

Better understanding the role of the milk typicity in the quality of fine cheeses

Duration : 2012 –2016

Highlights

In Quebec, locally produced products are becoming increasingly important to consumers. This project is one of the rare undertakings exploring the characteristics of locally produced milk and the characterization of indigenous fungal species in fine cheeses.

The project has allowed us to:

- Establish that indigenous yeasts from local products have unique characteristics that allow them to survive and either compete or work in synergy with starter cultures;
- Identify the flavour compounds generated by these microorganisms, creating the possibility of inoculating cheeses with the species studied in order to control flavour production;
- Demonstrate that there is a local influence since some milk from the same breed of cow differed in composition and fermentability depending on the origin of the milk;
- Demonstrate that a starter culture composed of multiple lactococcal strains may behave differently depending on whether it is used in raw or pasteurized milk; and
- Generate new information allowing us to keep records of cheesemakers

Objectives

The general objective of the project is to increase microbiological and technological knowledge about local milks in order to improve and regulate the quality of fine artisanal cheeses from Quebec and identify their unique characteristics.

Obj. 1. Verify the influence of the indigenous fungal microflora of milk on the cheese ageing process.

Obj. 2. Determine the impact of secondary fungal microflora on the flavour profiles of cheeses.

Obj. 3. Determine the components of milk that influence the growth of fungal microflora involved in the ageing process and secondary microflora.

Results and potential benefits

Major findings. The interactions between 12 indigenous yeast strains of raw milk and two Fungi used in the cheese ageing process were characterized. A molecular quantification method (gPCR) was optimized for some of the strains to evaluate the distribution of species in local cheeses. These species were also analyzed to examine their contribution to cheese flavour profiles. Floral, malted and rancid flavours were also associated with some of the indigenous yeast species. We also compared the composition of milk from different breeds (Canadian, Jersey, Brown Swiss, Holstein and industrial) and different regions of Quebec, as well as their impact on the growth of lactococcal strains and yeasts. For a single breed, the origin of the milk (region/locality) had a non-negligible influence on composition. In general, the lactococcal

strains grew better in milk from Brown Swiss cattle. Pasteurization of the milk improves growth rates (1 additional log) and lactic acid production is 4 times higher than in raw milk. It was demonstrated that some lactococcal strains only required the presence of caseins to grow while others also required the presence of serum proteins.

Economic and social impacts. This study allows for a better understanding of the impact of milk composition and indigenous microflora on the properties of local cheeses. This information helps us to identify the particularities of milk produced locally and the key indigenous species that have an impact on cheese quality.

Contact persons

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Professionals trained

Joanie Côté, M.Sc. candidate. Technological and physico-chemical properties of different types of milk (microbiology, physical chemistry)

Andréanne Lamarche, M.Sc. candidate. Distribution of local yeast strains (microbiology, molecular biology)

Ariane Pelletier, M.Sc. candidate. Optimization of an identification technique for flavours produced by local yeast strains (microbiology, analytics)

Annick Raymond-Fleury, B.Sc. student. Optimization of the barcoding method for rapid identification of milk yeasts and moulds (microbiology, molecular biology)

For further information

- Scientific articles concerning the detection of local yeast strains and the production of volatile compounds from the strains (in the process of being written)
- Presentations in the form of posters at the 2016 IDF Cheese Science & Technology Symposium

Financial contributions

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- Novalait

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