MILK YIELD RESPONSES TO STOCKING RATE AND IRRIGATION FREQUENCY FOR COWS GRAZING A TROPICAL GRASS PASTURE

W.K.EHRLICH and R.T. COWAN

Australian Tropical Dairy Institute, Dept of Primary Industries, Mutdapilly Research Station, MS 825 Peak Crossing, Qld 4306

Pasture systems in sub-tropical dairy areas are characterised by decreasing pasture quality and milk yield during autumn. Previous experiments had shown that irrigated tropical grasses could sustain stocking rates up to 4.3 cows/ha during autumn (Ehrlich *et al.* 1994). This experiment measured the effect of further increasing the stocking rate as well as reducing the irrigation frequency. Callide Rhodes grass (*Chloris gayana* cv. Callide) pasture, established 11 years previously, was divided into two replicate areas, which was subdivided into 0.57 ha paddocks. Paddocks were divided into three equal areas to give a six week rotation, with grazing for one week and resting for five weeks. These paddocks were allocated to the four treatments: (i) 3.5 cows/ha (3.5), (ii) 5.25 cows/ha (5.25), (iii) 6.1 cows/ha (6.1) and (iv) 3.5 cows/ha with half the irrigation frequency (3.5H). Twenty one Holstein-Friesian cows and heifers calving in October and November were blocked on milk yield during December and allocated at random to a non orthogonal design using 4, 6, 7 and 4 cows respectively. All pastures received 300 kg N/ha over the season and were irrigated fortnightly except for treatment 3.5H which was irrigated monthly. Mulching to 10 cm was used to precondition the pastures from October and every 6 weeks thereafter. Cows entered the experiment on 4 January 1995 and grazed the respective treatments for 18 weeks. Cows received 5 kg of concentrate daily. Milk yield was recorded at two consecutive milkings each week and liveweight was recorded fortnightly after morning milking. Pasture on offer and residual pasture was measured weekly. Yield of total pasture on offer, leaf and stem decreased as stocking rate increased (Table 1). Leaf and stem proportions were not altered by treatment. Pasture residues were lower at higher stocking rates. Treatment 3.5 had lower postgrazing leaf yield and higher postgrazing stem yield than other treatments. The effect of half irrigation on pasture growth was evident in February and thereafter, whereas milk yield was not affected until April.

Table 1. Mean pre and post grazing pasture yield, apparent daily leaf utilisation (UTLN), liveweight (LW) loss and daily milk yield for the pasture treatments over 18 weeks

Treatment	Pregrazing		Postgrazing		Apparent	LW	Milk yield
	Leaf (DMkg/ha)	Stem (DMkg/ha)	Leaf (DMkg/ha)	Stem (DMkg/ha)	UTLN (kg/cow)	loss (kg/cow)	(kg/cow)
3.5H	2098^{ab}	1519^{b}	1656^{b}	1558^{b}	8.9^{bc}	n.s.	14.2^{a}
3.5	2153^{b}	1476^{ab}	1079^{a}	1581^{b}	10.6^{c}	15**	15.3^{ab}
5.25	1947^{ab}	1309^{ab}	1276^{ab}	1256^{ab}	7.7^{ab}	28**	17.3^{b}
6.1	1811^{a}	1109^{a}	1029^{a}	1065^{a}	6.5^{a}	43**	17.4^{b}
l.s.d.(P=0.05)	314	337	459	426	2.1	-	2.1

Means in the same column not followed by the same letter are different ($P < 0.05$)
Significance of quadratic curvilinear regression: ** $P<0.01$; n.s. $P>0.05$

Pasture regrowth rates were similar for the different treatments throughout the experiment, indicating the growth rate of grass was not adversely affected by the high stocking rates. Cows lost more liveweight as stocking rates increased but milk production was maintained. Sixty percent of the apparent milk yield difference could be accounted for by energy released in body tissue. Using leaf growth of 42 kg/ha/day from a previous experiment utilisation of leaf approached 100% at 6.1 cows/ha compared with 86% at 3.5 cows/ha. Milk production was only affected by half irrigation when no significant rainfall was received for six weeks. Further increases in productivity are unlikely due to the limits of leaf growth. At these high stocking rates cows require substantial supplementary feed to avoid large liveweight losses.

EHRLICH, W.K., COWAN, R.T., ROMANO, D.A., CROUCH, D.A. and LOWE, K.F. (1994). *Proc. Aust. Soc. Anim. Prod.* **20**, 379.