

EFFECTS OF LIMING ACID SOIL ON WOOL PRODUCTION AND QUALITY OF YOUNG MERINO WETHERS GRAZING ANNUAL OR PERENNIAL PASTURES

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Pastures on acid soils are often dominated by poorly productive annual species. Lime can influence the botanical composition of pastures by favouring more productive sown species over some less productive species (eg *Vulpia* spp.) which are more acid tolerant (Garden 1992). Two permanent pasture types (one annual (AP), the other perennial (PP)) were established 40 km south-east of Wagga Wagga in 1992 as part of the long-term field experiment, MASTER - Managing Acid Soils Through Efficient Rotations. The experiment primarily aimed to develop an agricultural system that was economically viable and environmentally sustainable on highly acidic soils in south-eastern Australia. This paper reports the effects of lime and pasture type (AP and PP) on the annual production and quality of wool of young (1-2 yo) Merino wethers in the period 1998-2003.

Limed plots were initially limed (3.3-4.1 t/ha), then at 6-yearly intervals (1.6-1.8 t/ha) to maintain an average pH_{Ca} of 5.5 at 0-10 cm. Full details of the experimental design, site description and management are described by Li *et al.* (2001). The hogget wethers grazing the pastures were replaced annually. Each experimental group of 12 animals grazed three plots (of the same pasture type and lime treatment) rotationally (2.5 weeks grazed / 5 weeks rest, except in autumn and spring when plots were grazed for 1 week with 2 weeks rest). The grazing strategy was to keep all sheep in similar body condition on the limed and unlimed treatments without prejudicing pasture growth and persistence. Stocking rate was adjusted at the start of each cycle of the rotation using the 'put and take method'. Four core animals within each treatment group were measured.

Neither pasture type nor lime significantly affected clean fleece weight, mean fibre diameter or staple length of individual fleeces. However, both clean fleece weight and staple length varied significantly ($P < 0.05$) between years (Table 1). Overall, limed plots produced fleeces with lower ($P < 0.05$) staple strength than those not limed (26.1 v 28.8 N/ktex) with no difference in the point of break. Staple strength (Table 1) was also affected by a significant Year x Pasture type interaction ($P < 0.05$); the staples produced on AP in 1998/9 and 1999/2000 were stronger than those produced on PP. Across all years, the point of break was proportionally further from the tip on staples grown on perennial pasture than on annual pasture (66.2 v 63.6%).

Table 1. Effects of year on the predicted clean weight, quality traits and stocking rate of wethers grazing annual or perennial pastures on acid soil

	Year	1998/99	1999/2000	2000/01	2001/02	2002/03*
Clean fleece weight (kg)		3.82	3.65	3.47	3.30	-
Staple length (mm)		105.8	101.5	97.2	92.9	88.6
Staple strength (N/ktex)	AP	41.4	37.7	27.7	27.1	42.7
	PP	36.3	34.4	26.3	27.6	45.0
Point of break (% from tip)		61.4	63.9	66.3	68.8	71.2
Stocking Rate (head/ha)	AP-	12.6	11.8	14.3	16.3	9.8
	AP+	15.8	15.4	16.7	22.1	11.7
	PP-	12.9	12.2	14.4	15.7	9.7
	PP+	16.3	15.8	16.3	19.8	11.2

* Sheep on the site for 7 months only due to drought, but wool quality traits measured on 12 month fleece.

Lime had positive effects on botanical composition of both PP and AP (Li *et al.* 2003), allowing the limed pastures to carry 13-36% more sheep than the unlimed pastures, while maintaining the productivity of individual animals and increasing productivity per hectare.

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