EFFECT OF CHEMICAL REMOVAL OF BARLEY GRASS ON LAMB GROWTH RATES — PART II

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Summary

An area of uniform barley grass (*Hordeum murinum*) infestation, in Waikato, was divided into twenty-four 0.2 ha paddocks, treated with pronamide, carbetamide or 2,2-DPA for barley grass control in 1971 and set stocked by lambs. First seasons barley grass control was good and lamb growth rates increased on treated areas. During the second season barley grass on the treated paddocks increased considerably but was still less than on control paddocks. Pasture dry matter production and lamb growth rates during the second season were little affected by treatment until seed damage affected live weight gains in January. Herbicide treatment induced severe broadleaf weed invasion especially under high stocking.

INTRODUCTION

PLOT trial work with a number of herbicides applied to pasture has shown that these can give a reasonable measure of control of barley grass (*Hordeum murinum*) but their use is associated with an initial drop in dry matter production and a change in sward composition (Atkinson 1970; Meeklah et al. 1970). A paddock scale trial was initiated in Waikato in 1971 to determine whether change in sward composition would offset the reduction in pasture dry matter production when assessed via grazing lambs. The trial showed a significant improvement in lamb growth rates on treated paddocks over those on untreated paddocks during the first summer in spite of a reduction in available feed.

This paper reports the effect on stock and barley grass control for the period April 1972 to March 1973 from the same trial.

METHOD

The trial was conducted on twenty-four 0.2 ha paddocks. Two stocking rates were used and there were 3 replicates of each treatment x stocking rate. The experimental techniques were described in a previous paper (Hartley and Atkinson 1972). No further barley grass herbicide treatments were applied but all paddocks were sprayed with MCPB (1.7 kg/ha) in September and one half of each paddock was oversown with Arika ryegrass (*Lolium perenne*) (22 kg/ha) in April 1972, at which time all paddocks were topdressed with 375 kg/ha 50% potassic superphosphate.

Three groups of stock were used. A new randomisation of a median group of the original lambs grazed from April until September except for a period in June/July when the paddocks were spelled for 4 to 6 weeks according to pasture availability. After shearing in September this stock was replaced, in October, by ewe hoggets and extra hoggets added 3 weeks later to maintain adequate stocking pressure. In December shorn lambs replaced the hoggets. The stocking rates over the various periods are shown in Figs. 1 and 2.

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Dry matter production was measured by cutting at 4 to 5 weekly intervals, from two 3 m x 3 m cages per paddock by the trim technique. Line transects and herbage dissections were taken in July and September respectively.

RESULTS AND DISCUSSION

The measurements of pasture composition, pasture dry matter production and stock production throughout the year are shown in Tables 1 to 3 and Figures 1 and 2.

Barley grass control into the second season was disappointing. Point analysis in July showed barley grass to comprise only 0.5% to 1.3% of the cover compared with 13 to 16% at the same time before treatment and on the untreated paddocks (Table 1). However, by September up to 4% of the herbage from the pronamide paddocks was barley grass compared with 12% on untreated paddocks (Table 1). Final assessment on seed head counts in January showed barley grass to have increased relative to the first summer after treatment (Table 1). The barley grass on the untreated paddocks had increased two fold but the increase on the treated areas was considerably greater. Even allowing a two fold increase to other factors the barley grass on treated paddocks had increased 5 to 25 times. The pronamide treatment, best during the first year, suffered the greatest increase in barley grass, up to 50 fold increase. Though this multiplication is not beyond the plant's capability by seed production, the possibility that this treatment may be preventing the plant from

TABLE 1: PASTURE COMPOSITION AND BARLEY GRASS CONTROL

	Control	Treatment		
		pronamide	carbetamide	2,2-DPA
Point analysis§ 20/7/72	% cover hits	600 points/treatment		
ryegrass	41 bB (18)*	44 bAB (21)	39 bB (20)	53 aA (21)
barley grass	14 aA (13)	0.5 bB (13)	1.3 bB (16)	1.0 bB (13)
other grasses	28 aA (16)	24 aA (16)	25 aA (14)	12 bB (19)
clover	8 a (26)	11 a (26)	10 a (20)	9 a (21)
other species	7 bB (6)	18 aA (5)	23 aA (8)	25 aA (6)
litter and bare ground	7 a (23)	1 a (22)	1.5 a (24)	1 a (22)
Herbage dissection§ 21/9/72				
ryegrass	36 bA	39 bA	49 aBA	59 aA
barley grass	12 aA	4 bB	2 bB	tr bB
other grasses	40 aA	39 aA	26 bAB	15 bB
clover	8 a	5 a	8 a	8 a
other species	4 a	11 a	14 a	15 a
No. barley grass seed heads/ha (thousands) January 1973†				
low stocking rate	2000 aA	370 bcB	790 bAB	580 baB
increase‡	x 2	x 50	x 20	x 20
high stocking rate	1840 aA	240 cB	230 cB	240 cB
increase‡	x 2	x 50	x 10	x 10

* % cover hits 29/7/71 before treatment.

‡ increase over February 1972 (Hartley and Atkinson 1972).

† counts made from 90 random 0.09 m² quadrats per treatment.

§ mean for two stocking rates.

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flowering at the normal time and encouraging it to perenate into a second year should not be overlooked. However, 2,2-DPA, marginally the least beneficial treatment on first year's results, has deteriorated least and by the end of the second summer all treatments were comparable for barley control but still showed some improvement over untreated areas. The effect of stocking rate was fairly consistent and generally the higher stocking rate reduced clover and barley grass and increased ryegrass and weeds. The increase in the latter, predominantly stinking mayweed (*Anthemis cotula*) was very severe on the pronamide and carbetamide paddocks and led to the virtual collapse of these treatments during the drought in February 1973.

Pasture growth during the drought was so variable within the paddocks that production cuts from only two caged areas gave unrealistic estimates of summer production. Dry matter production, therefore, is only published to cover the periods of grazing by winter and spring stock groups (Table 2). At the low stocking rate, treatment had no effect on dry matter production but at the high stocking rate the pronamide paddocks outyielded the carbetamide and 2,2-DPA paddocks during the winter.

TABLE 2: DRY MATTER PRODUCTION (kg/ha) WINTER AND SPRING

	control	Treatment		
		pronamide	carbetamide	2,2-DPA
Low stocking rate				
26/4/72 - 21/9/72	4080 abA	3620 abcA	3170 bcA	3880 abcA
21/9/72 - 21/11/72	4700 a	4690 a	4950 a	4730 a
Total	8780 abA	8310 abA	8120 abA	8610 abA
High stocking rate				
26/4/72 - 21/9/72	3800 abcA	4310 aA	3120 bcA	2850 cA
21/9/72 - 21/11/72	4840 a	5170 a	4780 a	4510 a
Total	8640 abA	9480 aA	7900 abA	7360 bA

Oversowing with ryegrass gave no increase in dry matter production and did not appear to have any effect on subsequent barley grass re-establishment or weed invasion. Under the conditions prevailing over this period natural ryegrass recovery was adequate to restore pasture composition and production in the treated paddocks.

Live weight gains of the stock over the period are shown in Figs. 1 and 2 and total production per hectare in Table 3. These data are presented as cumulative increases regardless of change of stock. During this second year there was little difference in stock performance but some trends are indicated. Over the winter period especially early winter, the control lambs gained slightly more than treatment lambs but in the spring the trend was reversed. The summer pattern was much as last year (Hartley and Atkinson 1972) but with total growth and differences scaled down. The control lambs checked first in January but the dry conditions in February stopped lamb growth on all paddocks.

Wool weights were not significantly affected by any treatment except 2,2-DPA at high stocking rate (Table 3).

It may be argued that if barley grass is detrimental to stock, then the 60% to 80% reduction in barley grass still obtained from these treatments should have shown greater effect on growth rates than was achieved.

TABLE 3: LIVEWEIGHT GAIN AND WOOL WEIGHT PER HECTARE (kg)

Period 1972-73		Treatment			
		control	pronamide	carbetamide	2,2-DPA
LIVE WEIGHTS§					
Low stocking rate					
26.4-22.9	(25)*	412 aA	370 abA	327 abA	394 aA
5.10-28.11	(30-60)	497 a	551 a	542 a	528 a
11.12-29.3	(35)	123 abA	116 abA	115 abA	174 aA
TOTAL		1032 a	1051 a	986 a	1096 a
High stocking rate					
26.4-22.9	(35-30)	362 abA	415 aA	386 abA	293 bA
5.10-28.11	(35-65)	499 a	542 a	542 a	522 a
11.12-29.3	(50)	89 abA	57 bA	100 abA	134 abA
TOTAL		950 a	1014 a	1028 a	949 a
WOOL WEIGHTS (kg)					
Low stocking rate					
7.4-1.9	(25)	59 abA	57 abA	55 bA	60 abA
11.12-30.3	(35)	48 cB	43 cB	44 cB	48 cB
TOTAL		107 bAB	100 bB	99 bB	108 bAB
High stocking rate					
7.4-1.9	(30)‡	64 abA	62 abA	65 aA	56 bA
11.12-30.3	(50)	59 bA	60 bA	64 abA	70 aA
TOTAL		123 aA	122 aA	129 aA	126 aA

* No. lambs/hoggets per hectare

‡ Calculated as for 30 lambs/ha throughout

§ Inclusive of wool wt.

However, a major harmful effect of barley grass to stock is physical damage (Hartley and Atkinson 1972, 1973), an effect substantiated further by this trial. Lambs that had suffered seed damage to the eyes at any time during the summer averaged, over all treatments and control, 0.8 kg less live weight gain than undamaged lambs, which was significant at the 5% level of significance. (Seed was removed from the eyes at each weighing.) Though damage increases with increasing barley grass infestation the increase in eye damage, shown by this trial, was not directly proportional to the barley grass seed numbers as indicated by the percentage of eyes affected on the 4 treatments.—

Treatment	control	pronamide	carbetamide	2,2-DPA
Low stocking rate	57%	36%	48%	48%
High stocking rate	39%	23%	14%	20%

It would appear that the level of barley grass control achieved by these treatments was not adequate to reduce eye damage satisfactorily. Any beneficial effects from barley grass control will also have been reduced by stinking mayweed invasion. This was particularly severe on the high-stocked pronamide and carbetamide paddocks where it reached almost complete cover when in flower.

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Fig. 1: Cumulative live weight gain of stock on four pasture treatments. Low stocking rate.

Fig. 2: Cumulative live weight gain of stock on four pasture treatments. High stocking rate.

CONCLUSIONS

The failure of these treatments to maintain satisfactory control of barley grass into a second season means that they cannot be recommended as single applications under set stocking. Pronamide and carbetamide, which showed early promise, have in the second year shown no advantage over 2,2-DPA. The severe invasion of broadleaf weeds, especially stinking mayweed, tended to offset any disadvantage the former treatments might have had. However, stocking rate had a marked effect on weed invasion implying that management was important. If these treatments are going to be used for barley grass control then the treated pasture must be given a better management than a high rate of set stocking!

Under careful management these treatments may well prove advantageous for barley grass control which is necessary, since barley grass not only devalues sheep products but also adversely affects stock performance.

ACKNOWLEDGEMENTS

We wish to thank Messrs G. J. Parrish and F. E. Bartlett for providing the trial site and stock and C. B. Dyson for biometrical analysis.

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