EFFECT OF DAISY REMOVAL ON PASTURE PRODUCTION

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SUMMARY

The yields of three different ryegrass (*Lolium* sp) white clover (*Trifolium repens*) swards were determined following selective mechanical removal of daisy (*Bellis perennis*). In two pastures, where annual yields were greater than 10,000 kg DM/ha, daisy at 13 and 18% ground cover in spring failed to affect sward productivity. In lower producing pasture yielding 8,500 kg DM/ha, daisy at 28% ground cover in spring reduced yields by only 500 kg DM/ha. It was concluded that ryegrass/white clover cultivars selected for erect growth habit, free from nutrient or moisture stress are little affected by competition from daisy.

INTRODUCTION

Daisy infestations appear to be increasing within the Otago/Southland region, particularly in Bruce and Southland countries, and daisy is one of the few weeds common to intensively stocked all-grass farms on soils of high fertility.

Struick (1967) studied the growth habits of daisy in contrasting swards around Palmerston North; he found that daisy reached its highest percentage biomass (2 - 4%) in lawns and heavily grazed dairy paddocks, but less than 1% of biomass in a continuously grazed sheep paddock. In swards not grazed for 50 days, the plant never grew to competitive height and was never found in swards over 20 cm in height.

No selective herbicide is known that will remove daisy without affecting clover growth (Meeklah *et al* 1981), so that measurement of the effects of daisy on pasture production is difficult. This paper details results from a three-year study where daisy was removed mechanically and the subsequent yield of pasture species recorded.

METHODS

Prior to the growing season in 1979/80, 1981/82 and 1982/83, a single paddock infested with daisy was selected on a different farm each year within Bruce County. Twenty pairs of one metre-square cages, designed to exclude grazing animals, were placed within an even area of daisy infestation. Each pair of cages was approximately 2 m apart. All daisies including roots in one of each pair of cages were removed using a scalpel. Care was taken to minimise cutting or disturbance of the roots of neighbouring grasses and clovers.

Subsequently all pasture in each cage was cut close to ground level (1 - 1.5 cm) using a modified sheep shearing handpiece, at intervals corresponding approximately to the introduction of rotationally grazed sheep. Herbage was separated into grass, clover and daisy (Table 1). At the start of harvesting the percentage ground covered by daisy was estimated visually within each square.

TABLE 1: Seasonal DM kg/ha yield (LSD 5%) of grass + clover and daisy at three sites.

	1979/80		1981/82		1982/83	
	Weeded	Not weeded	Weeded	Not weeded	Weeded	Not weeded
Grass/clover	11430	11580(510)	8570	8090(510)	10790	10960(430)
Daisy		320		420		150

RESULTS

Ground covered by daisy at each site at the time of enclosure with cages was as follows:

Site 1: 13.8.79, 13% SEM 2.5
Site 2: 28.9.81, 28% SEM 1.4
Site 3: 3.9.82, 18% SEM 0.8

TABLE 2: DM yield response in a ryegrass/white clover sward following removal of daisy. 1981/82 season. Site 2.

Date cut:	21.10.81	12.11.81	4.12.81	21.12.81	25.1.82	16.3.82	5.5.82	Total
Grass + clover (kg DM/ha)								
Weeded	1530	1150	950	620	1530	1880	900	8570
Not weeded	1470	1030	810	600	1360	1970	870	8090
LSD (5%)				140*				420
Daisy (kg DM/ha)	40	90	70	50	110	50	10	420

*LSD is for pooled data on all cuts

Removal of daisy resulted in a minor yield increase only at Site 2 (Table 1). Results from this site are presented in Table 2, and show small and barely significant responses occurring only in the spring to summer period. Comparitive yields of grass and clover as a percentage of total yield are shown for all sites in Table 3. Only at Site 2 was there a small but significant increase in the proportion of grass during late spring to summer following removal of daisy.

TABLE 3: Comparative grass clover and daisy DM yield response following removal of daisy at three sites (as % mean total yield).

	5 Oct	1 Nov	15 Nov	5 Dec	11 Jan	5 Feb	28 Feb	21 Apr	LSD (5%)
Site 1 (1979)									
Grass, weeded	83	83	83	74	58	53	66	83	5
not weeded	83	84	82	70	60	56	65	81	
Clover, weeded	15	13	15	22	35	41	27	12	4
not weeded	13	12	14	19	33	39	29	13	
Daisy yield kg/ha	37	68	15	55	67	15	18	47	(Total 320)
Total grass + clover yield 11,500 kg/ha									
Site 2 (1981)	21 Oct	12 Nov	4 Dec	21 Dec	25 Jan	6 Mar	5 May		
Grass, weeded	75	82	75	69	66	75	78		5
not weeded	81	73	63	63	62	73	79		
Clover, weeded	21	17	24	30	31	24	20		5
not weeded	16	18	27	28	30	24	19		
Daisy yield kg/ha	41	90	70	50	111	46	14		(Total 420)
Total grass + clover yield 8,330 kg/ha									
Site 3 (1982)	8 Oct	19 Nov	20 Dec	19 Jan	16 Feb	20 Apr			
Grass, weeded	79	83	78	71	76	92			5
not weeded	76	81	78	73	80	94			
Clover, weeded	21	17	21	27	23	7			4
not weeded	22	17	20	25	19	6			
Daisy yield kg/ha	45	50	39	9	4	7			(Total 153)
Total grass + clover 10,880 kg/ha									

Yield of daisy at each cut (Table 3) shows a tendency for productivity to decline in autumn, while yields are highest on the site at which pasture yields were low.

DISCUSSION

Pasture yields in this trial were comparable, except at Site 2, with those generally accepted for fat lamb farms in Otago/Southland (G.G. Cossens pers comm). Removal of daisy had little effect on total yields of grass and clover for the three seasons over which this experiment was conducted.

Detailed yields from Site 2 (Table 2) showed that grass and clover response to removal of daisy was confined to the time of rapid pasture growth up to late January. While this confirms our observations that daisy, in terms of ground cover, appears more important in spring and early summer than in late summer to autumn, it shows that its effect on pasture yield is small. It must also be noted that Site 2 was the lowest yielding site, suggesting that it is only likely to be on areas where pasture competition or vigour is low that daisy will have any influence.

Evaluation of yields of the major pasture components (Table 3) shows that removal of daisy had no real effect on component yields at Sites 1 and 3, while at Site 2 there was no competitive effect on clover except at the first cut in early spring. A competitive effect of daisy on grass yields was apparent only during spring and early summer. Daisy yields (Table 3) from the three sites also confirm that the weed was most productive during that period.

Considering the visual prominence of daisy in high fertility pastures in spring, it was surprising that daisy yields were so low and that the plant had so little impact on pasture yield. Presumably its prostrate habit precludes competition for light, while its low productivity suggests that competition for nutrients and moisture is limited.

Thus the status of daisy as a weed can be questioned. In our work at Invermay we have noted that daisy is palatable to sheep and is not listed in world literature as in any way toxic. Chemical studies (Fagan and Watkins 1932) showed that composite herbs such as catsear (*Hypochaeris radicata*) daisy and dandelion (*Taraxacum officinale*) were rich in nitrogen, calcium and chlorine, they also noted their palatability.

For field evaluation trials of this nature, we feel mechanical removal of individual daisies is preferable to removal by spot treatment with herbicides. The cutting level of 1 to 1.5 cm was considered to simulate an intensive rotational grazing system in which at least some of the daisy was defoliated.

Although daisy has a pronounced visual impact during the late winter/spring period in Otago/Southland, it has little practical effect on pasture yields. Fast growing, erect grass and clover cultivars, free from nutritional or moisture stress, appear relatively unaffected by competition from daisy.

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