The lipid diet of cows and its impact on the technological properties of milk

Duration: 2021-2024

Highlights

- Dietary supplements containing saturated fatty acids have been marketed in particular to support the high milk needs of cows.
- Can their use in a cow's ration have an impact on the milk's ability to be processed into butter and cheese? Scientific data on the subject is limited and does not provide a definitive answer to this question.
- This research program aims to identify diet and milking strategies to produce milk with the ideal composition for dairy products and their consumers.
- Tests conducted on a research farm will assess the real impacts of different fatty acid supplements on the composition of the milk produced and its butter and cheesemaking abilities.
- The team will also study whether other feeds in the ration or the number of milkings per day influence the fatty acid composition of the milk and its processability.

Objectives

- To determine the impact of commercial lipid supplements added to cows' rations on milk production and composition, its fatty acid and protein profile, and its technological properties.
- Check whether these impacts can be modulated by the other ingredients in the ration or by milking frequency.
- Develop a tool for the commercial analysis of protein fractions in milk.

Results and potential benefits

For illustrative purposes, let's break down the potential impacts of cheese production. Cheese is an important dairy product in Quebec. Its production involves the processing of nearly half of Quebec's milk, leading to an annual production of 250,000 tonnes of cheese (50% of Canadian production). According to the literature, reductions in casein levels as low as 0.1 percentage units are possible and would result in losses in cheese yield to the order of 1%. In Quebec, this represents approximately 2,500 tonnes of cheese, and double in Canada. A more precise characterization of the impact of saturated fatty acid supplementation on milk's cheesemaking abilities is essential. Fatty acid supplements are increasingly used on farms in Quebec, and it is currently impossible to determine whether this supplementation has positive or negative impacts on the economic performance of our dairy plants.

There is a variety of lipid-based supplements from different sources used in dairy production. The environmental footprint of these by- and co-products varies, but requires wise and informed use. By specifying the impact of supplements on the technological properties of milk, this project will generate the knowledge necessary for the reasonable use of these ingredients. By identifying the nutritional strategies most suited to produce milk of the highest quality to meet industry needs, this project will help to reduce the loss of yield of dairy manufacturers and thus reduce their waste. All these elements will help to maintain the social acceptability of milk and dairy products.

Innovative aspects

- This project will provide the knowledge and tools to better link milk fat and protein production to industry needs, ensuring the economic sustainability of the dairy sector.
- By identifying the most appropriate nutritional strategies to produce the highest quality milk for the industry and developing a tool adapted to commercial conditions in order to measure quality, this project will help the dairy industry reduce losses and thus reduce their waste.

Professional trained

- **Myriam Landry**, Master's student in animal sciences (ruminant nutrition)
- **Maude Blouin**, Master's student in food science and technology (cheese technology)
- **Felix Huot**, future PhD student in animal sciences (data analysis, modelling, artificial intelligence)

For further information

The results will be presented at the Quebec Dairy Cattle Symposium, the Novalait Forum Techno, the STELA Colloquium, and other local presentations. Articles for *Le producteur de lait québécois* and *Milk Producer* will also be written. The Novalait steering committee will also be visited. In addition, there will be scientific publications (*Journal of Dairy Science*) and national and international conferences (American Dairy Science Association Annual Meeting, Animal Nutrition Conference of Canada)

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- CRIBIQ
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