carcass weights and GR measurements were recorded 0.5 to 1.5 h after slaughter. Treatments were compared by regression analysis. Statistical analysis was conducted as for Experiment 1, except that GR values were adjusted using separate regression lines for each treatment.

RESULTS

Lambs on the high plane of nutrition in Experiment 1 increased carcass weight while those on the low plane lost weight. Shearing reduced carcass weight at both levels of feeding. When GR measurements were corrected for differences in carcass weight they were reduced on average by 1.1mm by low nutrition ($P<0.01$) and 1.0mm by shearing ($P<0.01$). The effect of shearing was greater at the low plane than at the high plane of nutrition (1.2mm v 0.8mm) but the shearing x nutrition interaction was not statistically significant (Table 1).

In Experiment 2 the adjusted GR measurements of woolly lambs on both growth paths were similar to that of the initial slaughter group (Table 2). Shearing did not significantly reduce the adjusted GR value of lambs that were placed on a maintenance diet after shearing. When followed by a period of growth before weight loss there was no reduction in adjusted GR measurement. However when shearing was immediately followed by submaintenance feeding, in the late shorn treatment, the adjusted GR measurement was 1.5mm less than that of the woolly animals ($P<0.01$).

In Experiment 3 the adjusted GR for the shorn, underfed group was significantly lower ($P<0.001$) than for the other 2 groups (Table 3).

DISCUSSION

In all 3 of the present experiments, plus that reported by Bray *et al.* (1985), shearing immediately followed by a period of weight loss resulted in greater reductions of GR measurements than expected from the change in weight alone. When compared with

TABLE 2 Carcass weight and GR measurements (Experiment 2).

| Growth path | Shearing treatment | Carcass weight(kg) | GR (mm) | Adjusted GR ¹ (mm) |
|-------------------|--------------------------|--------------------|---------|-------------------------------|
| Initial slaughter | Woolly | 18.6 | 6.1 | 6.4 |
| Maintenance | Woolly | 19.1 | 6.6 | 6.6 |
| | Early shorn ² | 19.8 | 6.1 | 5.8 |
| Gain-loss | Woolly | 19.4 | 6.5 | 6.4 |
| | Early shorn ² | 19.7 | 6.6 | 6.3 |
| | Late shorn ³ | 19.4 | 5.0 | 4.9 |
| | LSD ⁴ | 1.3 | 1.4 | 1.1 |

¹ Adjusted to mean carcass weight of 19.3 kg by covariance.² Shorn at start of experiment when growth paths diverged.³ Shorn at start of weight loss phase.⁴ Least significant difference ($P=0.05$).

TABLE 3 Carcass weight and GR measurements (Experiment 3).

| Slaughter date | Carcass weight (kg) | GR (mm) | Adjusted GR ¹ (mm) |
|----------------|---------------------|---------|-------------------------------|
| November 5 | 21.7 | 12.4 | 12.8 |
| December 23 | 24.4 | 17.6 | 14.2 |
| February 7 | 19.9 | 6.2 | 7.9 |
| LSD | 1.2 | 2.2 | 2.3 |

¹ Adjusted to the mean carcass weight of 22.0 kg using within-group regressions.

² Least significant difference ($P=0.05$).

woolly growing lambs, shorn underfed lambs were leaner at site GR by 2.0mm in Experiment 1, 1.5mm in Experiment 2 and up to 6.3mm in Experiment 3. The large response in Experiment 3 was obtained in sheep that were more mature and underfed for a longer period than those in the other experiments.

Shearing followed by weight gain then loss, or by weight maintenance, had no effect on GR measurements of lambs over and above that accounted for by differences in weight in Experiment 2. This finding for 13-month-old lambs in spring is in agreement with results reported by Pownall *et al.* (1984), Sumner (1984) and Bray *et al.* (1985) for younger lambs in autumn. It is contrasted with the response obtained in Experiment 1 for shearing to reduce GR measurements of growing lambs aged 10 months in winter. It is possible this latter result is due to a seasonal effect since Jagusch and Rattray (1979), Kirton *et al.* (1982), and Bray and Taylor (1987) recorded enhanced losses and reduced gains of fat in winter. It is, however, consistent with the response to shearing in underfed lambs.

Shearing followed by mild underfeeding may well have a place in increasing the commercial value of overfat lambs as suggested by Bray *et al.* (1985) but it cannot be recommended without strong qualifications. The magnitude of the response was limited in 2 of the 3 present experiments and in that of Bray *et al.* (1985), and the practice has adverse implications for feed use efficiency, animal health and welfare and meat quality. Because of these factors it is recommended that lamb producers should concentrate on breeding leaner animals and on drafting strategies to avoid production of overfat lambs, and only resort to practices like shearing and mild underfeeding when all else has failed, and then with care.

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