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Effect of grazing frequency by dairy cows on herb based pastures

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Introduction

Herbage production and quality of perennial ryegrass pastures is often limited over the summer months (Powell *et al.* 2007). Chicory (*Cichorium intybus* L.) and narrow-leaf plantain (*Plantago lanceolata* L.) are perennial herbs that accumulate high herbage masses during late spring and summer (Powell *et al.* 2007; Li and Kemp 2005). These perennial herbs are being used by farmers to supplement dairy cows over summer. However, there have been many cases of poor plant persistence with current management practices. The aim of this research was to determine the effect of two grazing frequencies (GF; 2 weeks and 4 weeks) on the herbage production and persistence of pure swards of chicory, plantain and a herb-clover mix (chicory, plantain, red and white clover) over a single growing season.

Methods

Herbs pastures and grazing management

A grazing trial was conducted on No 1 Dairy farm, Massey University, Palmerston North, New Zealand from October 2011 to June 2012. Chicory (*Cichorium intybus* L.) cultivar 'Choice', plantain (*Plantago lanceolata* L.) cultivar 'Tonic' and a herb-clover mix [chicory, plantain, red clover (*Trifolium pratense* L.) cultivar 'Sensation', and white clover (*T. repens* L.) cultivar 'Emerald and Bounty'] were evaluated at two different grazing frequencies, every two and four weeks. The herb pastures were sown on 10 October 2011 in plots with an area of ≈ 300 m² (11.5 by 26 m) using a randomized complete block (five replicates) design with a factorial arrangement of the pastures. The pastures were grazed from December 2011 to June 2012 with lactating dairy cows immediately after the morning milking, with cows then removed when the sward height was between 7 and 10 cm.

Herbage measurements

Herbage mass samples were taken pre and post grazing by cutting to ground level two (0.1m²) quadrants per plot and oven-dried for 48 h at 80°C. Botanical composition samples were taken at the beginning (December), at the middle (March) and at the end of the grazing season (May) by cutting a strip besides each quadrant where pre grazing samples were taken. Plant density of the swards was evaluated at the beginning (December) and at the end

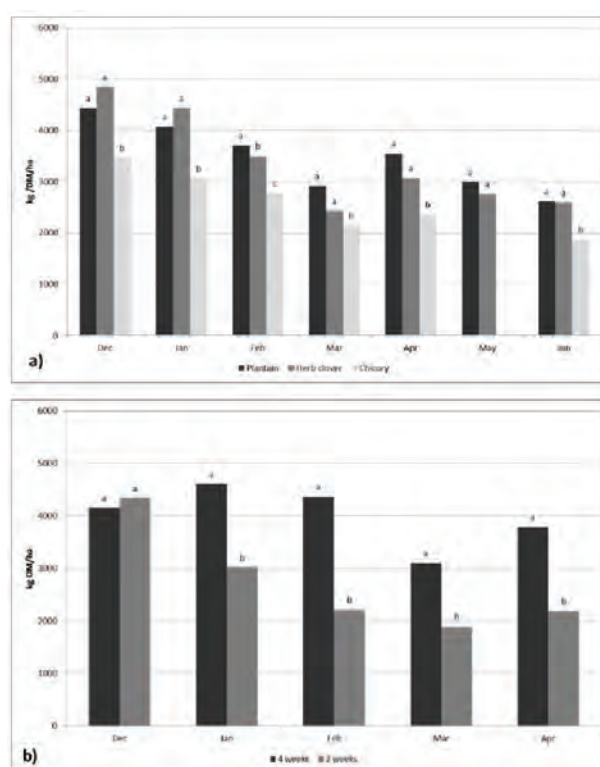


Figure 1. Herbage mass pre grazing (Kg DM/ha) for herb pasture (a) and grazing frequency (b).

(May) of the grazing season by digging up two randomly selected areas (0.04m²) in each plot.

Results

The herb-clover mix (12.1 ± 2.8 t/ha) and plantain (11.3 ± 1.7 t/ha) yield more ($P \leq 0.01$) than chicory (9.2 ± 1.3 t/ha) regardless of grazing frequency. However, herbage mass at every grazing was affected by both herb treatment and grazing frequency (Fig. 1). Plantain and herb-clover mix pastures produced greater ($P \leq 0.01$) herbage mass than chicory. Herbage mass was higher ($P \leq 0.01$) grazing every 4-weeks compared to 2-weeks. Plant density (Table 1) in the swards was not affected ($P > 0.05$) by grazing frequency; however, the proportion (Table 2) of chicory and plantain declined more with grazing every 2-weeks compared to 4-weeks. All herb treatments persisted in the first year regardless of grazing management. The herb treatments will be monitored to evaluate how they recover in their second year.

Table 1. Plant density (plants/m²) for the sown species in the pastures at the beginning (December, 2011) and at the end (May, 2012) of the grazing season. Values are mean \pm SD, n=10.

Date	2 weeks			4 weeks		
	Chicory	Plantain	Herb/clover (chicory/plantain)	Chicory	Plantain	Herb/clover (chicory/plantain)
Dec	215 \pm 138	180 \pm 118	188 \pm 87/ 235 \pm 109	180 \pm 118	453 \pm 360	125 \pm 73/ 280 \pm 221
May	233 \pm 177	148 \pm 97	140 \pm 93/ 338 \pm 138	148 \pm 97	460 \pm 114	68 \pm 41/ 323 \pm 107

Table 2. Proportion (%) of the sown species in the pastures. Values are mean \pm SD; n=10.

Sown Species	2 weeks			4 weeks			
	Dec	Mar	May	Dec	Mar	May	
Pure swards	Chicory	46.8 \pm 16.7	34.1 \pm 8.4	34.3 \pm 13.2	51.6 \pm 10.1	55.9 \pm 14.4	54.2 \pm 16.9
	Plantain	73.4 \pm 7.7	49.0 \pm 10.3	36.3 \pm 10.1	75.4 \pm 10.8	63.3 \pm 10.7	53.1 \pm 11.7
herb clover mix	Chicory	29.4 \pm 15.2	8.4 \pm 6.3	11.9 \pm 9.8	27.1 \pm 13.7	26.1 \pm 16.7	8.4 \pm 6.3
	Plantain	33.4 \pm 11.6	38.9 \pm 11.9	53.9 \pm 9.1	40.1 \pm 12.6	32.8 \pm 14.0	42.8 \pm 11.9
	White clover	11.0 \pm 8.0	19.1 \pm 11.7	14.9 \pm 10.2	9.0 \pm 5.9	6.4 \pm 5.7	3.7 \pm 3.3
	Red clover	8.0 \pm 5.1	6.3 \pm 6.9	4.2 \pm 3.9	8.2 \pm 4.5	13.7 \pm 11.8	13.2 \pm 3.4

Conclusion

Plantain produced more herbage than chicory over the growing season, and the herb and clover mix production was intermediate. Total herbage accumulation over the growing season for chicory and plantain was similar under 2 and 4 week grazing frequency. For the herb and clover mix the 2 week frequency out-produced the 4 week frequency.

Acknowledgements

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