Responses of irrigated pasture nutritive characteristics to summer nitrogen fertiliser

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Introduction Low summer rainfall in southwest Victoria, Australia, restricts pasture growth and reduces pasture nutritive value thereby limiting potential milk production. One fifth of dairy farmers in the region have some capacity to irrigate during summer and nitrogen (N) fertiliser is used to enhance pasture dry matter (DM) yield. Data on the effects of N fertiliser on irrigated pasture nutritive characteristics during summer in southwest Victoria are lacking. Two experiments determined the potential of N fertiliser to improve pasture nutritive (crude protein, CP and metabolisable energy, ME) value during summer.

Materials and methods Experiments ran from mid-October 2003 to the end of April 2004 on commercial farms. Farm 1 (38°28'S, 142°45'E) was under fixed sprinkler irrigation and Farm 2 (38°27'S, 142°42'E) under centre pivot irrigation. Perennial ryegrass dominated (84 to 88%) both experimental sites. Soil tests (0 to 10 cm) in October 2003 revealed: 26 and 28 mg/kg P (Olsen method), 120 and 230 mg/kg K (Skene method), 19 and 24 mg/kg S (CPC method) and $pH_{(water)}$ 6.7 and 6.0 for Farms 1 (dark-grey sandy loam) and 2 (dark brown-grey loam) respectively. Following each grazing 0, 25, 50, 75, and 100 kg N/ha (urea, 46%N) was applied to 12m x 24m plots, replicated three times in a randomised block design. Weekly neutron probe measurements determined irrigation scheduling and quantity. Fifteen pasture samples per plot (each approximately 100 cm^2), to ground level, were taken before each grazing from the 0, 50 and 100 kg N/ha treatments for CP and ME content analysis. While there were nine and seven grazings with N applications for Farms 1 and 2 respectively (McKenzie *et al*. 2005), sampling for ME and CP content was not conducted on the final grazing at either farm. Analysis of variance (GenStat Committee 2000) with significance declared if $P<0.05$ was conducted.

Results For most observations, N applications increased ($P<0.05$) both pasture CP and ME content relative to no N (Table 1). There were generally no additional gains in either CP or ME above those obtained at 50 kg N ha/grazing when 100 kg N/ha/grazing was applied. For both sites, 50 kg N/ha per grazing increased pasture CP and ME content by an average of 5.5 % DM and 0.8 MJ/kg DM, respectively.

Table 1 Effect of nitrogen treatment (kg N/ha per grazing) on pasture crude protein (CP, %DM) and metabolisable energy (ME, MJ/kg DM) content of irrigated dairy pasture during summer for Farms 1 and 2

Farm 1	12/11/03		2/12/03		16/12/03		5/01/04		20/01/04		3/02/04		18/02/04		15/03/04	
Treatment	CP	ME	CP	ME	CP	ME	CP	ME	CP	ME	CP	ME	CP	ME	CP	ME
0	13.5	11.8	11.7	11.0	11.6	10.4	9.1	10.2	16.8	10.6	15.5	10.8	14.3	10.5	14.1	10.4
50	16.3	12.2	18.3	11.7	16.7	11.1	20.6	11.6	22.2	11.3	24.0	11.8	20.7	12.0	20.1	11.4
100	18.9	12.2	21.5	12.2	19.2	11.5	25.1	11.7	22.8	11.1	23.8	12.0	23.0	12.1	24.9	11.8
l.s.d. (P<0.05)	2.89	0.48	4.8	0.67	4.03	0.76	4.76	0.80	3.79	0.73	3.94	0.63	4.60	0.65	5.53	0.65

Farm 2	30/10/03		21/11/03		15/12/03		9/01/04		2/02/04		1/03/04	
Treatment	CP	ME	CP	ME	CP	ME	CP	ME	CP	ME	CP	ME
0	18.3	11.9	21.2	11.6	14.9	10.6	21.4	11.4	18.3	11.5	14.3	10.7
50	26.9	12.2	22.6	11.5	21.1	11.7	23.4	11.9	21.7	12.1	18.9	11.8
100	24.7	12.1	25.0	11.9	20.5	11.6	24.2	11.7	24.0	12.2	25.0	11.9
l.s.d. (P<0.05)	3.34	0.40	3.59	0.52	1.78	0.23	1.70	0.48	4.30	0.65	6.16	0.61

Conclusions Summer pasture CP and ME content can be increased by N fertiliser up to 50 kg/ha per grazing. At 50 kg N/ha/grazing, pasture CP and ME content was increased by an average of 5.5 %DM and 0.8 MJ/kgDM. Together with improved dry matter yield from N use (McKenzie *et al.* 2005), these results have important implications for the feeding of high producing dairy cows during summer when pasture nutritive values are generally low and the purchase of supplements high in CP may not be economical.

References

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