The effect of Mefluidide on pasture and animal performance

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ABSTRACT

Mixed perennial ryegrass (*Lolium perenne* L.) and white clover (*Trifolium repens* L.) pastures at Ruakura were sprayed with Mefluidide, a herbage growth retardant, in 3 consecutive spring periods from 1978.

Pasture DM yield was markedly depressed at rates as low as 0.2 kg ai/ha and the effects were more marked with early season applications than those applied in late season. Mefluidide reduced the incidence of *Poa annua* L. in the swards and white clover was increased.

In 1979/80, weaned lambs were set stocked on pastures sprayed with Mefluidide at 0.2 kg ai/ha. Live-weight gain/head was increased at each of 3 levels of pasture on offer. Pastures again contained less *Poa annua* and more white clover.

In 1980/1 pastures were sprayed with Mefluidide at 0.2 kg ai/ha and with Ethofumesate at 0.2 kg ai/ha to eliminate clovers. Lamb gain was again increased on pastures sprayed with Mefluidide although 1 month after application fewer animals were carried at equivalent levels of herbage offer, due to lower herbage growth rates.

It is concluded that Mefluidide enhances the herbage quality of perennial ryegrass/white clover pasture and that the technique has special application where per head performance is of paramount importance.

INTRODUCTION

Pasture quality generally declines with the onset of reproductive growth in herbage species (Blazer, 1964). Inhibition of maturation by using plant growth regulators to maintain plants in a vegetative state enhances herbage quality. For example, maleic hydrazide has been shown to retard maturity and increase the digestibility of pangola grass (*Digitaria decumbens* Stent) and the water soluble carbohydrate content of cocksfoot (*Dactylis glomerata* L.) but plants become chlorotic and dry matter yields are reduced (Moore *et al.*, 1970; Brown and Blazer, 1965).

Mefluidide has been found to inhibit maturation of many cool season grasses, including tall fescue (*Festuca arundinacea* Shreb.) while still maintaining plant vitality (Gates, 1975; Glenn *et al.*, 1980). Trials were initiated at Ruakura to study its effect on perennial ryegrass pastures and animal performance.

METHODS

Experiments were conducted over 3 years (1978/81).

A small plot factorial experiment in spring 1978 compared the effect of 4 rates of Mefluidide at 5 different dates from September to December on the yield and quality of a dominant perennial ryegrass/white clover pasture containing appreciable proportions of annual Poa. The plots were assessed for yield on each date of application and there were 2 additional harvests in January and March 1979. Total yield samples were analysed for species composition and chemical analyses conducted on the separated grass fraction.

On 28 September 1979 paddocks of similar pasture type to that used in the previous experiment were sprayed with Mefluidide at 0.2 kg ai/ha. Additional paddocks were paired with the above as untreated controls. After uniform defoliation of all paddocks, weaned cross-bred lambs were set-stocked at 3 levels of herbage offer: (1.5, 3.0 and 4.5 kg DM/head/d). Lamb growth rates were recorded over 2-monthly periods (November-December and December-January). Pasture samples (grass only) were taken each month for chemical analysis.

On 30 September 1980 the following spray treatments were applied to the pastures:

(1) Mefluidide (registered trade name EMBARK, ICI N.Z. Ltd) at 0.2 kg ai/ha.
(2) Ethofumesate (registered trade name NORTRON, Fisons N.Z. Ltd) at 0.2 kg ai/ha.
(3) Unsprayed control.

Each main plot treatment was split to allow 5 levels of herbage offer and ewes and lambs were set-stocked in October and November and growth rate recorded. In December-January, weaned lambs were again set-stocked at 5 levels of herbage offer and growth rate recorded.

RESULTS

Effect on Herbage Yield, 1978/9

There was no significant interaction of date and rate of application on yield. The main effects are therefore presented in Table 1.

Greatest yield depressions occurred at the highest rate of Mefluidide application although the lowest rate applied (0.2 kg ai/ha) also reduced pasture yield

TABLE 1 The cumulative DM yield (kg/ha) of pastures sprayed with rates of Mefluidide on various dates from October to December 1978—main effects.

Rate of application	DM yield	Date of application	DM yield
Control	6990	2 Oct	5400
0.2 kg ai/ha	6060	16 Oct	5770
0.4	5940	30 Oct	6230
0.6	5580	14 Nov	6400
		28 Nov	6060
		18 Dec	6960
S.E. of diff.	290		360

by some 15%. Early applications of Mefluidide resulted in lower yields than later.

Effect on Grass Nutritive Value

The mean values over all harvest dates for increasing rates of Mefluidide application on total N, *in vitro* digestibility, MAD fibre and soluble carbohydrate indicated that MAD fibre decreased from 28.0 to 27.1% but no obvious trends could be observed in the other parameters.

Weaned Lamb Growth Rates, 1979/80

The ryegrass/clover pastures in 1979/80 were point-analysed in mid November, prior to weaned lambs being placed on the experiment. Mefluidide spraying increased ryegrass density, reduced annual Poa cover and density and increased white clover density and cover.

In the first period (November-December) lambs grazing Mefluidide pastures grew twice as fast as control lambs. In the second period (December-January) this advantage was apparent only at the pasture level of 3 kg DM/head/day (Table 2).

TABLE 2 Lamb growth rate (g/head/d) on pastures sprayed with Mefluidide (M) at 3 levels of pasture allowance in 1979/80—mean of 2 replicates

Herbage allowance	Period 1 Nov-Dec		Period 2 Dec-Jan		Total Nov-Jan	
kg DM/head/d	M	Control	M	Control	M	Control
1.5	91	57	-29	-19	31	19
3.0	127	61	71	29	99	45
4.5	154	84	36	52	95	68
Mean	124	67	26	21	75	44

Herbage chemical analyses on grass samples taken in November and December are shown in Table 3.

The grass component in November had higher % total N and *in vitro* digestibility and lower % MAD fibre in the Mefluidide treatment than the control. These differences were not as marked in December.

Ewe and Lamb Growth Rate, 1980/1

Since white clover was a confounding factor in the previous year's experiment, Ethofumesate was incorporated as an additional treatment to eliminate clovers.

The daily growth rate of the ewes and suckling lambs over the period October-November 1980 (Fig. 1) indicated that at most levels of pasture offer ewe live-weight gains were greatest in Mefluidide pasture followed by control pasture (containing white clover) and least in Ethofumesate pasture. The suckling lamb growth rates clearly showed that, at all levels of pasture offer to the lactating ewes, lamb growth rates were highest in Mefluidide pasture.

A similar picture emerged in the weaned-lamb data.

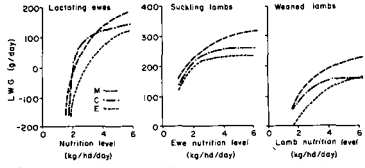

FIG. 1 Growth curves of lactating ewes, suckling lambs and weaned lambs grazing Mefluidide (M), Ethofumesate (E) and control (C) pastures.

DISCUSSION

Responses to Mefluidide applied to perennial ryegrass/white clover pastures in the Waikato have been measured by depressions in DM yield, a lowering of the MAD fibre content and an increase in the N content and digestibility of the grass component. Such findings are consistent with those reported for floral development inhibition with

TABLE 3 The effect of Mefluidide on nutritive value indices of perennial ryegrass in 1979

Treatment	Total N	Digest. %	MAD fibre %	Sol. CHO %	Lignin	Cellulose	Hemicellulose
Sampled 10.11.79							
Mefluidide	3.35	72.44	29.94	2.78	9.13	22.29	5.24
Control	2.68	66.90	29.79	3.90	8.44	19.53	5.75
Sampled 10.12.79							
Mefluidide	2.11	69.41	30.23	7.66	6.62	13.42	5.07
Control	2.18	64.94	31.62	6.51	8.83	16.36	4.56

Mefluidide on tall fescue pasture in the USA (Glenn *et al.*, 1980). However, depression in yield in our experiment was somewhat larger than that found in the USA. Aside from the internal quality parameters it was clear from our studies that in mixed pastures, containing white clover and *Poa annua* together with perennial ryegrass, spraying with Mefluidide resulted in pasture compositional changes which in themselves enhanced herbage quality. Annual Poa was reduced and white clover content increased in treated swards and the additional clover could be expected to result in higher lamb growth rates (Jagusch *et al.*, 1979).

Individual growth rates of ewes and lambs grazing treated pastures were spectacular although it must be remembered that fewer animals were carried on treated pastures during the initial phase of growth inhibition.

Despite DM yield loss, the application of low rates of Mefluidide to dominant ryegrass pastures in the spring offers a new technology whereby special purpose, high quality pasture is prepared for grazing animals when performance per head is of paramount importance. A small proportion of the total farm property (perhaps 3%) could be prepared for lamb finishing feed without serious disruption to farm feed flow on large scale operations. This method was successfully tried last season by a commercial farmer in the Kaimai hills (M. McAdam, pers. comm.).

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REFERENCES

Blazer, R. D., 1964. *J. Anim. Sci., 23:* 246.

Brown, R. H.; Blazer, R. E., 1965. *Crop Sci., 5:* 577.

Gates, D. W., 1975. 170th National Meeting of American Chemical Soc., Chicago, Il. Abstr. 70.

Glenn, S.; Rieck, C. E.; Ely, D. G.; Bush, L. P., 1980. *J. Agric. Food Chem., 28*(2): 391.

Jagusch, K. T.; Rattray, P. V.; Winn, G., 1979. *Proc. Agron. Soc. N.Z., 9:* 7.

Moore, J. E.; Ruelke, O. C.; Urry, F. M., 1970. *Proc. XI Internat. Grassld Cong.*, 738.