

## THE EFFECT OF A PLANT GROWTH REGULATOR (MEFLUIDIDE) ON PASTURE GROWTH AND MILK PRODUCTION

I.M. BROOKES and C.W. HOLMES  
Department of Animal Science, Massey University, Palmerston North

### Abstract

Nine paddocks (0.85 hectares each) of ryegrass-white clover pasture were divided in half and one half of each paddock **sprayed with** 0.15 kg ai mefluidide per hectare in mid-October. All paddocks were grazed 7-9 days after spraying and then rested for a further 14-20 days. A 7 week grazing trial using 8 pairs of identical twin cows was then conducted. All cows received an equal **herbage** allowance of 40 kg dry matter per head daily. Equal areas were offered to each treatment group and extra cows used to adjust the grazing pressure where necessary.

Mefluidide depressed pasture growth rates by 29% for 3-4 weeks after spraying. Subsequent growth rates did not differ significantly between sprayed (S) and unsprayed (U) pastures. Pasture quality was similar for both treatments in the second round of grazing (late November and early December), but in the third round (mid-December) sprayed pastures were more leafy, less **stemmy**, had higher N concentrations and were more digestible than unsprayed. This was not reflected as differences in the yields of milk, **milkfat** or milk protein between treatments. The net effect of spraying with mefluidide was therefore to decrease the carrying capacity of the sprayed area used in the grazing trials by 76 cow days compared with the equivalent unsprayed area. This would have resulted in the production of approximately 59 kg less **milkfat** from 2.5 ha over a 7 week period.

Keywords: Mefluidide, Embark **2-S**<sup>®</sup>, pasture growth, pasture quality, milk yield, dairy cows, **milkfat**, nutritive value.

### INTRODUCTION

Mefluidide, a plant growth regulator which inhibits **seedhead** formation in temperate grasses (Glenn *et al* 1980), when applied to pastures in late September improved nutritive value and resulted in increases in the liveweight gain of weaned lambs (Gold *et al* 1982). Dairy production can be markedly affected by pasture quality in the late spring and early summer (Holmes & Hoogendoorn, 1983) and methods of maintaining pastures in a vegetative state warrant further inspection. This experiment was designed to examine the effect of spraying pastures with mefluidide in mid-October and monitoring changes in pasture growth rate, nutritive value and milk production from cows grazing the pastures during the ensuing two months.

### MATERIALS AND METHODS

The trial was conducted at the Massey University Dairy Cattle Research Unit using nine paddocks (average area = 0.85 ha) of perennial ryegrass-white clover pasture. Each paddock was divided in half and one half sprayed with 0.15 kg active ingredient per hectare mefluidide (Embark **2-S**<sup>®</sup>, ICI Tasman Ltd) between October 12 and October 21 1983. The paddocks had been grazed by dairy cows 3-4 days prior to spraying and were **regrazed** 7-9 days after spraying. A grazing trial was initiated on November 3, 1983, 14-20 days after the regrazing.

Eight pairs of identical twin cows of mixed Jersey and Friesian breeding and mixed age were allocated so that pair mates grazed either the sprayed (S) or unsprayed (U) pasture. The cows had been in milk  $73 \pm 4$  days (Mean  $\pm$  SE) and had produced  $0.83 \pm 0.04$  kg milk fat per cow daily prior to the start of the trial. The two treatment groups were offered equal areas of pasture daily, and where necessary extra stock were included in the grazing groups to ensure all cows received an equal allowance of approximately 40 kg herbage dry matter (DM) per day. The trial continued until December 22, a period of 7 weeks. The arrangement of the grazing schedule is shown in Table 1. Herbage mass (kg DM/ha) was measured in both halves of each paddock before spraying, and before and after each grazing, using a rising plate pasture meter (Earle & McGowan, 1979). The meter was calibrated weekly by cutting, washing and drying 20 quadrats per paddock both before and after grazing. Pasture growth rates were estimated from changes in herbage mass.

Table 1: ALLOCATION OF PADDOCKS AND COWS TO PASTURES SPRAYED WITH MEFLUIDIDE (S) AND TO UNSPRAYED PASTURES (U).

	No. of paddocks grazed	No. of cows in grazing groups	
		S	U
<b>1 st grazing round</b>			
3-18 November	6	8	12
<b>2nd grazing round</b>			
18-24 November	2	8	10
24-28 November	1.3	9	10
28 November - 9 December	3.7	8	8
	7		
<b>3rd grazing round</b>			
9-22 December	4	8	8

Samples of herbage were taken prior to the second and third grazings by the treatment groups during late November and December. The proportions of grass leaf, grass stem and clover in each sample was determined. Total nitrogen concentrations were determined by Kjeldahl analysis and in vitro organic matter digestibility (DOMD) by the procedure of Roughan & Holland (1977).

Table 2: PASTURE GROWTH RATES (kg DM/ha daily) OF PASTURES SPRAYED WITH MEFLUIDIDE (S) COMPARED WITH UNSPRAYED PASTURES (U).

Period	Interval (days)	Pasture Growth Rates		SED
		S	U	
Between spraying and regrazing	7-9	19	43	8*
Between regrazing and start of grazing trial	14-20	80	105	3***
<b>During grazing trial</b>				
Between 1st and 2nd grazings	8-17	35	44	6 NS
Between 2nd and 3rd grazings	9-18	16	36	7 NS

NS Means not significantly different ( $P > 0.05$ )

● , \* \*\* Means significantly different at  $P < 0.05$  and  $P < 0.001$  respectively

The milk yields and concentrations of milkfat and milk protein for each cow were determined on three days per week during a preliminary period prior to the grazing trial and throughout the trial itself. Cow live weights and body condition scores were assessed at the beginning and end of the grazing trial. Preliminary period data were used as covariates to adjust treatment means.

Table 3: COMPOSITION OF HERBAGE SAMPLES FROM PASTURES SPRAYED WITH MEFLUIDIDE (S) COMPARED WITH UNSPRAYED PASTURES (U).

	Second round of Grazing Trial (40-49 days post-spraying)			Third round of Grazing Trial (58-68 days post-spraying)		
	S	U	SED	S	U	SED
<b>Pasture Components</b> (% dry weight)						
Grass Stem	30.9	38.7	3.1 NS	23.4	38.3	4.6 *
Grass Leaf	57.0	50.4	4.9 NS	61.4	50.0	1.6 **
Clover	11.4	9.5	4.0 NS	15.1	11.7	3.9 NS
N Concentration (g/kgDM)	34.3	37.7	3.0 NS	40.1	32.7	1.9 *
In vitro DOMD (%)	77.9	78.2	0.6 NS	77.6	74.8	0.4 **

NS Means not significantly different ( $P>0.05$ )

● , . \* Means significantly different at  $P<0.05$  and  $P<0.01$  respectively

Table 4: MEAN LIVE WEIGHTS, BODY CONDITION SCORES AND MILK PRODUCTION DATA FROM COWS GRAZING PASTURES SPRAYED WITH MEFLUIDIDE (S) COMPARED WITH UNSPRAYED PASTURES (U).

	Mean values for grazing trial (November 3 – December 22)		
	S	U	SED
<b>Live Weight (kg)</b>			
Initial	423	423	5 NS
Final	389	386	6 NS
<b>Body Condition Score</b>			
Initial	4.85	5.01	0.11 NS
Final	4.86	4.90	0.13 NS
<b>Milk Production</b>			
Milk yield (kg/d)	16.1	15.8	0.3 NS
Milk fat concentration (%)	4.89	5.02	0.06 NS
Milk fat yield (kg/d)	0.78	0.78	0.02 NS
Milk protein concentration (%)	3.82	3.66	0.05 NS
Milk protein yield (kg/d)	0.61	0.59	0.01 NS

NS Means not significantly different ( $P>0.05$ )

## RESULTS

Mefluidide significantly reduced pasture growth rate in the first 3-4 weeks after spraying (Table 2). During the period of the grazing trial, growth rates on the sprayed

and unsprayed areas were not significantly different. The composition of the **herbage** samples taken during the second and third rounds of the grazing trial is shown in Table 3. There were no significant differences between sprayed and unsprayed pastures during the second grazing round, but in mid-December during the third round, the sprayed pastures contained a significantly higher proportion of grass leaf, a lower proportion of grass stem, and higher nitrogen and DOMD concentrations than unsprayed pastures.

Milk production from cows grazing sprayed and unsprayed pastures is shown in Table 4 and Figure 1. Mean live weights and body condition scores of the treatment groups are also included in Table 4. Spraying pastures with mefluidide had no significant effect on milk production, liveweight gain or body condition score change at any stage during the grazing trial.

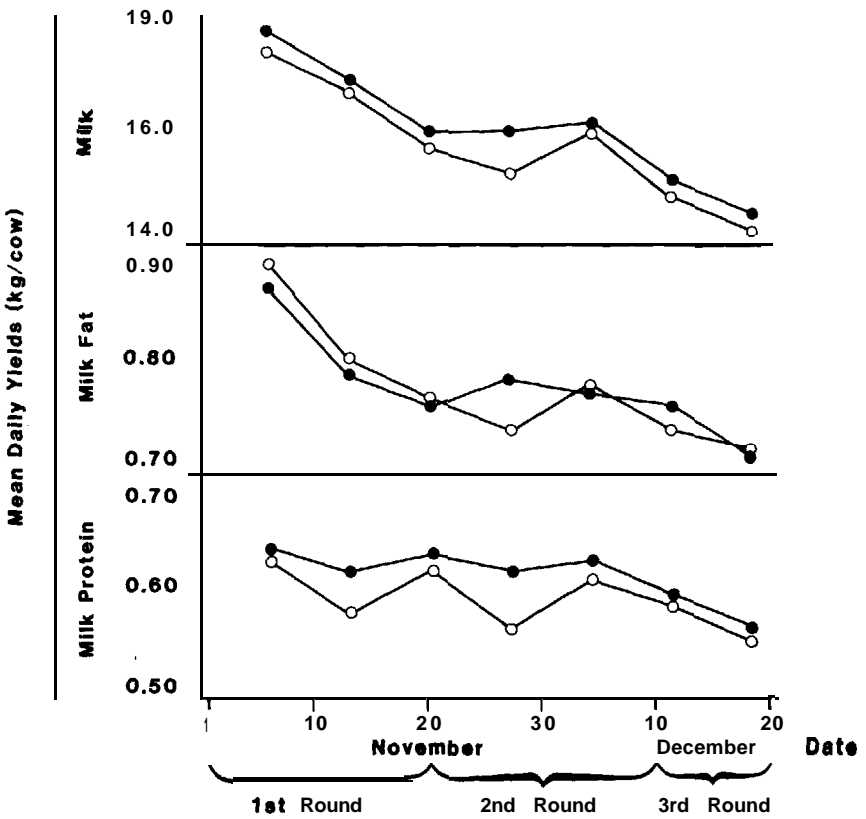


Figure 1: Mean adjusted daily yields of milk, milk fat and milk protein from cows grazing pastures sprayed with mefluidide (● -- ●) and unsprayed pastures (o-o).

### DISCUSSION

Spraying pastures with mefluidide decreased pasture growth by approximately 29% during the period between spraying and the start of the grazing trials some 3-4 weeks later. The net result of these depressed growth rates was that less pasture was present on the sprayed areas at the start of the grazing trial. The two treatment groups of cows were each offered the same daily allowance of **herbage** DM because

in practice, the farmer is likely to use this as the criterion on which to base the area allocated to the herd each day. In order to simplify grazing management, equal areas were offered to the treatment groups daily and extra cows included where necessary to adjust the grazing pressure. This resulted in an extra 76 cow grazing days on the unsprayed pastures during the period from November 3 to November 28. If the extra cows had not been included, the **herbage** allowances to each group would necessarily have been different and would have resulted in either an underfeeding of cows in group S or an accumulation of **herbage** in group U.

Pasture quality, as determined by proportions of grass leaf and grass stem, nitrogen concentration and in vitro DOMD, was significantly improved, by spraying with mefluidide, during the third grazing round of the trial in December. The sprayed pastures were leafier and contained less stem. Nevertheless, this was not reflected in increased yields of milk per cow, at this or any other stage of the trial. There was a suggestion that perhaps the stemmier nature of the unsprayed pastures did lead to an increased **milkfat** concentration, but the differences were not significant.

The net effect of the decrease in cow grazing days from the sprayed area, coupled with the failure to increase per cow production, was that approximately 59 kg less **milkfat** were produced over the period by cows grazing 2.5 ha of sprayed pasture, compared with an equal area of unsprayed pasture. The reason cows in group S did not show increased production per head may be related to the date of spraying. The increased lamb liveweight gain observed by **Goold et al** (1982) occurred following spraying in late September. However, spraying earlier than mid-October on highly stocked dairy farms may not be desirable, if the depression in growth rates was to occur at a time when the farm may still be facing a potential feed shortage due to high feed requirements and relatively slow spring growth rates.

It must therefore be concluded that the benefits of pasture control on a highly stocked dairy farm may be more easily achieved by methods other than spraying with mefluidide. Nevertheless, the spray may be useful in situations where stocking rates are relatively low and pasture conservation is difficult.

### ACKNOWLEDGEMENTS

ICI Tasman Ltd for donation of the mefluidide, advice as to its use and financial assistance. R.W. Vernall, Mrs J.A. **Rumbal** and Mrs J.P. Bridges for technical assistance. M. Chesterfield and B. Perkins for stock management.

### REFERENCES

- Earle, D.F.; McGowan, A.A. 1979. *Aust. J. Exp. Agric. Anim. Husb.* 19: 337-343.  
Glenn, S.; **Rieck, C.E.**; Ely, D.G.; Bush, I.P. 1980. *J. Agric. Food Chem.* 28: 391-393.  
**Goold, G.J.**; Jagusch, K.T.; Farquhar, P.; **MacLean, K.S.** 1982. *Proc. N.Z. Anim. Prod.* 42: 169-171.  
Holmes, C.W.; Hoogendoorn, C.J. 1983. *Dairyfming Ann.*, p. 36-43 Massey University.  
**Roughan, P.G.**; Holland, R. 1977. *J. Sc. Fd. Agric.* 28: 1057-1064.