

Project

Occurrence and impact of microbial biofilms on milk quality from farm to cheese vats



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National Dairy Research Strategy investment priority targeted:

- Microbiology – Better understanding of the impact of microbes on milk and dairy product composition and quality

PERIOD: 2018-2022

TOTAL BUDGET: \$1,514,310

Why this research is important:

There is general agreement that the microbiological quality of milk is central for the dairy sector. Contamination may occur during production, harvesting, storage, and processing of milk. In addition, the characteristics of microbial populations in raw milk at the time of processing have an impact on the processing properties of milk, and the organoleptic qualities and shelf life of dairy products. Dairy farmers are responsible for the management of on-farm risks, making milk the most controlled foodstuff before processing. Bacteria and biofilms are part of the risks that are managed on an ongoing basis. Biofilms, protective coats that form over cells, can be either beneficial or detrimental, and can mask infectious bacteria. Thus, the identification and control of biofilm formation is important to ensure quality of milk is maintained.

Research objective:

Study the origin, structure, composition and formation of detrimental and beneficial biofilms from the farm to the cheese plant.

Project overview:

The highly innovative aspect of the project is to better understand the interactions between microbial communities in the ecology of the dairy farm and cheese plant by targeting one of the main sources of microbial contamination: microbial biofilms. Given their importance as potential sources of raw milk contamination, better knowledge of biofilm formation and composition would allow substantial improvements in on-farm management practices for the production of quality dairy products.

Sixty farms in Quebec (30) and Ontario (30) will be recruited as well as two cheese plants. A first phase of sampling will take place along the farm to cheese plant continuum. It will therefore be possible to assess the variabilities of biofilm microbial communities among different types of farms (e.g. classified by use of bedding, silage and hay). A second sampling phase will be carried out for two on-farm cheese processors (farm mixed-type facilities). Those farms will be characterized by a farm-to-plant continuum with a single internal milk supply source. Further sampling will also be carried out on different dairy farms in order to collect bacteria from milking equipment (machine, lines, and cistern) and the farm environment (drains, floor parlor) by swabbing these surfaces.

Expected outcomes:

The initial outcome will be the comparison of microbial communities involved in biofilm formation between farms and cheese plants. Relevant information on the impact of management practices on biofilm occurrence will be generated to formulate recommendations to farmers and cheese producers for the management of milk quality and equipment sanitation. Moreover, the study of beneficial biofilms on both the artisanal and industrial scale of cheese making will allow the sector to better characterize the microbial communities responsible for the quality of the products of a specific cheese maker.

The participation of 60 Canadian dairy farms and two dairy processors will contribute to the successful completion of the project.

FUNDING PARTNERS:



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NOTE: As per the research agreement, aside from providing financial support, the funders have no decision-making role in the design and conduct of the studies, data collection and analysis or interpretation of the data. Researchers maintain independence in conducting their studies, own their data, and report the outcomes regardless of the results. The decision to publish the findings rests solely with the researchers.