Project

Understanding the contribution of milk composition and microflora during ripening of cheeses

Principal Investigators:
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National Dairy Research Strategy investment priority targeted:
• Microbiology – Better understanding of the impact of microbes on milk and dairy products composition and quality

PERIOD: 2019-2022
TOTAL BUDGET: $682,570

Why this research is important:

Cheese contains a natural microflora that varies in terms of its abundance and composition. This microbiota is an important element of cheese typicity and quality. The variations in the composition of the natural microbiota are a source of constant challenge for cheesemakers because they affect how the product tastes. Consumers expect the flavour, colour and texture of each cheese to be consistent and optimal, regardless of the season. In Canada, we know that the composition of summer milk is less rich than in fall, and that the season affects the nature of milk microbiota. The cheese yield from summer milk is also lower, and seasonal variations affect cheese ripening. However, little is known about the link between the factors that influence the natural microbiota of milk and cheese, especially on the role it plays during ripening. To better develop and produce fine cheeses, this project aims to identify the contributions of several environments on the composition of natural cheese microflora, including the farm, milk transport and the cheesemaking environment. In addition, the project aims to analyze the effect of modern milk filtration technologies on the resulting microbiota. This knowledge will be used to equip farmers and processors with the best practices for producing and processing milk with the sought-after characteristics for developing speciality cheeses.

Research objective:

Better understand and control the microbiological and chemical factors of milk that affect its cheese-making quality.

Project overview:

Eight cheese plants will participate in this research project, four that process more than one million litres per year, and four that process less than one million litres per year. At these cheese plants, it will be possible to trace milk from the farm to the factory, and to take samples at different times. Two types of cheese will be studied: Cheddar and washed-rind cheese. At each sampling time, samples will be taken from milk in the bulk tank on the farm, when exiting the delivery truck, before processing (and after heat treatment) and from the cheese produced (three samples per ripening time). The microbiological characterization of the milk samples will be done using a molecular biology approach. The effect of the natural microbiota of milk on cheese and its texture will be assessed by producing one clarified milk, that is free of microorganisms, and one that will be reseeded with an isolated and characterized complete microbiota. Once the microbiota is characterized, other factors, such as the milk protein concentration or the application of heat treatments that influence the microflora composition, the levels of natural antimicrobial protein of milk and mineral balance, will be tested in a lab-scale cheese production environment.

Expected outcomes:

This project will lead to a better understanding of the composition of natural microbiota in the various dairy environments (from farm to ripening cave) as well as an understanding of the contribution of these species during ripening, through the different seasons and the use of various manufacturing technologies. Diagnostic tools and recommendations regarding factors that affect cheese quality will be developed for dairy farmers and processors. This will benefit the entire cheese industry to improve how it predicts the development of cheese texture, and identify the technological levers that can be used to control it. This kind of improvement will certainly help reduce variations in cheese quality and production costs.

The participation of eight Canadian dairy processors will contribute to the successful completion of the project.

FUNDING PARTNERS:

CANADIAN AGRICULTURAL PARTNERSHIP

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