Fatness of lambs grazed on 'Grasslands Maku' lotus and 'Grasslands Huia' white clover

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ABSTRACT

In 5 trials involving lambs grazing either lotus (L) or white clover (WC) in summer/autumn, those on L were consistently less fat. In trial 1 Romney wether lambs (n = 12), grazed 62 days, had weight-corrected carcass fat depths C of 2.1 (L) and 3.4 (WC) mm. In trial 2 Romney hoggets (n = 10) grazed 40 days, L had a lower side fat percent than WC at a similar weight. Trial 3 compared Romney lambs (n = 20) of the same weight. After 80 days fat depths were significantly lower for L. In Trial 4 Southdown × Romney lambs (n = 24), grazed for 45 days. Several measures of fatness were significantly lower in the L group after correcting for initial fatness and carcass weight. Trial 5 was similar to trial 4 (n = 16), but continued over 76 days and the differences in fatness were greater. Growth rates of the lambs in these trials were in favour of the WC group by an average of about 15 percent.

The lotus tannin content was 10 to 30 g/kg DM. It is concluded that lambs grazed on pure lotus are likely to be less fat than lambs of the same weight grazed on clover, possibly because the protein of lotus is to some extent protected from rumen degradation by tannins, thus effectively increasing its protein content.

Keywords Lamb fatness; pasture species; lotus; white clover; carcass composition

INTRODUCTION

Only limited information is available on non-genetic strategies for reducing levels of lamb fatness other than by reducing carcass weight. Lambs fed diets high in protein have sometimes been shown to be leaner (Norton *et al.*, 1970; Ørskov *et al.*, 1976), but differences in overall level of nutrition have not usually led to appreciable differences in weight-corrected measures of fatness (Kirton *et al.*, 1981). Several other environmental factors, such as grazing management, rearing rank, season and early weaning, have also had an effect in some studies (Kirton, 1983). This paper reports the results of a series of 5 trials in which lambs grazed 'Grasslands Maku' lotus or 'Grasslands Huia' white clover.

EXPERIMENTAL

For each of the trials, lambs were grazed on pastures comprising either 'Grasslands Maku' tetraploid lotus (*Lotus pedunculatus* Cav.) or 'Grasslands Huia' white clover (*Trifolium repens* L.). The timing of the trials, their duration, and the types of sheep used, are outlined in Table 1. The sheep were rotationally grazed *ad lib.* with the aim, except in Trial 5, of sustaining maximum growth rates for as long as possible. In Trial 5 the feed available to the WC group was restricted for part of the time in an attempt to reduce carcass weight differences between the groups. Details of lotus pasture management and tannin levels are provided by John and Lancashire (1981).

Slaughter followed normal commercial practice and

TABLE 1 Characteristics of the trials.

	Trial				
	1	2	3	4	5
Season	1978-79	1979	1979-80	1980-81	1982-83
Starting date	29 Dec.	16 Mar.	16 Dec.	5 Dec.	21 Dec.
Duration (days)	62	40	80	45	76
Breed[1]	R	R	R	SD × R	SD × R
Sex	Wether	Wether	Wether	Wether + Ewe	Wether + Ewe

[1] R = Romney; SD × R = Southdown × Romney cross.

fatness was measured as described by Purchas and Beach (1981).

In order to compare fatness at the same carcass weight, either measurements were analysed using carcass weight as a covariate (Trials 1, 4, and 5), or animals for slaughter were matched for weight (Trials 2 and 3). For Trial 4 a fat depth measured ultrasonically (Purchas and Beach, 1981) at the beginning of the trial was also included as a covariate.

RESULTS

The results for all 5 trials are shown in Table 2. Growth rates were generally higher for the white clover group, but these values do not constitute a valid comparison between the 2 pastures because the lambs used for the carcass measurements did not comprise the entire groups being used for live-weight gain in all instances. Consequently neither growth rates nor carcass weights were analysed statistically.

Every measure of fatness in Table 2 was lower for the lotus group than the white clover group, with the greatest differences being shown in Trial 5, possibly because those were the fattest lambs.

The concentration of condensed tannins in the lotus was 10 to 30 g/kg DM (W. T. Jones, pers. comm.).

DISCUSSION

The demonstration in these trials of a repeatable difference is fatness of lambs from 2 different pastures is important because previous studies have not shown consistent differences when lambs have been fed a variety of pastures (Barton and Ulyatt, 1963) and crops (Jagusch *et al.*, 1977). The higher tannin content of lotus relative to white clover would seem to be the characteristic that is most likely to be responsible for the lower levels of fatness. Condensed tannins increase intestinal nitrogen absorption by reducing the extent of protein breakdown in the rumen (John and Lancashire 1981; Barry and Manley 1983), and thus would be expected to decrease the fatness of lambs in the same way as a diet higher in protein (Ørskov *et al.*, 1976).

The fatness differences in the 5 trials were not large, but with current New Zealand export lamb carcass grades being determined largely by fat depth GR, a small difference in fatness can have a major effect on financial returns if the lambs are close to the grade boundaries.

Although the lamb growth rates achieved on 'Grassland Maku' lotus in the trials reported are satisfactory, the further use of lotus in many lamb-finishing areas of New Zealand is currently limited except as a special-purpose crop (Brock and Charlton 1978). The relative growth rates of lambs on lotus and white clover were similar to those reported by John and Lancashire (1981). The development of a tannin-containing legume suitable for high soil fertility conditions, which conferred beneficial effects such as bloat resistance (Jones *et al.*, 1973), satisfactory growth rates and less fat deposition in lambs, could be worthwhile.

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TABLE 2 Growth and carcass characteristics of the lambs on lotus and white clover treatments.

Trial	Number of animals	Growth rate (g/d)	Carcass weight (kg)	Side fat %	Fat depth (mm) C	J	GR	S2
1. Lotus	12	163	13.7	22.0	2.1	-	7.9	4.9
White clover	12	215	15.5	25.0	3.4 **	-	8.8	5.8
2. Lotus	10	193	16.7	27.0	3.2	-	9.5	6.0
White clover	10	225	16.0	29.2 *	3.8	-	10.4	6.6
3. Lotus	20	219	18.6	-	4.1	10.5	-	6.8
White clover	19	217	18.3	-	4.6 *	11.2	-	7.9 *
4. Lotus	24	217	15.8	22.8	2.8	6.6	-	6.3
White clover	24	236	16.4	25.0 **	3.3	8.3 **	-	7.2
5. Lotus	16	168	17.7	-	3.5	12.8	13.9	10.2
White clover	16	203	19.9	-	6.2 ***	15.7 **	17.8 ***	13.1 ***

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