Pasture characteristics of irrigated dairy farms in northern Victoria

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Abstract

A survey was conducted on 10 irrigated dairy farms in northern Victoria in October, January and April of the 1998/99 lactation to determine whether pasture characteristics were related to the quantity of pasture consumed. Pasture consumption averaged 8.3 t DM/ha/yr on the 5 low, and 12.3 t DM/ha/yr on the 5 high, pasture consumption farms. From October to April, there were declines in the ryegrass plant frequency (from 95 to 80%), the ryegrass tiller density (from 5,400 to 3,100 tillers/m^2), and the proportion of sown species (from 66 to 30% DM), while there were increases in the paspalum tiller density (from 400 to 680 tillers/m^2) and the proportion of volunteer species (from 9 to 36% DM). Regression analysis showed that pasture consumption was positively related to both ryegrass frequency in January and to paspalum tiller density in January (R^2=68%), and that both DM digestibility and crude protein were positively related to pasture consumption.

KEY WORDS

Tiller density, pasture production, botanical composition, crude protein, DM digestibility.

INTRODUCTION

Perennial pastures that are used for dairy production in the irrigated region of northern Victoria are based on perennial ryegrass and white clover, but are invaded, and often dominated, by paspalum and summer active weeds. A high ryegrass content is crucial to optimising pasture growth and nutritive characteristics in the cooler months. There has, however, been no systematic characterisation of pastures on irrigated dairy farms, or whether these characteristics are related to the quantity of pasture consumed.

MATERIALS AND METHODS

A survey was conducted on 10 irrigated dairy farms in northern Victoria in October, January and April of the 1998/99 lactation. Pasture consumption (t DM/ha/yr) from the milking area was estimated on a whole farm basis for the 1998/99 season (1) and averaged 8.3 t DM/ha/yr on the 5 low, and 12.3 t DM/ha/yr on the 5 high, pasture consumption farms. Stocking rates averaged 2.7 cows/ha on the 5 low, and 3.7 cows/ha on the 5 high, pasture consumption farms. Supplementary feeding levels were the same for both groups of farms (1.7 t DM/cow/yr). Pasture measurements were taken on the same transect at each of the 3 sampling times, in 10 paddocks on each farm. Botanical composition and nutritive value samples were taken to ground level using hand shears. Sward structure was determined by taking fifteen 92 mm diameter cores, sorting into species, and counting tillers and growing points. Ryegrass plant frequency was determined 5 times in each paddock using a 1 x 1m quadrat (3).

RESULTS and discussion

The sward structure changed over time, with a 40% decline in the ryegrass, and a 60% increase in the paspalum, tiller densities, from October to April (Table 1). This reduction in the ryegrass tiller density from spring to autumn is consistent with other observations in northern Victoria (2). While there was no change in the average white clover growing point density from October to April, there were changes in growing point density on individual farms, which ranged from a 50% increase to a 60% decrease.

Table 1. Main effect of time of year on sward structure.

Sampling time	Ryegrass frequency	Tiller or growing point density (# / m^2)			
	(% quadrats with ryegrass)	Ryegrass	Clover	Paspalum	Other
October	95	5400	820	400	1070
January	86	4700	820	600	1580
April	80	3080	690	680	2400
l.s.d. (*P*=0.05)	4.0	888	227	139	599

From October to January, the proportion of perennial ryegrass and white clover halved, while that of paspalum and other species doubled, with little further change in composition from January to April (Table 2). Pasture height was greatest in January, and *in vitro* DM digestibility (DMD) and crude protein (CP) were greatest in October. The pasture consumption level affected some pasture characteristics, with the paspalum content in January (26 vs. 8 %DM; $P<0.05$) and the CP content (average of 3 sampling times) (15.5 vs. 13.9 %DM; $P<0.05$) being higher, and the other content (average of 3 sampling times) being lower (11 vs. 17 %DM; $P<0.05$), on the high, than on the low, pasture consumption farms.

Table 2. Main effect of time of year on pre-grazing pasture characteristics.

Sampling time	Botanical composition (%DM)					Pasture height	*in vitro* DMD	Crude protein
	Ryegrass	Clover	Paspalum	Other	Dead	(mm)	(%DM)	(%DM)
October	50	17	3	6	25	80	80	16.6
January	22	7	17	18	36	95	68	14.1
April	24	6	18	18	34	72	71	13.5
l.s.d. (*P*=0.05)	6.6	4.9	6.3	6.3	7.2	12.5	2.8	1.94

There were a number of differences between low and high pasture consumption farms in the pasture on offer. Together they suggest that a smaller proportion of the grown herbage was consumed on the low, than on the high, pasture consumption farms. Thus the pasture height was 20 mm greater in October and January, and the dead content was 8% units greater in January, on the low, than on the high pasture consumption farms. Furthermore, pasture allowance was lower on the farms consuming in excess of 12 t DM/ha/year of pasture, than on the farms consuming less that this (25 to 35 vs. 40 to 80 kg DM/cow/day). Therefore, increases in stocking rate, or a reduction in supplement use when pasture allowances are high, may be means by which pasture consumption could be increased on the low pasture consumption farms.

The nutritive value of the pasture on offer increased with the quantity of pasture consumed, with a higher CP content for the high, than for the low, pasture consumption farms. Furthermore, regression analysis showed increases in the DMD, of 0.34% units, and in the CP (% DM), of 0.29% units, for every 1 t DM/ha/yr increase in pasture consumption. This increase in nutritive value is consistent with research (2) showing that the CP and DMD of the pasture on offer increases as the residual pasture mass is reduced.

Regression analysis of pasture consumption against the components of sward structure (Table 1) showed that pasture consumption (PC; t DM/ha/yr) was related to both paspalum tiller density in January (PdJ; tillers/m^2) and to ryegrass plant frequency in January (RfJ; % quadrats), according to the equation:

PC = -16.5 (?7.2) + 0.006 (?0.002) PdJ + 0.27 (?0.08) RfJ

($100R^2$=68.0; r.s.d.=1.52; c.v.=14.8%; *P*=0.018)

Inclusion of other sward structure components did not improve the proportion of variation accounted for. Having a high density of both paspalum and ryegrass would enable the pastures on the high pasture consumption farms to be relatively productive throughout the entire year. Pastures with a high density of either paspalum or ryegrass, but not both, are likely to suffer a reduction in total annual pasture growth.

Conclusions

The results of the survey suggest that pasture consumption could be increased on some farms though improved utilisation of pasture that is already being grown, and that a high density of both paspalum and perennial ryegrass may be necessary in order to achieve high annual pasture consumption.

ACKNOWLEDGEMENTS

Funding was provided by the Department of Natural Resources and Environment, and the Dairy Research and Development Corporation through Murray Dairy.

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