



Improving fodder grass in the context of climate change

Duration: 2014 – 2018

Highlights

- Due to climate change, fodder production in the province of Quebec must be adapted.
- Timothy grass is a plant that grows well in cool climates, but the current climate is beginning to make it less advantageous.
- An alternative must be found to timothy grass that is better suited to the growing conditions in Quebec.
- When mixed with alfalfa, tall fescue, meadow fescue and meadow brome grass are associated with estimated milk production per hectare that is comparable to that of the alfalfa/timothy grass mix. These grasses thus represent possible alternatives to timothy grass throughout Quebec.
- Timothy grass remains an interesting grass in our current climate, as the yield and nutritional value of the alfalfa/timothy grass mix were among the highest when comparing different mixes.
- Tall fescue in the form of haylage or semi-dry silage can replace timothy grass in cow rations. Cows fed with rations consisting of timothy grass or tall fescue in the form of haylage had similar dietary intake, milk production and milk fat content.
- Cows fed rations consisting of tall fescue in the form of semi-dry silage consumed less but had similar milk production.
- When the dairy farm is considered as the only decision-making unit, the best grass/alfalfa binary association from a technical-economic and environmental point of view is currently being analyzed.
- The development of timothy grass germoplasts with the best regrowth rate is ongoing.
- Increased knowledge on the best forage species to grow will enable dairy farmers in Quebec to make more informed choices in the context of climate change.

Objectives

GENERAL OBJECTIVE: to determine the best fodder grass for production in the face of climate change.

SPECIFIC OBJECTIVES:

- Assess alternative grasses to timothy grass grown in association with alfalfa.
- Assess the impact of replacing timothy grass with tall fescue preserved in the form of wilted or semi-dry silage in the fodder rations of lactating cows.
- Assess the impact of the choice of pure plant species and alfalfa-based binary associations in crop rotations, with or without intensive management, on farm profitability.
- Develop a selection method and produce germoplasts that can be used to develop rapid regrowth varieties of timothy grass.

Results and potential benefits

The alfalfa/timothy grass mix performed well throughout Quebec in our current climate. The alfalfa/meadow fescue, alfalfa/tall fescue and alfalfa/meadow brome grass mixes are possible alternatives to the alfalfa/timothy grass mix as they have comparable seasonal yields, their persistence is good in the first three years of production and the estimated milk production per hectare associated with these mixes is similar to that of the alfalfa/timothy grass mix. The alfalfa-based mixes including the festulolium and perennial rye grass varieties studied do not seem to be feasible alternatives to timothy grass in Quebec. Harvesting binary alfalfa-grass mixes at the early-bloom stage of alfalfa promotes the persistence of the mixes, their dry matter yield and the estimated milk production per hectare of fodder. There is some variability between the germoplasts of timothy grass around the world for regrowth leading to a second cut, such that genetic selection could be undertaken to develop rapid-regrowth varieties. Tall fescue in the form of haylage or semi-dry silage can be used to replace timothy grass in cow rations as milk production is similar no matter which of the two grasses the ration consists of. This study also helped us confirm interest in using alfalfa/grass mixes in rations. The results are currently integrated in a farm management computer model and will help us to determine the economic and environmental impacts, on farm as a whole, of the practices that will be proposed as part of the project.



Professionals trained

Florence Pomerleau-Lacasse is the master's student at McGill University who completed the fodder grass plot testing component from 2015 to 2017.

Anne-Marie Richard is the master's student at Université Laval who was in charge of the animal testing component comparing the use of tall fescue to that of timothy grass in dairy cow feed.

Véronique Ouellet is currently completing her PhD in animal science, and Jean-Philippe Laroche is currently finishing his bachelor's degree in agronomy (distinction profile) at Université Laval. They are working on the modelling component of the project. The results will help us to determine the economic and environmental impacts, on the farm as a whole, of the practices that will be proposed as part of the project.

For further information

The results of this project will be communicated in popular science articles, and posters at the Symposium des bovins laitiers and the Forum Techno Novalait and related science information days, as well as through presentations.

Financial contributions

Partnership for innovation in dairy production and dairy processing (EPI:2011-2017):

- Fonds de recherche du Québec – Nature et technologies
- Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec
- Novalait

Centre de recherche en sciences animales de Deschambault for animal experimentation

AAFC for germoplasm selection

Total budget: \$190,000

Contact persons

Project supervisor:

Édith Charbonneau

Animal Science Department

Université Laval
2425 rue de l'Agriculture
Quebec City (QC) G1V 0A6

418 656-2131 # 12762
edith.charbonneau@fsaa.ulaval.ca

Contributors:

Gaëtan Tremblay

Agriculture and AgriFood Canada

Gilles Bélanger

Agriculture and AgriFood Canada

Philippe Séguin

McGill University

Annie Claessens

Agriculture and AgriFood Canada

Rachel Gervais

Université Laval

Doris Pellerin

Université Laval

Julie Lajeunesse

Agriculture et Agroalimentaire Canada

Guy Allard

Université Laval

Alain Fournier

Ministère de l'agriculture, des pêcheries
et de l'alimentation du Québec

Robert Berthiaume

Valacta