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BRIEF COMMUNICATION

Use of *Lotus corniculatus* to increase sheep production under commercial dryland farming conditions without the use of anthelminticsC. A. RAMIREZ RESTREPO, T. N. BARRY, N. LOPEZ VILLALOBOS, P. D. KEMP, W. B. POMROY, W. C. McNABB¹, T. G. HARVEY AND N. M. SHABOLT

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Legumes are an important component of feeding systems in temperate zones to fix nitrogen and to produce high quality forage as a feed for livestock. However, marginal protein deficiency exists when ruminants are fed on fresh temperate forages due to high degradation rates of forage proteins in the rumen. Consequently, there is a large absorption of NH₃ from the rumen, leaving absorption of essential amino acids (EAA) from the small intestine that is below animal requirements for these AA (Barry, 1982).

Condensed tannins (CT) in *Lotus corniculatus* (Birdsfoot trefoil) reduce rumen protein degradability and increase EAA absorption from the small intestine (Waghorn *et al.*, 1987). Separate feeding experiments with sheep have shown that CT in lotus increased wool production and milk secretion (Wang *et al.*, 1996a&b) and both ovulation rate during mating, and lambing percentage (Min *et al.*, 1999; Min *et al.*, 2001), all with no increase in voluntary feed intake (VFI). In addition, lambs fed lotus accumulated fewer dags than lambs grazed on perennial ryegrass (*Lolium perenne*)/white clover (*Trifolium repens*) pasture (Leathwick & Atkinson, 1995). Each of these effects was measured in separate specific experiments.

The objective of this study was to assess the effect of feeding *Lotus corniculatus* upon wool production and lamb weaning weight under commercial dryland farming conditions without anthelmintic drench input, using a systems approach, where effects upon animal productivity and parasites were measured in the same experiment.

The grazing experiment was conducted during 12 weeks over the late spring-summer of 2000 at Massey University's Riverside farm near Masterton in the Wairarapa. The experiment compared the productivity of groups of 50 undrenched lactating Romney ewes and their lambs (mainly twins) grazing either *Lotus corniculatus* (cv. Grasslands Goldie) (CT-acting) or perennial ryegrass/white clover pasture (non-CT-containing). Ewes and lambs were rotationally grazed at a pasture allowance of

7 kg green DM/ewe/day. Weekly breaks were used in both swards, with front and back electric fences. Lotus and pasture dry matter (DM) production and nutritive value were measured over the complete growing season.

Live weight of both ewes and lambs was measured at the beginning and at fortnightly periods. Rectal faecal samples for faecal nematode egg concentration (FEC) were collected from 20 ewes per treatment at the beginning, and at two-week intervals. Lambs were faecal sampled at six and three weeks before weaning and at weaning. Nematode eggs per gram of faeces (epg) were determined using a modified McMaster technique with a precision of 1 egg counted equals 50 epg. Ewes and lambs were scored on a scale 1-5 (1 = no dags, 5 = most dags) at the start of the trial and at two-week intervals. Fleece weight was recorded at shearing at the end of the experiment for both ewes and lambs.

Over a 14-month period, total DM production was slightly higher on lotus than pasture under summer dry East Coast conditions (10,358 vs. 8,257 kg DM/ha), with lotus producing more than pasture during summer/autumn and less than pasture in winter. Total CT concentration in lotus was 24 g total CT/kg DM, with only traces in perennial ryegrass/white clover pasture (1.4 g total CT/kg DM).

There was no difference in ewe live weight between ewes grazed on lotus or pasture (Table 1). In contrast, although lambs had similar initial live weight, lambs grazed on lotus had higher ($P < 0.0001$) final live weight than lambs fed pasture, as a consequence of higher daily gain (37%; $P < 0.0001$) (Table 1).

Wool production was similar for ewes grazing lotus and pasture (4.22 v. 4.04 kg) but was greater for lambs grazing lotus (1.17 v. 0.98 kg; $P < 0.0001$). Dag score increased with time grazing pasture (Fig. 1) and remained consistently higher ($P < 0.0001$) than in ewes fed lotus. Faecal egg counts were higher ($P = 0.06$) for ewes grazing pasture than for ewes grazing lotus. Lambs grazing lotus had significantly lower dag scores than those grazing

TABLE 1: Effect of grazing ewes and lambs on *Lotus corniculatus* or perennial ryegrass/white clover (pasture) during spring 2000 on liveweight change (least squares means \pm SEM).

	<i>Lotus</i>		Pasture		P
		(n)		(n)	
Ewes					
Initial live weight (kg)	61.5 \pm 0.92	50	61.0 \pm 0.92	50	NS
Final live weight (kg)	69.0 \pm 0.92	50	67.3 \pm 0.92	49	NS
Lambs		(n)		(n)	
Initial live weight (kg)	14.0 \pm 0.53	79	13.8 \pm 0.51	78	NS
Final live weight (kg)	36.2 \pm 0.53	79	30.1 \pm 0.51	78	***
Liveweight gain (g/day)	258 \pm 3.0		189 \pm 3.0		***

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FIGURE 1. Comparative dag score of ewes grazing *Lotus corniculatus* or perennial ryegrass/white clover pasture. I = SEM.

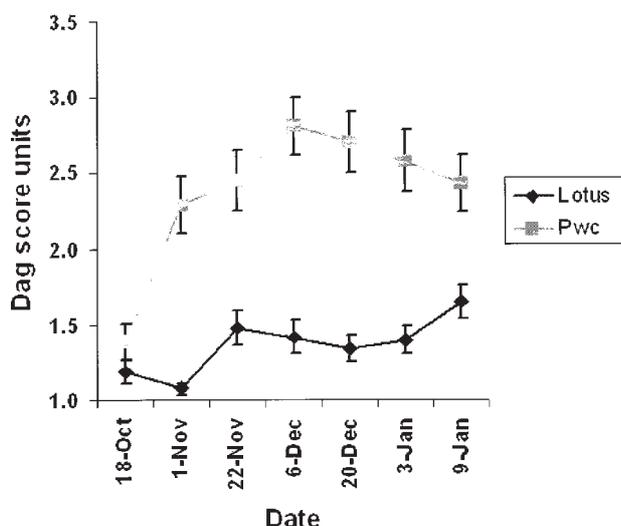
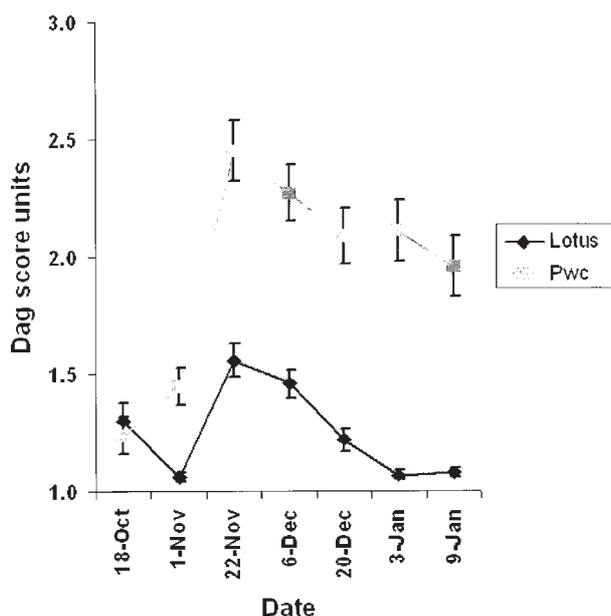


FIGURE 2. Consecutive mean values of dag score in groups of lambs grazing *Lotus corniculatus* or perennial ryegrass/white clover pasture. I = SEM.



pasture ($P < 0.0001$) (Fig. 2) with the same trend for FEC throughout the experiment (data not shown).

These results show that grazing on CT-containing *Lotus corniculatus* can be used to simultaneously increase wool and body growth, whilst at the same time minimising FEC, dag formation and, hence, the requirement for anthelmintic drenching. Similar results were found when the experiment was repeated in the 2001 spring (Ramirez-Restrepo et al. unpublished).

Under dryland farming conditions, use of *Lotus corniculatus* increased wool production and growth of lambs with reduced anthelmintic use, probably due to the

effects of its condensed tannins in reducing rumen protein degradability and in controlling internal parasites, reducing costs for the farm and improving the quality of the final product in the market.

ACKNOWLEDGEMENTS

The senior author is grateful to the New Zealand Ministry of Foreign Affairs and Trade for providing the scholarship for his studies. We thank WoolPro for financial support and Geoff Purchas, Neil Kilmister and James Bruce for help with the experimental animals.

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