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Species composition affects yield and nutritive value of binary legume-grass mixtures

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Introduction

- Legume-grass mixtures provide more consistent forage yield than grass or legume monocultures (Sleugh *et al*. 2000; Sturludóttir *et al*. 2013).
- Performance and nutritive value of mixtures with recommended grass and legume species in eastern Canada are not well documented.
- **Objective :** To identify binary legume-grass mixtures with high forage yield and nutritive value under both frequent clipping and cattle grazing.

Materials & methods

18 binary mixtures

one of 3 legume species:
Birdsfoot trefoil (*Lotus corniculatus* L.)
Lucerne (*Medicago sativa* L.), grazing type
White clover (*Trifolium repens* L.)

plus one of 6 grass species:
Cocksfoot (*Dactylis glomerata* L.)
Kentucky bluegrass (*Poa pratensis* L.)
Meadow bromegrass (*Bromus biebersteinii*)
Meadow fescue (*Festuca pratensis* L.)
Tall fescue (*Schedonorus phoenix*)
Timothy (*Phleum pratense* L.)

Three sites

- Normandin and Lévis - Frequent clipping with a forage harvester.
- Nappan: Cattle grazing.

Experimental design

- Split-plot with legume species as main plots and grass species as subplots; 3 replications.

Sampling

- In the first three post-seeding years, plots were clipped or grazed when timothy reached 25 cm in height.

Laboratory and data analysis

- A subset of herbage samples were analysed for neutral detergent fibre (NDF) concentration and *in vitro* digestibility of NDF. Nutritive attributes were then estimated by near infrared reflectance spectroscopy in all herbage samples.
- Potential milk production was estimated with MILK2006 (Shaver *et al*. 2006).
- Analysis of variance with treatments and harvest methods (clipping and cattle grazing) as fixed effects using GENSTAT 14 statistical software.

Results & discussion

Table 1. Main effects of legume and grass species on herbage seasonal dry matter yield, neutral detergent fiber (NDF) concentration, and *in vitro* NDF digestibility (NDFD) of the mixtures under frequent clipping and cattle grazing. Values are averages over three production years.

Mixtures	DM yield (Mg ha^{-1})		NDF (g kg^{-1} DM)		NDFD (g kg^{-1} NDF)	
	Frequent clipping	Cattle grazing	Frequent clipping	Cattle grazing	Frequent clipping	Cattle grazing
Legumes						
Birdsfoot trefoil	6.13	6.14	428	522	726	677
Lucerne	5.17	6.71	435	511	711	665
White clover	4.74	6.72	462	505	746	698
SEM	1.21		7.1		11.6	
Grasses						
Meadow bromegrass	6.03	6.75	449	484	732	690
Timothy	5.39	6.36	402	508	729	697
Tall fescue	5.37	7.05	471	529	737	696
Kentucky bluegrass	5.22	6.81	430	529	696	619
Meadow fescue	5.08	6.20	445	525	744	704
Cocksfoot	4.99	5.97	454	502	728	675
SEM	1.22		8.0		11.8	

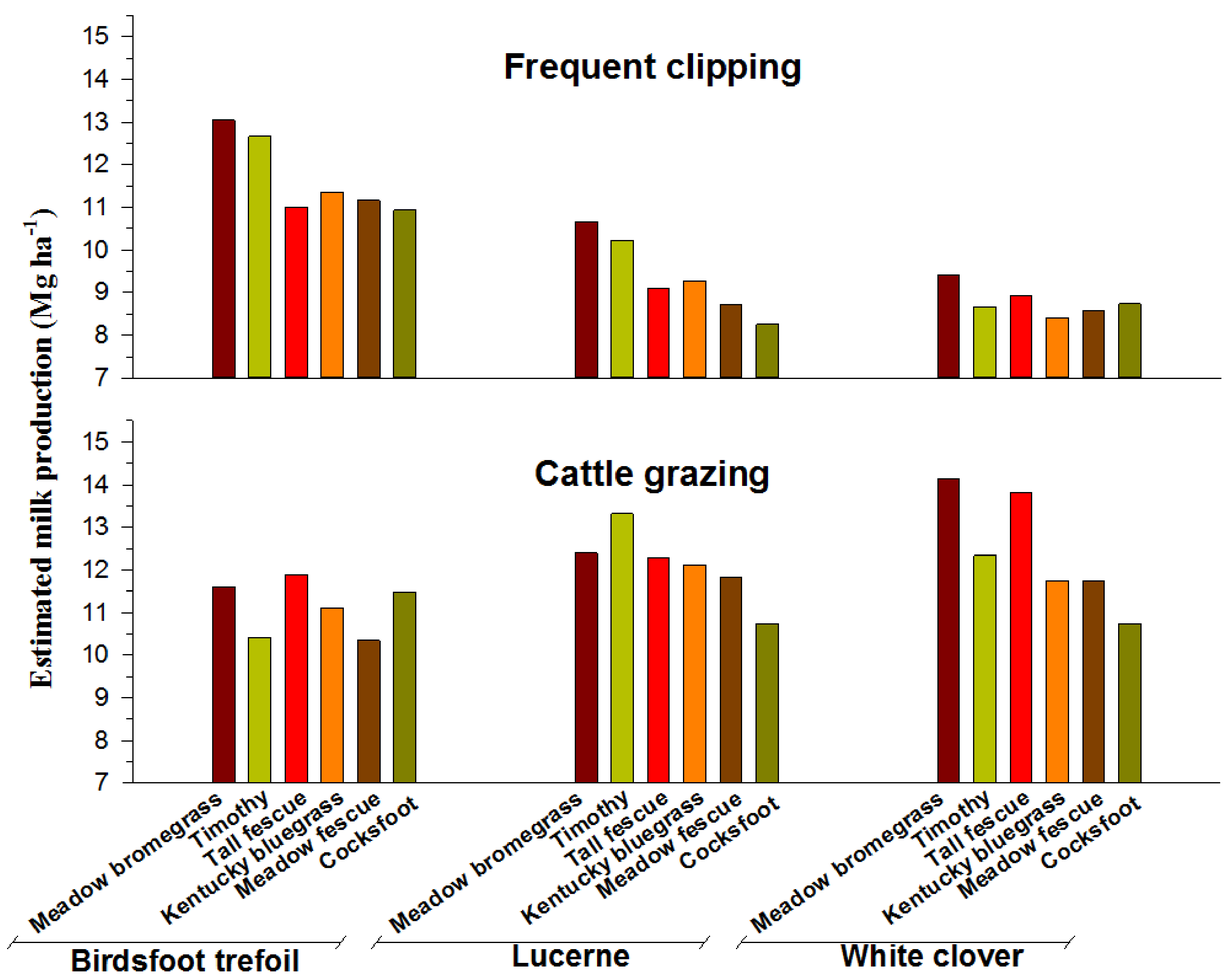

Figure 1. Estimated milk production per hectare for 18 binary legume-grass mixtures under frequent clipping and cattle grazing. Values are averages over three production years (SEM = 2.28 Mg ha^{-1}).

- Legume and grass species affected herbage DM yield, NDF concentration, and NDFD (Table 1) but this effect varied with the harvest method for DM yield and NDF concentration.
- Estimated milk production was greatest with birdsfoot trefoil-based mixtures under frequent clipping but lowest under cattle grazing (Fig. 1). It was greatest with timothy and meadow bromegrass-based mixtures under both frequent clipping and cattle grazing (Fig. 1).

Conclusions

- Frequent clipping and cattle grazing affected differently the performance of legume-grass mixtures, primarily the legume component.
- Meadow bromegrass performed very well with the three legume species under both frequent clipping and cattle grazing.

References

Shaver *et al.* 2006 Univ. of Wisconsin; Sleugh *et al.* 2000. Agron. J. 92:4; Sturludóttir *et al.* 2013. Grass Forage Sci. 69:229.

Acknowledgements

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