

Nitrogen management on complex mixtures at contrasting sites in Eastern Canada - New-Liskeard site.

Research team

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Context of the research

Forages are a major feed component for the cow-calf and backgrounding sectors of the beef industry. There is considerable room for improving beef production from pastures. Appropriately managed pasture with a significant legume component is inherently one of the most sustainable feed sources for cattle. Forage species have different yield potential and nutritional quality, which can influence the productivity of beef cattle in pasture. Little research has been done to determine which forage species combinations have the greatest potential to improve beef production from forages. Complex mixtures is also a tool to manage pasture in a changing climate as different species combination may assure dry matter yield (DMY) from year to year if the combination is well done. Therefore, it is very important to test these mixtures under different environments.

Objectives

Evaluate the effect of N fertilization on yield, nutritive, and persistence of complex pasture mixtures.

What we did.

Plots were seeded in 2013. Starting in 2014, plots were « mob grazed » to simulate rotational grazing from beginning of June until the end September. Four complex mixtures were evaluated at three N rates (0, 60 and 120 kg/ha/season). The same trial was established at three sites (Normandin, QC; Nappan, NS; New-Liskeard, ON).

The four complex mixtures were chosen based on their ranking of a previous trial.

- Timothy, Meadow fescue, reed canarygrass, Kentucky bluegrass + alfalfa or birdsfoot trefoil. Timothy and meadow fescue have either poor regrowth/poor tolerance to frequent defoliation.
- Tall fescue, meadow brome grass, reed canarygrass, Kentucky bluegrass + alfalfa or birdsfoot trefoil. Tall fescue and meadow brome grass have either good regrowth/good tolerance to frequent defoliation.

What we've learned.

Table 1. Seasonal dry matter yield (t/ha) for the nitrogen mixtures trial at the New-Liskeard site in 2014. Three grazing cycles during the season.

	Alfalfa			Birdsfoot trefoil		
	TmMfRgKb ¹	TfMbRgMb	Mean	TmMfRgKb	TfMbRgMb	Mean
0N	7.6	8.7	8.2	7.4	9.9	8.7
60 N	8.2	8.6	8.4	7.3	9.8	8.6
120 N	8.2	8.4	8.3	7.9	9.3	8.6
Mean	8.1	8.6	8.3	7.5	9.7	8.6

Table 2. Dry matter yield (t/ha) for the nitrogen mixtures trial at the New-Liskeard site in 2015. Two grazing cycles done.

	Alfalfa			Birdsfoot trefoil		
	TmMfRgKb ¹	TfMbRgKb	Mean	TmMfRgKb	TfMbRgKb	Mean
0N	4.3	5.2	4.8	4.9	6.2	5.6
60 N	6.1	5.6	5.9	6.1	5.8	6.0
120 N	6.4	6.2	6.3	5.9	5.6	5.8
Mean	5.6	5.7	5.7	5.6	5.9	5.8

¹Tm=timothy; Tf=tall fescue; Mf=meadow fescue; Mb=meadow brome grass; Rg=reed canarygrass; Kb=Kentucky Bluegrass.

- Reed canarygrass and Kentucky Bluegrass had very poor establishment and did not contribute significantly to the yield in both mixtures during the first year.
 - There was no response to applied nitrogen in the first production year (Table 1).
 - Grass mixtures responded differently with legume species in the first production year (Table 1).
 - Winterkill was severe in 2015. Before the second grazing cycle (beginning of July), seeded legume species contributed to 3% (60 and 120 N/ha) to 6% (0 N/ha) of total DMY. In spite of this, grass population was not affected. This was also observed at Normandin and Nappan.
 - Data from 2015 are not statistically analyzed. However, DMY for grass mixture containing timothy is lower than the one containing tall fescue with 0 N/ha applied (Table 2).
- Grazing observations:
- Mixtures with tall fescue will need an intensive management. The first grazing cycle must be done early but be sure that tall fescue stem is in elongation to avoid them at the second grazing cycle.

What are next steps?

This study will continue one more year to gather DMY and botanical composition variation. Nutritional value will also be evaluated. This will allow us to propose mixtures to improve pasture DMY and nutritional value while maintaining economic nitrogen management and the opportunity for different animal type (cow-calf and backgrounding animals) being fed on these pastures.