



Improving cows' protein diet through new models tested in Quebec

Duration: 2018 – 2021

Highlights

- To ensure their economic, environmental and social sustainability, dairy farms in Quebec must reduce their environmental footprint while remaining profitable.
- A number of models are used in different countries to evaluate the protein supply in rations to balance them with the needs of high-yielding dairy cows in order to reduce production costs and nitrogen dejections without compromising yield.
- Nitrogen (N) excretion is a major problem: on average, 30% of nitrogen is recuperated in milk proteins, with fecal and urinary losses representing 35% and 35%, respectively, of the nitrogen ingested.
- The goal of this research is to validate the impact of a revision of three cow ration formulation models on protein and amino acid recommendations in the Quebec context.
- Two of the most popular models in North America will be compared—the 2001 National Research Council (NRC) model and the 2018 revision and the Cornell Net Carbohydrate and Protein System (CNCPS v.6.5, 2015)—as well as the new French system, INRA (2018).

Objectives

The goal of this research is to validate the impact of a revision of three cow ration formulation models on protein and amino acid recommendations in the Quebec context.

More specifically, the objectives are to:

- 1) Determine the influence of ration characteristics on the models' capacities to predict protein supply by comparing the predictions from the three models with the reference model (NRC, 2001).
- 2) Compare the milk yields and milk proteins predicted by the four models with values reported in the literature and measurements from 100 farms in Quebec.
- 3) Propose adaptations to the ration formulation model used by the Quebec-Atlantic Centre of Expertise (Valacta: currently based on NRC, 2001) and to the other models used in Quebec so that they reflect the particularities of rations used in Quebec.

Results and potential benefits

The proposed study will verify if the predictions from the new models also apply to the rations commonly used in Quebec, as opposed to those with an alfalfa/corn base (United States) or multiple types of feed (Europe). The project presents a unique advantage by comparing the predicted values to the values actually observed on Quebec dairy farms. If it is found that biases are present with regard to certain types of rations frequently used in Quebec, corrections to these biases may be integrated to better adapt the models used by Valacta, and other organizations in Quebec, to the Quebec context. As a result, our study will validate and quickly transfer these advances to Quebec dairy farms, resulting in the application of the new American and European dietary models. These modifications will result in reductions in the amount of protein in rations, production costs and nitrogen emissions into the environment. The project will position Quebec as an innovative industry leader with regard to protein and amino acid (AA) recommendations for dairy rations.



Professional trained

Simon Binggeli, PhD student.

For further information

The research results will be transferable to dairy farmers by way of the dietitians and experts who formulate the rations. An article will be written for the journal *Le Producteur de Lait Québécois*. In addition, a presentation proposal will be submitted to CRAAQ for the Quebec Dairy Cattle Symposium. Other communications activities (articles, training sessions and presentations) are planned for collaborating users, including Novalait and Valacta.

Financial contributions

- Special call for proposals in dairy production and processing (2016–2021)
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Quebec consortium for industrial bioprocess research and innovation (CRIBIQ)
- Novalait

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