Impacts of strategic grazing on density and ground cover of naturalised hill pasture

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Introduction Low ground cover by perennial species is a major problem in naturalised pasture on steep hill country in southern Australia. This leads to water and nutrient runoff, recharge to groundwater, and soil erosion, all of which impact on the environmental sustainability and profitability of grazing enterprises. Restoration of perennial components, particularly the native grasses for these marginal land classes, is of great importance for improving water balance, halting land degradation (Ridley *et al*. 1997), extending growing season, and increasing pasture production. The objective of this study was to use strategic grazing management to increase the ground cover and plant population density of perennial species in steep hill country.

Materials and methods The site was on a naturalised hill pasture near Ararat, Victoria, Australia (143º08'E, 37º25'S). The soil was a sedimentary clay loam; mean rainfall was 600mm/year. From Oct 2002 to May 2003, 4 treatments were imposed in a randomised complete block design with 3 replicates. Treatments were: (1) short-term deferred grazing (SD): pastures not defoliated between Oct 2002 and Jan 2003; (2) long-term deferred grazing (LD): from Oct 2002 to May 2003; (3) late-start deferred grazing (LSD): from Nov 2002 to May 2003; and (4) set-stocking treatment (ST). The pasture initially was dominated by annual grasses (>65%, mainly *Vulpia bromoides*) with about 30% perennial grasses. Most perennial grasses were native grass such as *Austrodanthonia* spp*., Austrostipa* spp. and *Microlaena stipoides*. Using an optical point quadrat, ground cover was measured 3 times between Jan and May 2003 and plant population density was measured by collecting 10 X 80mm diameter soil cores/plot in Oct 2003. Data were analysed using a General ANOVA model (Genstat Committee, 2000).

Results Grazing initially had no effect on ground cover. ST reduced (P<0.01) ground cover by Mar 2003 (Figure 1). This was due mainly to the removal of senescent annual grass by grazing from Jan to Mar, a period of feed shortage. ST ground cover increased from Mar to May, but was still lower (P<0.1) than other treatments. Treatments SD, LD and LSD significantly (P<0.05) increased tiller density of perennial grass, but did not affect the densities of annual grass, *Romulea rosea* and annual clovers, compared with ST (Table 1). There were no significant differences in the densities of all plant types between SD, LD and LSD.

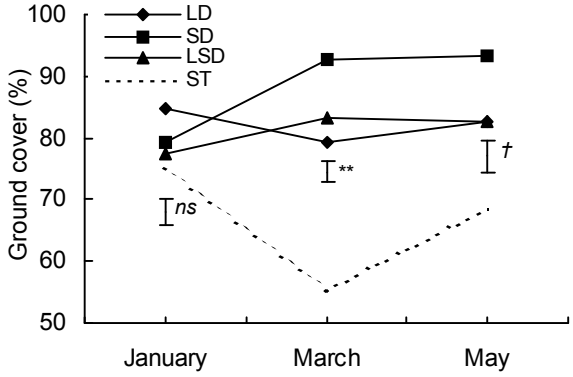

Figure 1 Ground cover under various grazing treatments (Vertical bars=s.e.; *ns*=not significant; **P<0.01; †P<0.1)

Table 1 Plant population density (tillers of grasses, plants of other species/m^2) of perennial grass (PG), annual grass (AG), *Romulea rosea* (RR), and annual clover (AC) in October 2003

Treatment	PG	AG	RR	AC
SD	8800	4040	2230	670
LD	9450	3890	3300	570
LSD	8380	2310	2820	480
ST	6430	7310	3540	1160
s.e.m.	*515**	*1955*	*759*	*462*

*P<0.05

Conclusions Set stocking in this environment is likely to decrease ground cover due to removal of dead annual grasses by grazing in summer/autumn. Deferred grazing has the potential to reduce the risk of a high proportion of bare ground on steep slopes, and to increase the density of perennial species. The long-term effects of various deferred grazing regimes on plant population density and ground cover may become cumulative and need further investigation.

References

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