BOTANICAL COMPOSITION RESPONSES TO GRAZING PASTURE BY DIFFERENT CLASSES OF SHEEP

P.E. Quigley and J.Z. Foot

Agriculture Victoria, Hamilton, 3300, Vic.

Abstract

A recently sown pasture was set stocked with Merino wethers, autumn-lambing ewes or spring-lambing ewes for 2 years, to determine the consequences for pasture growth, weed invasion and the persistence of desirable species. Initially, the pasture was dominated by perennial ryegrass and subterranean clover. Annual data showed perennial ryegrass tended to decline in all treatments while subterranean clover remained at a similar percentage contribution. Grazing with wethers caused ongoing, substantial invasion by annual grasses. Pastures grazed by spring-lambing ewes had increasing densities of broadleaf weeds. We concluded that different classes of sheep, set stocked at the same dry sheep equivalent (DSE) per hectare on an annual basis, have dissimilar effects on botanical composition of pasture. This has implications for interpretation of the outcomes from different grazing management systems.

Key words Perennial ryegrass, subterranean clover, sheep, selective grazing, sward dynamics

The seasonal consumption of herbage varies considerably depending on stock class. For set stocked ewes, seasonal grazing pressure depends on the time of lambing, and varies considerably. Wethers, however, exert a more consistent grazing pressure. This may have important consequences for pasture sustainability. There is little information available on the effects of different classes of sheep on pasture composition. Such knowledge would be especially valuable for extrapolating results from grazing management studies which currently are receiving national attention.

Materials and methods

This experiment was conducted at Hamilton, in Victoria, which has a mean annual rainfall of 700 mm. The pastures consisted of twenty 0.5 ha plots sown to perennial ryegrass (*Lolium perenne*) cvv. Nui, and Grasslands Lincoln plus subterranean clover *(Trifolium subterraneum*) cv. Trikkala in May 1992. Chemical analysis of a soil sample from the site showed available phosphorus (Olsen) was 13 µ g/g. Phosphatic fertiliser was applied annually in autumn at the same rate on all plots (20 kgP/ha).

The Merino sheep which began grazing the plots in December 1993 were either ewes which lambed in May, ewes which lambed in September or wethers. They were all from a common bloodline. Lambs were weaned 12 weeks after the start of lambing. There were 8 replicates of each ewe treatment and 4 for the wethers. Each plot was stocked at 7 ewes or 12 wethers (approximately equivalent DSE on an annual basis). Mean weight of the sheep at the beginning of the experiment was 49 kg/head for all 3 classes.

Botanical composition was measured monthly using the dry weight rank method (1). Ten permanent-quadrats (each 0.1 m^2) were spaced at 2 m intervals in each plot. Data for each species were transformed to arcsin values then analysis of variance was used with sheep class, season and year as factors.

Results

In Table 1 the botanical composition for each sheep class is shown on a seasonal basis for 2 years. There was a significant ($P<0.001$) reduction in perennial ryegrass in all treatments during the course of the experiment, with no difference between sheep classes. Spring-lambing ewes had less ($P<0.05$) subterranean clover in the pasture than either the wethers or autumn-lambing ewes. There was no significant difference in clover between years. Overall, the spring-lambing ewes had significantly ($P<0.001$) more broadleaf weeds than the other 2 sheep classes. There was no significant change in

broadleaf weeds between years. The wethers had less than half the amount of volunteer perennial grasses (chiefly fog grass and bent grass) found in both ewe treatments. When averaged over the 3 treatments, the contribution made by these grasses increased from 13% to 17% during the experiment. This change was significant ($P<0.01$). Annual grasses increased in all treatments between the first and second years ($P<0.001$) but the change was greater on the wether plots ($P<0.05$). There were significant differences between seasons for all pasture components except volunteer perennial grasses.

Table 1. Seasonal changes in botanical composition of pastures grazed by different classes of sheep.

Pasture component	Sheep class	Botanical composition (% of green DM)					
		Summer		Autumn/Winter		Spring	
		1993	1994	1994	1995	1994	1995
Perennial ryegrass	Spring-lambing ewes	77	65	54	35	36	34
	Autumn-lambing ewes	78	65	56	38	41	33
	Wethers	85	73	49	27	31	28
Subterranean clover	Spring-lambing ewes	7	11	24	31	50	34
	Autumn-lambing ewes	8	17	24	35	50	51
	Wethers	8	19	29	30	58	41
Broadleaf weeds	Spring-lambing ewes	8	7	7	11	5	7
	Autumn-lambing ewes	6	4	4	4	1	1
	Wethers	3	4	0	2	1	2
Volunteer perennial grasses	Spring-lambing ewes	8	15	9	13	8	18
	Autumn-lambing ewes	8	14	6	10	5	8
	Wethers	4	4	3	5	1	1
Annual grasses	Spring-lambing ewes	1	2	6	11	2	8

Autumn-lambing ewes	1	0	11	13	3	8
Wethers	1	0	20	38	9	29

Discussion

When set stocked, the different classes of sheep were associated with a variety of changes in the botanical composition of the pastures they grazed. This illustrates that long-term outcomes from different grazing systems, evaluated for example with wethers, are likely to be substantially different when other classes of sheep are used. These important differences have implications for conclusions drawn from current key programs on grazing management conducted nationally by the Meat Research Corporation.

Each class of sheep may have selected different plant species in their diets during particular parts of the year, also as the experiment progressed their diets could have been influenced by the relative proportions of species on offer. Importantly, the intensity of grazing on the ewe plots would have varied considerably through the year, less so on the wether plots. This may have interacted with phenological development of different plant species, influencing medium-term changes in botanical composition. The sex of the sheep *per se* would not have influenced the nutritive value of their diets (2).

Acknowledgments

We are grateful for financial support provided by the Meat Research Corporation. Mr Peter Heazlewood provided technical assistance throughout the project and Mr Gavin Kearney assisted with statistical analysis of data.

References

1. 't Mannetje, L. and Haydock K.P. 1963. *J. Brit. Grassld. Soc.* **18**, 268-275.

2. Langlands, J.P. 1969. *Anim. Prod.* **11**, 369-387.