

Sources of contamination of raw milk butter with *Escherichia coli* during processing

Naomi Barbosa, Amaury Gérard, Sybille Di Tanna, Marianne Sindic

Laboratory of Quality and Safety of Agro-Food Products, Gembloux Agro-Bio Tech, University of Liège, Passage des Déportés, 2, 5030, Gembloux, Belgium

Email : naomi.barbosa@uliege.be

Introduction

In Wallonia, many farms make butter from raw milk to diversify their production and yield.

This product must comply with Regulation (CE) No 2073/2005 on microbiological criteria for foodstuffs. Enumeration level of this bacterium is an indicator of the hygiene of the manufacturing process.

Objectives

Analyze *E. coli* contamination in order to improve the sanitary quality of raw milk butter:

- to identify during which phase(s) and through which surface(s) contamination with *E. coli* occurs.
- To identify the elements that favor the development of *E. coli* throughout the butter manufacturing process

Materials and method



Surface samples: milk pipeline; junction with skimmer; skimmer; ripening vessel; churn.

Samples of dairy products: whole milk; cream; skimmed milk; matured cream; butter.

Results

Overall, out of 18 batches of butter, 14 (78%) were of unsatisfactory microbiological quality regarding *E. coli*, which is not surprising provided that every visited farms faced recurrent problem with this bacterium.

Significant effect of manufacturing parameters on *E. coli* levels was evaluated using ANOVA.



Milk

On several occasions, milk pipeline was identified as a critical point and an influence of the cleanliness of this inlet could be observed ($p_{\text{value}} = 0.006$).

Microbial quality of raw milk butter was significantly impacted by overall quality of raw material (milk - $p_{\text{value}} = 0.040$) or intermediate products (cream - $p_{\text{value}} = 0.004$).



Skimming

On a few occasions, junction between pipeline and skimmer was a critical point. This orifice is narrow, making cleaning procedure by hand or in the dishwasher tricky.



Ripening

Enrichment of cream with lactic starters can significantly impact microbial quality of raw milk butter ($p_{\text{value}} = 0.034$), though competition between these mesophilic bacteria and cream microflora, including beneficial, spoilage and pathogenic bacteria. Through lactic acid production, starters create an environment less favorable for *E. coli*.

Conclusion

The objective of this study was to identify the sources of *E. coli* contamination of raw milk butter and to study the development of this bacterium during butter manufacture. Surface samples identified two areas that were most frequently contaminated. It is therefore necessary to clean and disinfect all surfaces meticulously, paying particular attention to two identified critical points. In addition, the study tried to determine factors that could influence the contamination of dairy products with *E. coli*. A clear correlation was identified between the microbiological quality of the milk used (and thus of the cream) and the microbiological quality of the butter produced. A beneficial impact of lactic starters during cream maturation was identified.

The study found sources of *E. coli* contamination on the participating farms, but also identified points of attention that could help other producers facing this problem.

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