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The use of challenge studies to explore the fate of *Listeria monocytogenes* in artisanal cheese varieties from Belgium

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INTRODUCTION

In the European Union, Regulation (CE) No 2073/2005 demands that *Listeria monocytogenes* remains undetected in cheese varieties allowing its growth, before sales by the manufacturer. A threshold value of 100 cfu/g is tolerated at this step in cheeses not suitable for the growth of this pathogen. Defining more accurately cheese varieties allowing or not the development of *L. monocytogenes* is thus a priority, especially to avoid unnecessary economic losses for producers. Predictive microbiology software could be used for this purpose, but available models are only based on data acquired through *in* vitro studies, not taking into account matrix effect. As a result, predictions are generally too pessimistic. Currently, challenge studies, involving the artificial inoculation of the pathogen in cheese, remain a more appropriate method to assess the growth of *L. monocytogenes* in food.

OBJECTIVES

The goal of this investigation was to perform challenge studies in order to provide knowledge on the growth potential (δ) of *L. monocytogenes* in several varieties of artisanal cheeses manufactured in Belgium. Only cheeses produced in dairy farms were considered. δ obtained using three methods of calculation were compared.

SAMPLING

Unripened acid-curd cheeses (12 batches)

https://commons.wikimedia.org

Mold-ripened soft cheeses (12 batches)

Smear-ripened soft cheeses (12 batches)

https://commons.wikimedia.org

Gouda-type cheeses (12 batches)

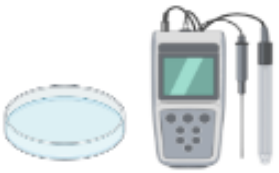
St-Paulin-type cheeses (20 batches)

https://commons.wikimedia.org

METHODOLOGY

Day 0 (D0)

Each batch was composed of 12 cheeses. Using a syringe, a cocktail of 3 strains of *L. monocytogenes* isolated from dairy products was inoculated in 6 samples/batch. Other 6 samples were used as controls.



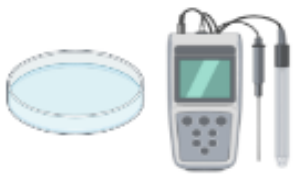
Microbiological enumerations † and physicochemical analyses* on 3 controls and 3 samples.

Shelf-life

8±1°C

Unripened cheeses: 14 days
Ripened cheeses: 30 days

Use-by date (UBD)



Microbiological enumerations† and physicochemical analyses* on the remaining samples. Calculation of δ‡

***Physicochemical analyses**

pH
Water activity
Dry matter
Salt content
Fat content

†Microbiological enumerations

L. monocytogenes
Escherichia coli
Lactic acid bacteria (22°C)
Total microflora (22°C)
Yeasts and molds

‡δ calculation (log cfu/g)

1. EURL *Lm*

median(UBD)-median(D0)

2. NVWA

If standard deviation at UBD > 0.5 log cfu/g:
max(UBD)-median(D0)

Else:
median(UBD)-median(D0)

3. FASFC

max(UBD)-min(D0)