EFFECT OF NITROGEN RATE AND TIME OF APPLICATION ON MEFLUIDIDE TREATED SMOOTH BROME

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Introduction

Livestock producers who graze beef cattle or dairy animals usually have an abundance of pasture during spring when cool-season grasses grow rapidly. As hot, summer weather arrives, cool-season grasses cease vegetative growth and produce seed. Forage quality decreases as the grasses become dormant. Without alternative pastures or forages, cool season pastures become over-grazed and cattle performance is reduced.

Using pastures composed of warm-season grasses that produce maximum dry matter during summer is one method to sustain animal growth. To overcome summer dormancy of cool-season grasses, producers could rotate livestock to separate warm-season grass pastures and sustain animal growth. Another is to suppress seedhead production of cool-season grasses with a growth regulator. Delaying seedhead production, even if early growth is suppressed, may be useful when forage is limiting during July and August. Figure One shows idealized smooth brome growth and hypothesized advantage of delayed seedhead production.

Mefluidide (N-[2,4-dimethyl-5-[[(trifluoromethyl)sulfonyl] amino]phenyl]acetamide) is a growth regulator that has been shown (Wimer et al. 1986) to increase cow performance during the summer months through suppressing seedhead formation.

Objectives

The overall objective was to determine the optimal nitrogen fertilizer system when mefluidide is used in smooth brome production.

The specific objectives of this research were:

1. Determine effect of nitrogen rate applications on smooth brome dry matter yield and forage quality.

2. Determine effect of time of nitrogen application on dry matter yield and forage quality.

3. Determine effect of split nitrogen application on dry matter yield and forage quality.

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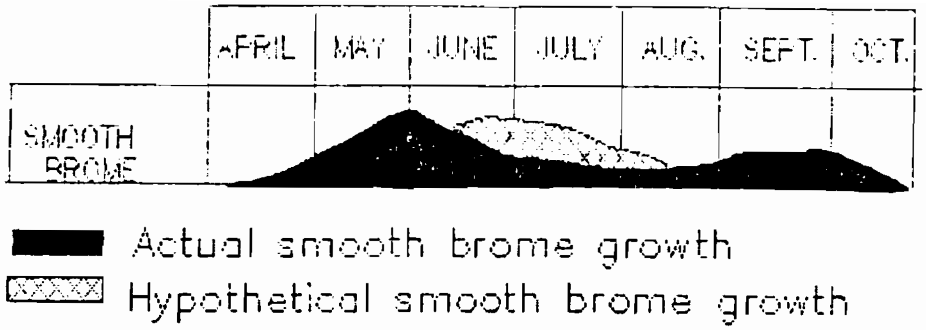

Figure 1. Seasonal distribution of smooth brome

Methods

The experiment was conducted in 1985 and 1986 at two sites in eastern Nebraska. Particulars of each experiment are listed in Table 1. The experiments were randomized complete block designs. Treatment design was a complete factorial of nitrogen with mefluidide treatments. Ammonium nitrate (34-0-0) was applied at 45, 90 and 135 kg ha^{-1} two weeks before mefluidide application, at mefluidide application and two weeks after mefluidide application.

In addition to the single nitrogen applications, split applications were made. Each nitrogen rate was split in half and each half applied at two of the three application dates. All combinations of split applications were made. Selected control treatments with nitrogen rates and timings were also included but not as a complete factorial. Mefluidide was applied at 0.28 kg ha^{-1} (Embark 2-S) in 159 L/ha of water carrier with 0.25% (v/v) nonionic surfactant (X-77).

Three harvests were taken annually. Date of harvest was determined by smooth brome growth. Harvest was accomplished with a flail harvester. Harvest area was 0.9 m wide and 3.6 m long. Forage quality was determined by analyzing for crude protein (CP), IVDMD, ADF and NDF. Total crude protein in kg ha^{-1} (CP * 100% Dry matter) will be presented to illustrate the effect of treatments on forage quality.

Results

Results indicate that mefluidide decreased spring growth and only marginally increased growth during the critical summer months. At two locations in Nebraska, it was found that delayed nitrogen fertilizer application helped delay dry matter production.

Table 1. Cultural practices and site characteristics for Mead and Allen, NE.

	Mead		Allen	
Soil Parameters				
Series:	Sharpsburg silty clay loam		Alcester silt loam	
	Typic Argiudoll fine, mesic, montmorillonitic		Cumulic Haplustoll fine-silty, mixed, mesic	
OM %	3.6		3.8	
pH	6.3		7.1	
B & K #1 (ppm)	30		8	
K (ppm)	297		248	
Cultural Practices:				
	1985	1986	1985	1986
Nitrogen App Dates:	4-18	4-9	4-18	4-4
	5-1	4-25	5-2	5-2
	5-17	5-7	5-17	5-21
Mefluidide App Dates:	4-29	4-24	5-2	5-2
Harvest Dates:				
Harv1	5-14	5-8	5-20	5-15
Harv2	8-28	6-24	7-19	6-18
Harv3	10-3	8-15	10-3	8-11

Effect of nitrogen rate and application date on dry matter yield. Nitrogen increased total seasonal yields linearly at Mead and Allen in both years (Figure 2) for both mefluidide and non-mefluidide treated smooth brome. Mefluidide treated smooth brome yielded less total dry matter than the untreated yields. However, there was a slight increase in dry matter at the second harvest due to mefluidide application (Figure 3). Nitrogen application increased yields at all application dates (Figure 4) although the degree of nitrogen rate response was affected by date of nitrogen application. Not all harvests had significant nitrogen rate responses. Of the 12 harvests (3 per year per location), seven had significant nitrogen rate responses. The late nitrogen application tended to have little effect on the early harvest since in some cases it was either not applied yet or only applied a short time before harvest. The late application did show increased yields at the mid-season harvest compared to the early application. A linear regression equation described the response of dry matter for each nitrogen application. Time of application affected even the last harvest in the season, except for the last harvest at Mead in 1985.

Effect of split nitrogen application on dry matter yield. Split nitrogen applications had no effect on dry matter yields at Mead. At Allen split application increased yields for the first harvest in 1985. This was due to some of the single nitrogen applications not being applied before the first harvest. Generally the split nitrogen applications had a minor effect on dry matter yields.

Effect of nitrogen rate and application date on forage quality. Total crude protein production showed results similar to dry matter production: mefluidide reduced production for the first harvest, but tended to increase it slightly for the second harvest (Figure 5). By the third harvest no treatment differences were found. Late nitrogen applications decreased initial protein production and increased mid-season production (Figure 6).

Summary

Use of this growth regulator would be beneficial to those producers who have extra pasture capacity early in the season, but find themselves short during late June and July. The results indicate that nitrogen needs to be applied in relatively large quantities and later in the season than normally recommended for smooth brome. This will result in a loss of spring growth, but an increase in mid-season dry matter production. Overall production may be decreased using these methods.

References

1. Wimer, S.K., J. K. Ward, B. E. Anderson and S. S. Waller. 1986. Mefluidide effects on smooth brome composition and grazing cow-calf performance. J. Anim. Sci. 63:1054-1062

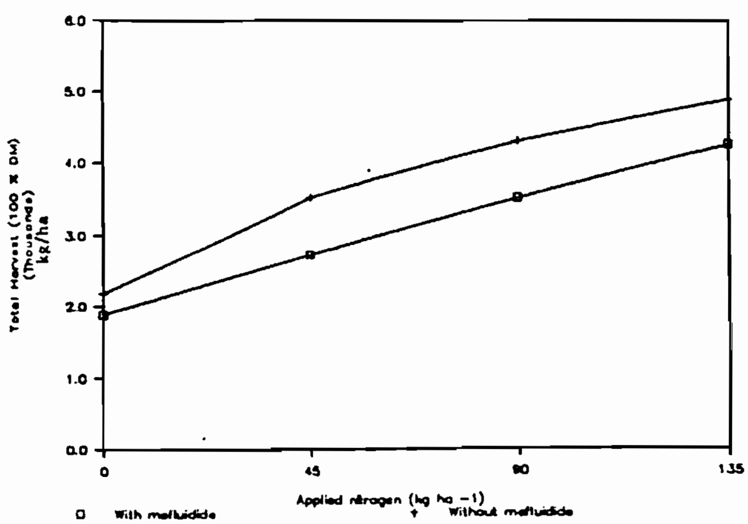

Figure 2. Effect of nitrogen application rates and mefluidide on dry matter. 1985-1986.

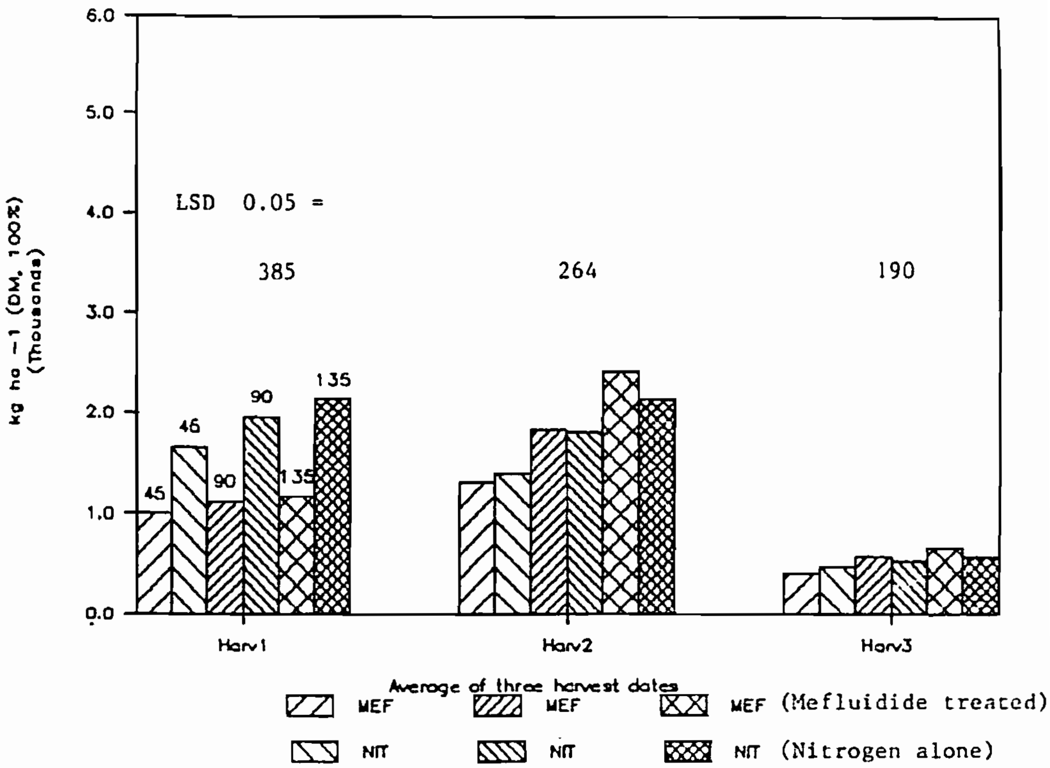

Figure 3. Effect of mefluidide and nitrogen rate on dry matter. 1985-1986.

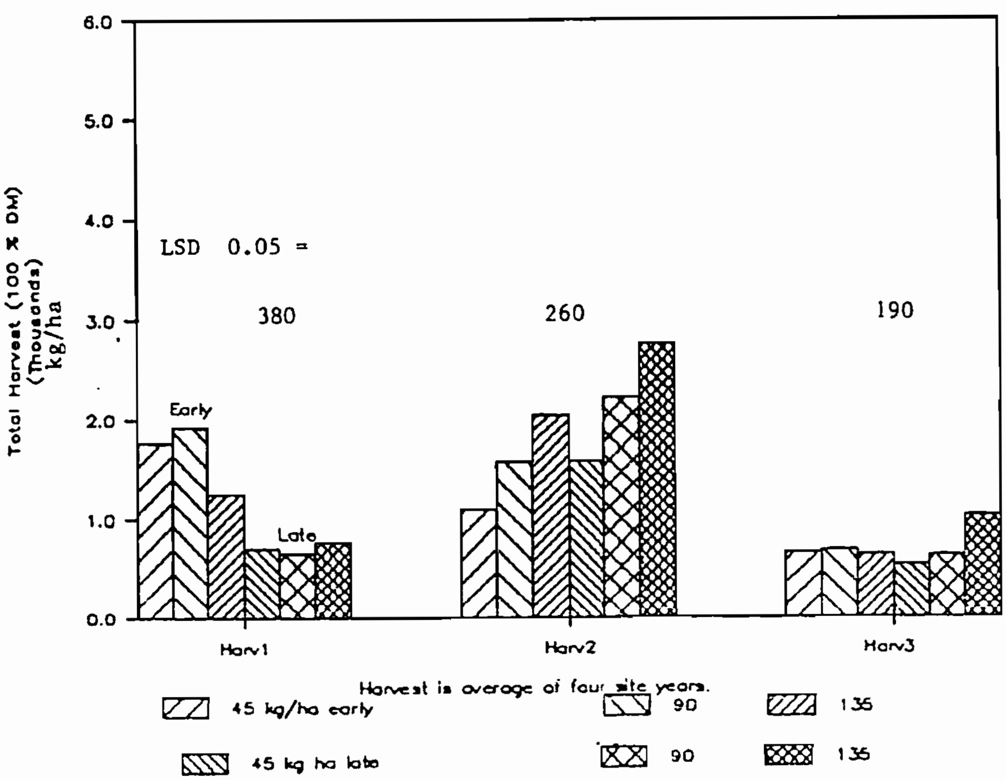

Figure 4. Effect of time and rate of nitrogen application with mefluidide on dry matter. 1985-1986.

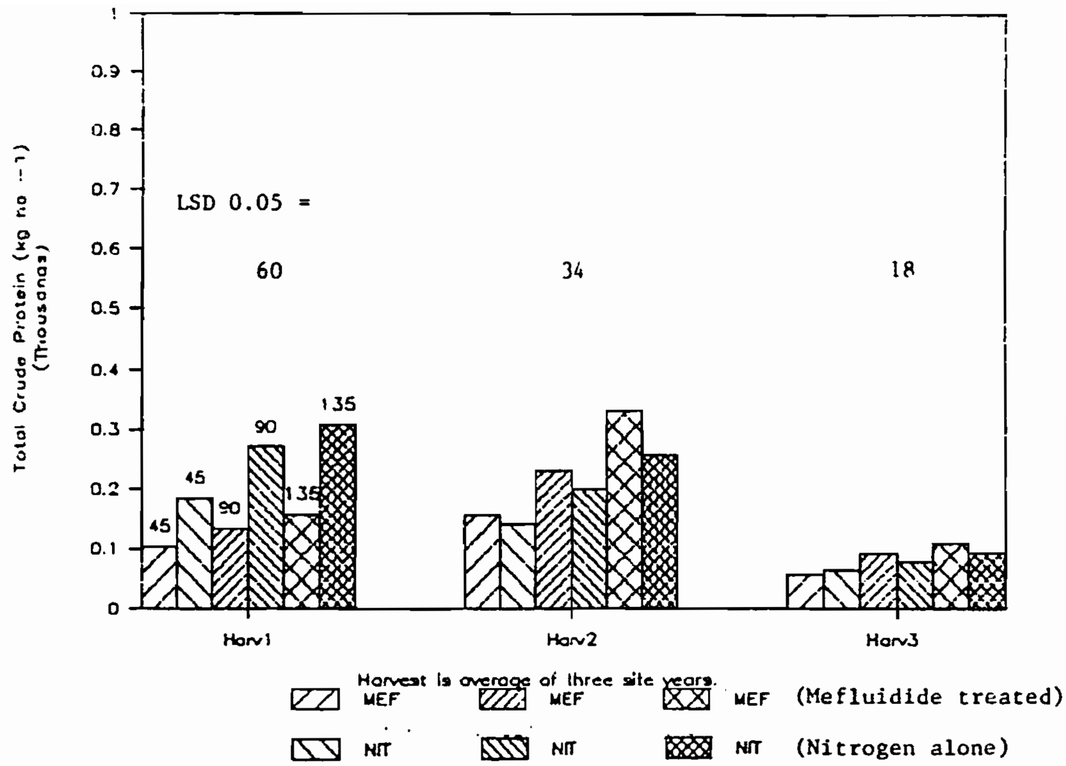

Figure 5. Effect of mefluidide and nitrogen rate on total crude protein. 1985-1986.

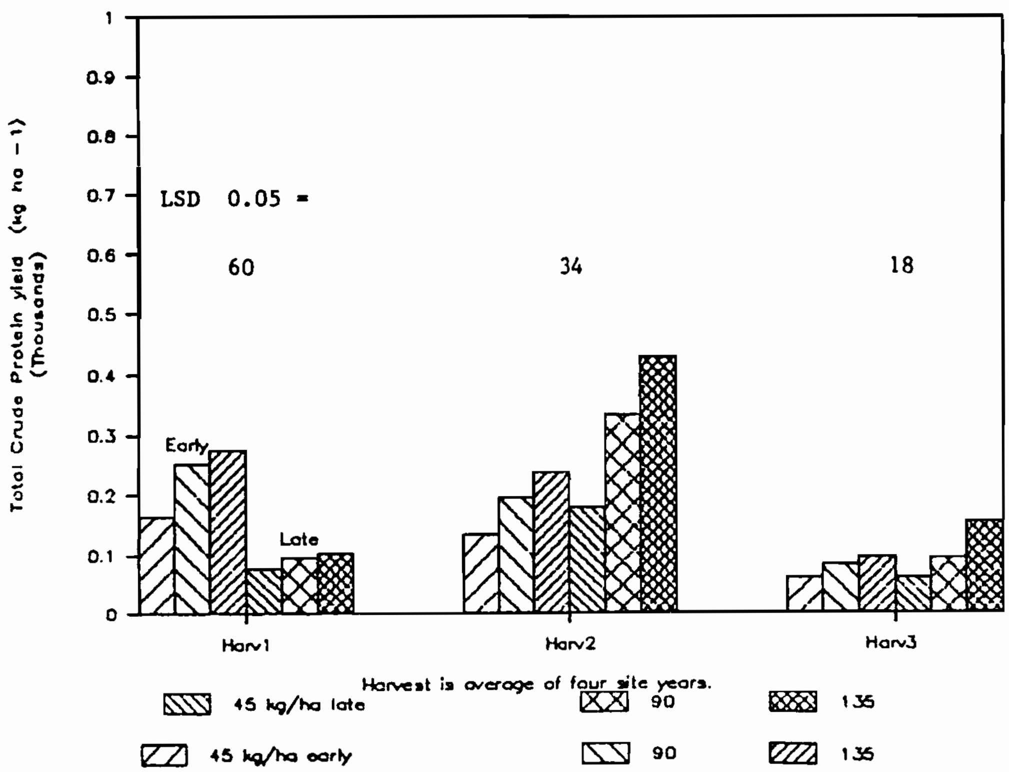

Figure 6. Effect of time and rate of nitrogen application with mefluidide application on total crude protein. 1985-1986.

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<u>CREDITS</u>

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