THE PERFORMANCE OF 'GRASSLANDS MATUA' PRAIRIE GRASS IN THE SOUTHERN NORTH ISLAND

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Abstract

The performance of 'Grasslands Matua' prairie grass (*Bromus catharticus*) was compared with perennial ryegrasses under mowing or grazing in three trials conducted in the southern North Island. Production of Matua under mowing at Flock House and Waimatc West was 13% and 19% greater than G.4708 and Nui ryegrass, respectively, with the extra production contributed in summer and winter. At Masterton no difference between Matua and Ariki ryegrass production occurred under grazing.

A 31% increase in annual production was recorded for both Matua and G.4708 swards receiving N, compared with those sown with white clover, with the annual yield of G.4708 receiving N similar to Matua receiving no N.

Less frequent defoliation increased production of Matua swards by 17% and the Matua component by 38%. Production of Nui in comparison with Matua swards was 14% lower under frequent and 9% lower under infrequent defoliation. Similar production was recorded from red clover under frequent, and infrequent defoliation for both Nui and Matua swards. A 48% lower yield of white clover occurred under infrequent defoliation of Matua swards.

At Masterton a higher incidence of goitre in newborn lambs, accompanied by a 12% lower lamb liveweight at weaning, occurred on Matua- compared with Ariki-based swards.

Aspects of seasonal production, fertility response, management, and animal health are discussed.

INTRODUCTION

Prairie grass has been used in New Zealand for many years, though no New Zealand cultivar was available before 1973. 'Grasslands Matua' (*Bromus catharticus*) was the first prairie grass cultivar selected and bred for New Zealand conditions. It was released as being reliable in type and having agronomic merit on high fertility farms under a rotational grazing system and lax defoliation (Rumball, 1971).

*Respectively at Hawera, Palmerston North, Pahnerston North, Hawcra, Masterton and Flock House.

This paper presents results of field trials conducted in the southern North Island on aspects of seasonal production, fertility responses, management, and animal health aspects of Matua prairie grass in comparison with some perennial ryegrasses.

EXPERIMENTAL

For the purpose of this paper the performance of Matua in comparison with ryegrass standards has been extracted from more complicated field studies.

EXPERIMENT 1

This small plot trial was sown on May 8, 1973, at the Waimate West Demonstration Farm, South Taranaki. It compared Matua with G.4708 tetraploid Ariki ryegrass under a mowing, clippings removed regime. Each grass was either sown with white clover or given artificial nitrogen (400 kg/ha/yr), and mown at approximately monthly intervals to 3 cm.

EXPERIMENT 2

This small plot trial laid down at Flock House, Bulls, in spring 1976 compared Matua with Nui ryegrass, both sown with red clover. Two management regimes were imposed: either cut to a stubble height of 3 cm with clippings removed when the ryegrass reached 700 to 800 kg/ha DM (frequent) or 1200 to 1400 kg/ha DM (infrequent).

These cutting frequencies averaged 28 and 46 days between cuts. Basal phosphate and potassium fertilizer was applied and nitrogen (N) returned at a rate of 2% of DM removed.

EXPERIMENT 3

This grazing trial was sown at the Masterton Field Research Area, on April 4, 1974, on to an area which had built up a number of contrasting fertility regimes under a phosphate X lime trial. Matua and Ariki ryegrasses were sown on to areas with two residual pH levels (5.5 and 6.5) and two residual soil phosphate levels (Truog 7 and 15).

Each grass species was grazed by breeding ewes which remained on the same grass species throughout the trial. Paddocks were grazed under a rotational grazing system at an average stocking rate of 16 ewes/ha, rising to 22 ewes/ha during peak pasture growth periods. The average rotation length was 34 days

TABLE 1: SEASONAL PRODUCTION OF MATUA PRAIRIE GRASS AND RYEGRASSES
(percentage response (+) or depression (—) of Matua compared with total production (kg/ha) of ryegrass)

	Year	Autumn	Winter	Spring	Summer	Trial Total
Waimate West:						
G.4708	1973-4	—	—	6120	2180	
Matua		—	—	+ 2n.s.	+ 35**	
G.4708	1974-5	990	1660	4590	2230	17 770
Matua		+ 13n.s.	+ 19*	+ 25**	+ 40**	+ 19**
Flock House:						
Nui	1976-7	—	890	4460	"3000	8 350
Matua		—	+ 40**	— 3n.s.	+ 30**	+ 13**
					"part sumtner	
Masterton:						
Ariki	1975-6	—	—	4390	2780	
Matua		—	—	+ 21n.s.	— 5n.s.	
Ariki	1976-7	930	2200	6150	2790	19 240
Matua		— 37n.s.	— 52*	-5n.s.	+ 25**	— 3n.s.

*$P < 0.05$. **$P < 0.01$. n.s. not significant.

with stock remaining on each paddock 4 days. Sward production was measured by clipping quadrats before and after grazing.

RESULTS AND DISCUSSION

TOTAL DRY MATTER PRODUCTION

In the Waimate West and Flock House trials (Table 1), Matua-based swards out-yielded ryegrass swards by 19 and 13%, the mean contribution of the Matua component being 78 and 60%, respectively.

At Masterton no overall difference in total yield was recorded between Ariki and Matua swards (Table 1), with no effect from different phosphate levels. Ariki gave no response to the higher pH but Matua swards responded by 21% (this just failed to reach significance ($P < 0.05$). Overall Matua contributed only 36% of the total dry matter. A possible reason was the low seeding rate (20 kg/ha), resulting in low plant numbers established. Volunteer ryegrass was the major component contributing to production.

At Waimate West and Flock House total production of the Matua-based swards during winter was 19 and 40% higher than ryegrass-based swards, respectively. This was in contrast to the Masterton trial where winter production was significantly lower ($p < 0.01$). With the exception of the first year of the Master-

ton trial, summer production of Matua-based swards was consistently higher than ryegrass swards, with a 25% increase over all trials and seasons.

MANAGEMENT ASPECTS

Nitrogen

The ability of Matua swards to produce high dry matter yields in the absence of fertilizer N is highlighted in Table 2. Total dry matter over the period autumn 1974 to summer 1974-5 was similar for G.4708 swards receiving N and no N Matua swards. The nitrogen response for both G.4708 and Matua swards was 31 %. Roth species showed no response to N in autumn, during a drought, but large responses occurred in winter and spring. In summer Matua gave a 12% response to N with G.4708 swards depressed by 19%. Over the period autumn 1974 to summer 1974-5 the response to N was 8 kg DM/kg N for Matua swards and 6.4 kg DM/kg N for G.4708 swards. From winter 1974 to summer 1974-5 the response in the Matua and ryegrass components to N was 54 and 63%, respectively. Over the same period the yield of white clover in no N treatments was 40% lower in Matua than G.4708 swards, with significant depressions ($P < 0.01$) occurring in spring and summer.

Frequency of Defoliation

Less frequent defoliation increased production of Matua swards by 17% and the Matua component by 38% from April to early January (Table 3). Total production of Nui swards cut at similar frequencies was 14% lower under frequent and 9% lower under infrequent defoliation.

The production of volunteer white clover in the Matua sward was 48% lower under infrequent than frequent defoliation. Little difference occurred in Nui swards. The increase in the Matua component under infrequent defoliation was at the expense of the white clover. Red clover production increases at infrequent defoliation were similar for both species.

Animal Health

Prairie grass contains low levels of several major and minor elements. The magnesium concentration of Matua at Waimate West sampled in late winter (28/8/74) was significantly ($P <$

TABLE 2: THE EFFECT OF NITROGEN — WAIMATE WEST
(kg/ha)

	*Autumn 1974**	*Winter 1974*			Spring 1974			Summer *1974-5*		
	Total	*Sown spp.*	*White Cl.*	*Total*	*Sown spp.*	*White Cl.*	*Total*	*Sown spp.*	*White Cl.*	*Total*
Ryegrass:										
No N	960 a†	970 cC	40 a	1080 cC	2270 cC	1070 aA	3690 dD	710 dC	1470 aA	2470 cB
N	1030 a†	2110 aA	10 a	2250 aA	5300 aA	40 cC	5490 bB	1710 bB	70 cC	2000 dC
% Response	+ 7	+ 118	— 75	+ 108	+ 133	— 96	+ 49	+ 141	- 9 5	— 19
Matua:										
No N	1110 a	1460 bB	30 a	1600 bB	3560 bB	630 bB	4700 cC	1480 cB	900 bB	2950 bA
N	1130a	2170 aA	20 a	2340 aA	5510 a.4	40 cC	6780 aA	2940 aA	100 cC	3300 aA
% Response	+ 2	+ 49	- 3 3	+ 46	+ 55	— 94	+ 44	+ 99	— 89	+ 12

*No herbage dissection.

†Figures in columns without a common letter differ significantly at the 5% (lower case) or 1% (upper case) level of significance (Duncan's Muliple Range Test).

TABLE 3: EFFECT OF FREQUENCY OF DEFOLIATION — FLOCK HOUSE (kg/ha)

	Sown spp.	*While Clover*	*Red Clover*	*Total*
Nui:				
Frequent	3980	1280	1110	7390
Infrequent	5140	1400	1880	9300
% Response	+ 29	+ 9	+ 69	+ 26
Matua:				
Frequent	4691	1470	1160	8690
Infrequent	6490	760	1710	10210
% Response	+ 38	- 4 s	+ 47	+ 17
MSD (5%)	916	826	673	1186

0.01) lower than in G.4708 (0 168 *vs* 0.189% dry matter), although considerably higher than levels reported by Rumball et al. (1972). This may be a reflection of the high soil magnesium status of the Waimate West site (quick test Mg of 13). Despite the lower magnesium levels in Matua, there is no evidence that it is associated with a higher incidence of clinical hypomagnesaemia in dairy cows. This indicates that magnesium in prairie grass may be more readily available to animals than magnesium from perennial ryegrasses as suggested by Wilson (1977) or that magnesium requirements are met by higher dry matter intakes of prairie grass.

Iodine concentrations in prairie grass are lower than reported for other species. Iodine contents of Matua parent lines 8 and 9 (Matua being derived from 18 plants of line 8 and 4 plants of line 9 (Rumball, 1974) was 0.09 ppm, similar to other commercially available prairie grass lines but 45% lower than Paroa (Rumball *et al.*, 1972). In the second year of the Masterton trial, a 46% (% of lambs born dead or alive) incidence of goitre occurred in newborn lambs from ewes on Matua-based swards compared with no incidence on Ariki-based swards. At weaning in early December, lambs born and reared on Matua-based swards had a significantly ($P < 0.05$) lower liveweight than lambs born and reared on Ariki-based swards (22.00 vs 24.58 kg). Healy et al. (1972) showed that soil ingestion was an important source of iodine and suggested residual dry matter after grazing as a factor influencing soil ingestion. Residual dry matter recorded over the winter of the second year was 680 and 1040 kg/ha for Ariki and Matua swards, respectively, suggesting that the higher residual dry matter resulted in lower soil

ingestion of iodine, and this, combined with the lower iodine concentration in prairie grass, precipitated an outbreak of goitre. In practice the deficiency would be overcome by the use of iodine-containing licks or by dosing stock with potassium iodide (Whitten, 197 1).

CONCLUSIONS

Prairie grass is known for its winter growth and this has been maintained in Matua with up to 40% more winter production recorded than from perennial ryegrass. However, most of its increase in annual dry matter production was contributed during summer, with increases of up to 40% being obtained. The increases in dry matter production over summer and- winter should ensure a future for Matua under dairying, and the potential for Matua on sheep and beef farms managed under a rotational grazing system and lax defoliation should not be overlooked.

The response to high pH of Matua swards at Masterton indicates that the application of lime may be of benefit. This was supported by a dairy cow grazing trial in Taranaki where the performance of limed and non-limed pastures was compared at two stocking rates. Seventy percent more prairie grass was observed on areas that had received lime.

The significantly greater dry matter production in the presence of clover and a greater response to nitrogen than tetraploid Ariki ryegrass suggests that in the short term Matua may use nitrogen more efficiently than ryegrass. In the longer term the significant reduction in white clover growth under infrequent defoliation may result in nitrogen limiting growth. This reduction in clover growth may be partly overcome by the use of red clover in combination with more erect type white clovers such as 'Grasslands Pitau' or 'Ladino'. The strategic use of nitrogen in winter and spring, periods of greatest response, should also be considered.

Matua appears to be most productive when sown as the sole grass species, at adequate seeding rates, in combination with red and possibly erect white clovers. Grazing on a long rotation with strategic winter and spring N applications will ensure substantially higher yields than from ryegrass/white clover pastures. Matua should be considered as a special-purpose pasture and to achieve its potential be managed as such, including a much more lax defoliation than for ryegrass.

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