



Creation of a document database on microorganisms associated with non-compliant and/or atypical dairy products

Duration: 2021-2024

Highlights

- Raw milk is considered an excellent growth medium for microorganisms (MO). Despite the very strict hygiene conditions imposed in dairy production and processing in Quebec, milk may contain pathogens and MOs responsible for alteration.
- In dairy processing plants, these MOs can lead to non-compliant and/or atypical dairy products (NC/AT) that result in significant economic losses and waste.
- These MOs are even more problematic because they are difficult to eliminate. Some of these MOs also form biofilms that allow them to survive in the outdoor environment and sometimes make them more resistant to disinfectants and certain antimicrobials.
- There is very little scientific literature on the characterization of industrial strains.
- The overall objective of this project is therefore to generate a document database of microorganisms associated with NC/AT dairy products in Quebec.
- By the end of this project, a document database containing several hundred microbial strains that are problematic for the dairy industry will be available and accessible to all.
- Nearly 1,000 strains will be identified and characterized based on their profiles for antimicrobial resistance, biofilm formation, and sensitivity/resistance to temperature and disinfection agents.
- This data will be useful for suppliers to better link defects to their microbial sources. It can be used to develop faster detection methods of these MOs or even more targeted alternative control strategies.

Objectives

The overall objective of this project is therefore to generate a document database on microorganisms associated with non-compliant and/or atypical dairy products in Quebec.

To achieve this, three specific objectives will be pursued:

- 1) Identify the microorganisms associated with non-compliant and/or atypical dairy products.
- 2) Characterize the microorganisms identified in Objective 1.
- 3) Identify the sensitivity/resistance to heat and disinfectants of the microorganisms identified in Objective 1.

Results and potential benefits

In the short term, this project will provide stakeholders in the agri-food industry (suppliers and researchers) with access to a document database on problematic MOs in Quebec's dairy industry. The MOs that are documented will serve as a basis for a range of future studies, including on the control, detection, and interactions between MOs, to help attain the highest quality of finished products possible. The information associated with this database will be available via a website. Complementary research on these strains will build on the data obtained in this project and ensure that the database is continually updated.

In the long term, this new knowledge will help identify problematic MOs faster and contribute to the development of more effective inactivation strategies to reduce economic losses and waste. Such an approach serves not only an insurance policy for the Quebec consumer, but also a mark of quality that would enhance the reputation of products nationally and internationally, and encourage consumers to choose local products.

Results and potential benefits, suite

The potential benefits of the research results are also:

- **Economic:**
 - Reduced production and productivity losses associated with applying additional cleaning and disinfection processes.
- **Environmental:**
 - Reduced waste of downgraded products.
 - Reduced use of water and sanitation products in the application of additional wash sequences.
- **Social:**
 - Characterization of antimicrobial-resistant strains in the dairy processing sector.
 - Participation in the World Health Assembly's 2015 Global Action Plan on Antimicrobial Resistance.

Innovative aspects

- Development of a collection of strains (psychrophilic, sporulate or thermoresistant bacteria as well as yeasts and moulds) isolated in NC/ATs from various dairy plants and processing companies in Quebec.
- This collection will be stored in an information bank containing data on the type of defect generated in dairy products, their sensitivity/resistance to heat or disinfectants, their ability to form biofilms, their sequencing (where applicable), and/or their resistance to antimicrobials.
- The information gathered during this project will be accessible to partners in the dairy industry and, in particular, for use in additional research on this major issue for the industry.

Professional trained

- **Laurie Sanschagrin:** Master's student in food science - food microbiology, Université Laval; Pathogenic and alteration microorganisms found in dairy products and their ability to form biofilms.
- **Coralie Goetz:** Post-doctoral fellow in agri-food microbiology, Université Laval; Characterization and control of biofilms.
- One master's student (to be determined)
- Three undergraduate interns (to be determined).

For further information

Graduate students and postdoctoral fellows contributing to this project will be required to present the results obtained throughout the project through poster sessions and oral presentations intended for a general audience, such as at the Forum Techno organized by Novalait and which brings together the different stakeholders in the industries concerned. In addition, the results obtained will be presented in scientific articles or popular science articles.

Financial contributions

- Novalait
- CRIBIQ
- MAPAQ - Innov'Action Program under the Canadian Partnership for Agriculture, an agreement between the governments of Canada and Quebec.
- SaniMarc Group

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Contact persons

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