CONTROL OF BARLEY GRASS BY GRAZING MANAGEMENT

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Summary

Pastures containing barley grass (*Hordeum* spp.) were subjected to various regimes of sheep grazing for 2-3 years. Continuous set-stocking, to maintain pasture short but not over-grazed, virtually eradicated barley grass in 2 years. Periodic hard grazing achieved similar results in 3 years. Hard grazing in the spring which prevented barley grass flowering was of major importance. Lax grazing in the summer, to maintain pasture cover and impede seedling establishment, reduced barley grass the following year. The grazing intensities used had no adverse effect on dry sheep and little effect on other pasture species.

INTRODUCTION

Most of the work on barley grass control in New Zealand has been concentrated on chemical control. There are however, some reports, mainly of an observational nature, on the effects of stock on barley grass (*Hordeum* spp.). Gunning (1966) cited instances where increased stocking rates had reduced or almost eliminated barley grass while Taylor (1971) recommended de-stocking to control barley grass. In Australia, evidence on the effect of grazing management is conflicting. (Smith 1968; Morley *et al*, 1969; Myers and Squires 1970).

Observations made by the authors on herbicide trials indicated that grazing intervals and intensity, especially in the spring, had an appreciable effect on barley grass. Preliminary small plot trials supported this belief so three major field trials were initiated in 1975 and 1976 to measure the effect of grazing on the incidence of barley grass.

METHOD

The first trial, the "year round trial", commenced May 1975 on the research farm at Rukuhia, Hamilton, on Horotiu sandy silt loam. The pasture was basically perennial ryegrass (*Lolium perenne*)/white clover (*Trifolium repens*) but had a high proportion of barley grass (*Hordeum murinum, H. leporinum*) and bromus mollis (*Bromus mollis*).

The area was divided into twelve 0.2 ha paddocks and four grazing regimes imposed, three replicates of each treatment. The paddocks were blocked according to the previous summer's barley grass density and treatments randomised on each block. The treatments were:–

Farm Practice – based on 20 wethers/ha increased by 50% in the spring, to represent lambs. The sheep were set-stocked August-December (lambing-weaning), rotationally grazed during the summer, set-stocked in the autumn (tupping) and rotationally grazed during the winter.

Set- stocked – sheep numbers were adjusted to maintain the pasture at between 500-1000 kg/ha total dry matter (DM) or 2-4 cm high.
Medium rotational – sheep numbers adjusted to reduce the pasture to about 750 kg/ha DM after grazing. Grazed 1 week on 2 weeks off.
Hard/lax rotational – as above but grazed harder in spring and autumn (500 kg/ha DM) and less hard in the summer and winter.

Sheep numbers were adjusted according to feed availability as measured by capacitance meter using the technique of Jones and Haycock (1970). For medium grazing pressure they were offered 3-4% of their liveweight in DM per day. The hard grazed were offered 2% per day and lax grazed 6% per day with some seasonal adjustment made by experience as the trial progressed. This was found to leave the pasture at the desired height after grazing. Annual topdressing was increased to 500 kg/ha superphosate applied in the autumn.

Two further trials, the "spring/summer" trials, commenced October 1976 and were designed to separate the effects of spring and summer grazing treatments. One trial was sited at Rukuhia near the "year round" trial and the other on an area of dense barley grass on the Ahuriri lagoon, Napier.

Spring treatments (October-December) were:–
Lax set-stocked – mean stocking rate for the farm in spring
Hard set-stocked – to keep pasture at 2-4 cm
Short rotation – similar total stocking density as hard set-stocked grazing 3½ days per 2 weeks.
Long rotation – same flock as above grazing 7 days per 4 weeks.

Summer treatments (January-March) were:–
Hard set-stocked – mean stocking rate for farm in summer
Lax set-stocked – half the above stocking rate
Long rotation – similar total stocking density as lax set-stocked grazing 1 week in 4 weeks
Mob stocked – mob stocked for 1-2 days when pasture 10-15 cm high.

There were four replicates of each spring and summer treatment. These treatments were imposed on long narrow paddocks 10 x 80 m separated by electric fences. The spring paddocks ran in one direction and the summer paddocks ran across these at right angles giving a factorial design with all combination treatments on plots 10 x 10 m replicated eight times. The whole area of each trial was grazed periodically as a single unit from April to September.

The amount of barley grass on each treatment was assessed by recording the number of seed heads and on some counts the number of seeds per seed head. Dry matter production was recorded throughout on the "year round" trials and during the first spring, autumn and winter on the "spring/summer" trials either directly by cutting or indirectly using a capacitance meter and the Jones and Haycock techniques (1970). Pasture species composition was recorded by visual observation and point analyses. Stock numbers were recorded throughout on all trials and animals weighed every 3 weeks on the "year round" trial.

RESULTS

The effects on barley grass seed head production are shown in Tables 1 and 3. In the "year round" trial (Table 1) the drop in barley grass content on all treatments relative to pre-trial level may have resulted from increased fertilizer application and regular grazing. There was a reduction of barley grass in the first season relative to farm practice following all the harder grazed treatments. The trend continued into the second year and by the third summer no barley grass could be found under set stocking (except on the stock camps that had been created), or on two of the three hard/lax rotational paddocks. The number of seed per head was also reduced by the harder spring grazing especially set stocking.

TABLE 1: Relative number of barley grass seed heads produced under four grazing regimes over three years on the "year round" trial. No. of seeds per head shown in parenthesis.

	Pre trial	1st year	2nd year	3rd year
Farm practice	100	100 a	100 a (17.3)	100 A
Set-stocked	111	24 a	0.4 b (13.8)	0 B
Medium rotational grazed	98	41 a	18 a (16.5)	29 A
Hard/lax rotational grazed	107	37 a	1 b (14.4)	0.1 B
Farm practice No/m²	135	18.7	14.2	22.1

TABLE 2: No. of sheep carried per hectare by season* over the 3 years of the "year round" trial (to nearest whole number) and the corresponding mean liveweight gain per animal (kg) in parenthesis.

		Farm Practice	Set-Stocked	Medium Rotation	Hard/lax Rotation
Autumn	75	20 (2.4)	43 (-1.4)	39 (-4.8)	39 (-2.6)
	76	20 (1.1)	20 (-0.2)	14 (2.6)	27 (10.5)
	77	13 (4.3)	16 (3.7)	17 (-0.5)	10 (4.6)
	Mean	18	26	23	25
Winter	75	21 (3.3)	22 (6.0)	16 (9.2)	13 (7.4)
	76	24 (11.7)	21 (4.3)	19 (13.8)	17 (18.6)
	77	22 (12.1)	25 (13.6)	27 (14.7)	25 (19.8)
	Mean	22	23	20	18
Spring	75	30 (10.2)	33 (15.1)	29 (9.3)	36 (12.0)
	76	30 (5.9)	44 (15.2)	48 (11.7)	56 (7.6)
	77	26 (6.1)	39 (16.3)	28+(9.3)	60 (8.7)
	Mean	29	39	35	50
Summer	76	21 (-0.3)	34 (2.6)	28 (3.2)	20 (6.7)
	77	28 (-0.8)	29 (2.1)	30 (-1.5)	12 (10.1)
	78	23 (-8.6)	25 (0.3)	19 (-6.3)	14 (3.9)
	Mean	24	29	26	15
3 yr mean	24	30	27	28	

* Seasons defined by 3 calender months commencing 1 April, 1 July, 1 October, 1 January.

\+ This treatment was under stocked Spring 77 due to lack of sheep.

The stock numbers carried on each treatment over the 3 year period are shown in Table 2 on a seasonal basis together with the mean live weight gains for each period. The set-stocked treatment carried most animals in total and on seasonal average except in spring. The increased

stocking rates, particularly in the spring generally increased liveweight gains relative to farm practice thus indicating no adverse effect on animal performance. Dry matter production over the 3 years showed a 20% ($P < 0.1$) increase under the hard/lax rotation relative to farm practice with smaller increases under set-stocking (9%) and medium rotation (6%).

Table 3 shows the effects of two seasons' spring grazing treatments and one summer treatment on the "spring/summer" trials. Continuous hard set-stocking gave good initial control of barley grass. However, after grazing pressure was removed in January barley grass regrew to varying degrees but, on the trials measured, with a reduced number of seeds per head. Lax, rotational and mob stocking during the summer reduced barley grass, relative to the hard set stocking treatment, in the following season. Dry matter production from the plots that had been hard grazed during the summer was severely depressed (> 50%) at the first winter cut, 5 weeks after closure, but unaffected subsequently.

TABLE 3: Relative number of barley grass seed heads produced under four spring and summer grazing treatments on spring/summer trials. Mean No. of seed per head shown in parenthesis.

Spring treatments	1st year				2nd year		
	Rukuhia		Ahuriri		Rukuhia	Ahuriri	
	Dec	Feb	Dec	Feb	Dec	Dec	Jan
Lax set-stocked	100 aA	100 A (17.2)	100 A	100 a	100 aA	100 aA	100 a
Hard set-stocked	0.4 cC	33 B (12.5)	0.4 D	108 a	0.2 dD	10 cB	68 a
Short rotation*	18 bB	43 B (15.6)	110 A	89 a	6 cC	30 bcAB	74 a
			13 C	150 a			
Long rotation**	0.2 cC	25 B (15.6)			3 cBC		
	69 a	25 B	54 B	114 a	18 bAB	50 abA	73 a
Lax set-stocked No/m²	26	9	257	222	75	280	626

Summer treatments	Dec/Jan
Hard set-stocked	100 a
Lax set-stocked	66 a
Long rotation	54 a
Mob stocked	79 a
Hard set-stocked No/m²	27

* 2 replicates grazed 4 days and 3 nights and others grazed 3 days and 4 nights each grazing period. Different figures shown where results differ.

** an error in sheep movements 1st year at Rukuhia led to 2 replicates receiving an extra graze in November (good control) while the other two missed a graze (poor control).

Point analyses and visual assessments of the pastures showed treatments to have had no major effect on the ryegrass/white clover balance. However, hard grazing, particularly in the spring, tended to increase annual weeds such as thistles and, at Rukuhia, warm zone weed grasses mainly *Setaria* and *Panicum* species.

DISCUSSION

These results show that grazing management could make a valuable contribution to the control of barley grass. Continuous set stocking so that pasture was never undergrazed or overgrazed was the most effective. Periodic hard grazing gave almost as good control of barley grass.

The "spring/summer" trials indicated that spring grazing was of major importance. However, grazing pressure had to be kept up into

January or even February where the incidence of barley grass was high. All treatments that reduced grazing during the summer decreased barley grass the following year. Providing grazing pressure was high in the spring and lax in the summer it did not appear to matter whether the grazing was continuous or intermittent.

The high level of control achieved in two replicates of the long rotation at Rukuhia which received an extra grazing in November (Table 3) indicates that very hard grazing in November may be particularly effective for barley grass control.

In the first year at Ahuriri a big difference occurred between the paired replicates of the short rotation treatment. Because of pugging following rain at the commencement of the trial the "flock" used for the rotational treatment was reduced slightly in number and was thus at a lower total density than the hard set-stocked. The two replicates grazed 3 days and 4 nights showed better barley grass control at Ahuriri than the two grazed 4 days and 3 nights. It is probable that feed consumption during the 4 nights (which included early morning and early evening) was greater than during the 4 days. If this accounts for the difference in barley grass control then there may be a "critical" grazing pressure level that must be obtained to give good control. The short rotation treatments at Rukuhia and the second year at Ahuriri where grazing intensity was higher did not show this phenomenon.

CONCLUSION

Barley grass can be controlled by hard grazing in the spring to reduce seed production and lax grazing in the summer, to reduce seedlings establishment. Grazing intervals are less important than intensity providing seed heads do not become inedible between grazings. However, hard grazing pressure must be maintained through spring and into early summer to control late seed production.

ACKNOWLEDGEMENTS

The authors wish to thank the Lands and Survey Department, Napier for the use of their land and Mr C. B. Dyson for trial design and statistical analyses.

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