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Nutritive value of AM and PM-cut alfalfa, red clover, and white clover

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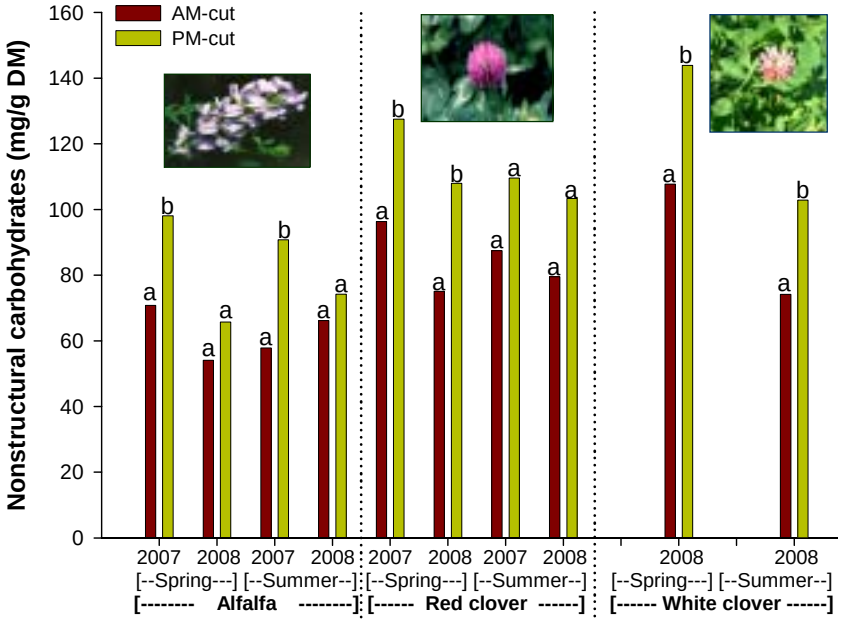
Introduction

- Delayed cutting during the day increases the nonstructural carbohydrate (**NSC**) concentration in alfalfa, which improves milk production (Brito et al., 2008) and N use efficiency by dairy cows (Brito et al., 2009).
- This increase in NSC concentration may
  - vary with forage species (Pelletier et al., 2009) and growth period;
  - affect fiber concentration.
- **Objective:** To compare the effect of delayed cutting during the day on concentrations of forage NSC, neutral detergent fiber (**NDF**), and acid detergent fiber (**ADF**) of three legume species.

Materials & methods

- Normandin, Québec (48°51'N, 72°32'W).
- 3 forage legume species: alfalfa, red clover, white clover.
- Production years: 2 for alfalfa and red clover : 2007, 2008
  1 for white clover : 2008.
- 2 growth periods/year: spring, summer.
- 4 replications.
- 2 forage sub-samples of 250 g each:
  - 1st sub-sample: heated in a microwave oven for 1 min to reach ± 70°C, then dried at 55°C for 48 h in a forced-air oven; used for NSC analysis.
  - 2nd sub-sample: dried at 55°C for 48 h in a forced-air oven; used for NDF and ADF analyses.
- Harvest at flowering except the spring growth of alfalfa in 2008 (early bud).
- Water soluble carbohydrates by HPLC; starch by colorimetric method (Bertrand et al., 2008).
- NSC = starch + sucrose + glucose + fructose + pinitol.
- NDF (using amylase and sodium sulphite) and ADF determined using the Ankom Fiber Anlayzer according to Goering and Van Soest (1970).
- For each production year, the MIXED procedure of SAS was used with growth periods as repeated measurement.

Results & discussion



The NSC concentration of AM and PM-harvested forages

For each forage species, growth period, and year, means with different superscript letters are different at $P < 0.05$.

- Delayed cutting during the day increased NSC concentration by 32% in alfalfa, 33% in red clover, and 36% in white clover (average across years and growth periods). This effect was significant in six of the ten harvests.
- Forage NSC concentration was highest in white clover (107.2 mg/g DM), followed by red clover (98.4 mg/g DM), and alfalfa (72.2 mg/g DM) (average across years, growth periods, and time of cutting).
- Forage NSC concentration was higher in the spring growth compared to the summer regrowth in white clover (+42 %) and in red clover (+7 %), whereas it was similar in both growth periods in alfalfa (average across years and time of cutting).

Concentrations (mg/g DM) of NDF and ADF in AM- and PM-harvested forages.

Species	Growth period	Time of cutting	2007 NDF	2007 ADF	2008 NDF	2008 ADF
Alfalfa	Spring	AM	354	299	404	353
		PM	370	311	419	367
	Summer	AM	437	370	382	337
		PM	424	364	404	357
Red clover	Spring	AM	298	226	355	297
		PM	286	217	344	285
	Summer	AM	341	271	333	289
		PM	331	273	334	301
White clover	Spring	AM			195	179
		PM			188	170
	Summer	AM			252	239
		PM			244	232
SEM[1]			10.9	10.4	9.9	8.1

[1]Standard error of the mean comparing values within a column.

- The NDF and ADF concentrations were not affected by delayed cutting during the day.

References

Bertrand et al. 2008. Grass Forage Sci. 63:421-432.
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Conclusions

Delayed cutting during the day increased nonstructural carbohydrate concentration by approximately 33% in the three studied forage legumes without affecting fiber concentration.

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