



Improving dairy processing eco-efficiency using an integrated approach to dairy fluid concentration

Duration: 2019–2022

Highlights

- Milk contains more than 88% water. Milk composition does not change significantly when used to produce drinking milk (other than as a result of the standardization of its fat content) as opposed to milk used for cheesemaking where 90% of its volume is found in whey.
- Filtering milk to extract water and concentrate proteins is a widespread practice in dairy technology. It makes the production of a host of foods possible, in addition to making processing more eco-efficient. To do so, “baromembrane” processes are used, including reverse osmosis and ultrafiltration, which is garnering a growing amount of interest. The result is a concentrate that is rich in proteins, and the creation of whey, a liquid by-product.
- The residue from reverse osmosis presents a composition that is very close to water and can be used in dairy plants to reduce the consumption of potable water, whereas the whey obtained through ultrafiltration contains lactose and mineral salts that make it difficult to use.
- The idea of pre-concentrating dairy fluids (RO and UF) to reduce transportation costs and the environmental impact (GHG) is attracting attention a context of eco-efficiency (EE).
- This project will measure the energy gains obtained by applying these new practices to cheese processing and the valorization of whey in an industrial context. It will draw on the knowledge and simulation software recently developed by the NSERC-Novalait Industrial Research Chair on Process Efficiency in Dairy Technology.
- The results will then be used to complete an initial evaluation of the potential of using whey obtained through ultrafiltration on dairy farms.

Objectives

The main objective of this project is to develop knowledge that will allow dairy processors to integrate the use of dairy concentrates obtained through RO or UF.

More specifically, the objectives are to:

- 1) Optimize cheese production conditions using dairy concentrates obtained through RO and UF;
- 2) Quantify the eco-efficiency gains obtained through the generation of cow water through RO in cheese-making;
- 3) Optimize the use of concentrates to improve material flow in the dairy processing industry.

Results and potential benefits

This project is an original initiative that draws on the knowledge and new simulation software tool recently developed as part of the NSERC-Novalait Industrial Research Chair on Process Efficiency in Dairy Technology. The research will generate preliminary data on the potential of improving EE through the use of UF whey on dairy farms. The project will produce significant benefits with respect to the use of milk components (including water) and reducing the environmental footprint of dairy transportation and milk processing processes.



Professional trained

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Master's candidate in Food Sciences and Technologies in September 2019

For further information

The research results will be able to be quickly transferred to the dairy industry through diverse means, including the STELA Colloquium, the Novalait Forum Techno and different scientific conferences. Other communications activities (articles and presentations) are planned for collaborating users.

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

Total budget: \$177,996

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