

**Monitor populations of Staphylococcus aureus and
Escherichia coli in 3 lots of raw milk Brie de Meaux**

Summary of results

1. MAIN GOAL

As part of the updating of its “Guide des Bonnes Pratiques d’Hygiène” (GBPH) and application of HACCP principles, the “Syndicat des Crémiers Fromagers de l’Île de France” (SCF IDF) undertook an approach to conducting aging tests on products identified as particularly susceptible to microbiological hazards.

Five cheese technology were selected for these tests (Steering Committee March 31, 2011). These tests are designed to track the behavior of unwanted germs Staphylococcus aureus and Escherichia coli in representing each of the five technological products subject to ripening conditions usually employed by the cheesemongers.

This report describes the evolution of these two bacterial species in 3 lots of raw milk "Brie de Meaux" cheeses selected as representative of cheese technology: soft cheese with bloomy Rind fleurie (PMCF) (steering committee of 14 October 2011).

2. RESULTS

Analyzed cheeses

The identification of three lots of cheese received by the laboratory LARF74 Actilait is presented below. They were sent from a dairy partner of CFS-IDF directly packaged refrigerated. However, on request of the CFS-IDF, records copies accompanying cheeses, may be provided to them. These lots of cheese were chosen because they showed initial contamination (according to regulation) in E. coli and S. aureus and countable sufficient to achieve aging tests. They were identified by the cheese under his own checks.

At reception cheeses were aged, according to the information recorded on their record Accompanying, 34 days for lot BC2309M, 30 days for lot MA2709M and 25 days for the lot made on 14/10/11.

NAME	cheesemaking date	Batch n°	Expedition date	Reception date LARF74
Brie de Meaux	23/09/2011	BC2309M	26/10/11	27/10/11
Brie de Meaux	27/09/2011	MA2709M	26/10/11	27/10/11
Brie de Meaux	14/10/2011	Ni*	07/11/11	08/11/11

ni: not indicated reference, the date of cheesemaking was therefore chosen to identify this batch of Brie in the remainder of this report (reference data = fab14 / 10/11).

Cheeses conservation methods

The three lots of cheese were kept under the conditions of temperature and humidity defined by SCF IDF (document distributed at the Steering Committee of 14 October 2011) for Cheese technology of soft cheese with bloomy rind, these conditions were:

- Unpackaged cheese on stainless steel rack

- Constant temperature of 13 ° C,
- Saturated humidity
- Maximum aging to apply: 90 days,
- Type of care: one return every cheeses by week.

3. Results

Physicochemical characteristics of cheeses

Changes in physico-chemical characteristics of 3 lots of Brie followed is presented below.

The values are averages and standard deviations obtained for the samples at each stage of sampling

Réf lot	BC2309M						
jours à 13°C (J)	J0	J11	J21	J29	J39		
Date analyse	27/10/11	07/11/11	17/11/11	25/11/11	05/12/11		
pH	4.8±0.23	5.88±0.36	6.12±0.35	6.77±0.13	7.44±0.18		
aw	0.989 ±0.003	0.976 ±0.005	0.962 ±0.004	0.964 ±0.005	0.972 ±0.005		
Réf lot	MA2709M						
Date analyse	27/10/11	07/11/11	17/11/11	25/11/11	05/12/11		
jours à 13°C (J)	J0	J11	J21	J29	J39		
pH	4.45±0.07	5.48±0.07	5.68±0.21	6.47±0.07	6.79±0.11		
aw	0.985 ±0.002	0.980 ±0.003	0.965 ±0.003	0.961 ±0.003	0.971 ±0.004		
Réf lot	fab14/10/11						
Date analyse	08/11/11	17/11/11	25/11/11	05/12/11	12/12/11	19/12/11	3/01/12
jours à 13°C (J)	J0	J9	J17	J27	J34	J41	J56
pH	4.5±0.16	4.92±0.06	5.20±0.29	6.17±0.29	5.97±0.03	6.36±0.34	6.68±0.03
aw	0.985 ±0.001	0.981 ±0.003	0.965 ±0.001	0.972 ±0.003	0.966 ±0.002	0.968 ±0.002	0.951 ±0.007

Microbiological results:

The results obtained at various stages of sampling are summarized below, expressed in CFU / g cheese. The values are the averages for three samples of same batch of cheese to each analysis time.

Réf lot	BC2309M						
jours à 13°C (J)	J0	J11	J21	J29	J39		
Date analyse	27/10/11	07/11/11	17/11/11	25/11/11	05/12/11		
<i>E. coli</i>	800	2300	860	<10	<10		
<i>S. aureus</i>	25	<10	<10	nr	nr		
Réf lot	MA2709M						
Date analyse	27/10/11	07/11/11	17/11/11	25/11/11	05/12/11		
jours à 13°C (J)	J0	J11	J21	J29	J39		
<i>E. coli</i>	1100	9700	1500	ne 17	<10		
<i>S. aureus</i>	35	<10	<10	<10	nr		
Réf lot	fab14/10/11						
Date analyse	08/11/11	17/11/11	25/11/11	05/12/11	12/12/11	19/12/11	3/01/12
jours à 13°C (J)	J0	J9	J17	J27	J34	J41	J56
<i>E. coli</i>	3500	980	390	50	180	ne 10	<10
<i>S. aureus</i>	400	42	<10	<10	nr	nr	nr

nr : non réalisé, ne = nombre estimé, <10 : les 3 échantillons ont un dénombrement inférieur à 10 UFC/g

Qualities appreciation of cheeses

During conservation at 13 ° C, the cheeses have evolved, especially:

- The texture of the body: the disappearance of the "plastery" heart in favor of a texture more, creamy soft and homogeneous.
- The appearance of their rind that has become progressively more wrinkled, less smooth.
- A browning of the rind (greater on lots BC2309M and MA2709M)
- The release of a characteristic odor of urea indicator advanced proteolysis.

At the last stage analyzed (cheese stored 41 days at 13 ° C in a humid atmosphere), both received first lot had a general appearance strongly degraded and a strong smell, elements considered as making these cheeses unattractive for consumption by staff responsible for technical analysis.

For lot "fab14 / 10/11" in J41 stage, cheeses were less physically degraded although also characterized by a strong smell of urea-type. Photos of this cheeses lot aged 41 days illustrate aging observed at this stage.



Appearance of Brie lot "fab 14/10/11" after 41 days of storage at + 13 ° C

4. CONCLUSIONS

The three lots of cheese name "Brie de Meaux" were analyzed to track changes in their levels of coagulase-positive staphylococci and Escherichia coli during aging at a constant temperature of 13 ° C in humid atmosphere maintained.

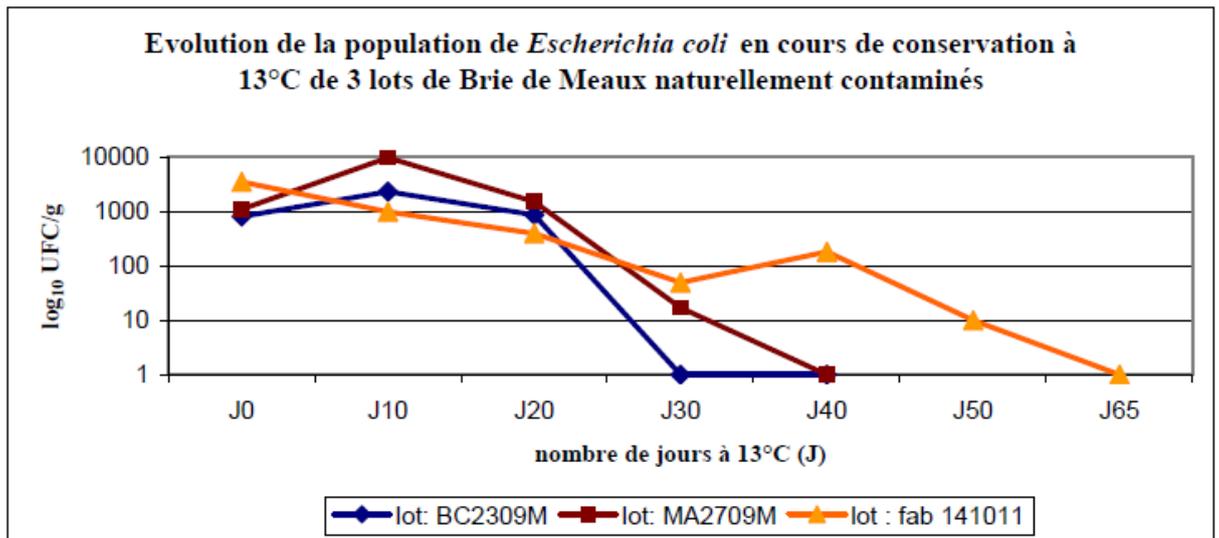
Cheeses were ripened under visual appreciation indicators proteolysis body (softening giving a "creamy" appearance).

This is confirmed by the evolution of the pH of the body (pH increase of 1, 9 to 2.4 units between the 1st and 40th day of storage).

During the same time, the cheeses aw slightly decreases from an average value of 0.99 to 0.97 after receiving 40 days of conservation.

About microbial populations monitored, cheeses contained in reception low levels of *S. aureus* although quantifiable. The samples contained less 1000 cfu / g for one of 3 lots (fab 14/10/11), the other 2 with less than 100 levels cfu / g (BC2309M and MA2709M). During conservation at 13 ° C, their population in *S. aureus* decreased rapidly: it was no longer detectable at 10 days (D10) for the first two lots, and from J17 for the laste lot (fab14 / 10/11).

For *E. coli*, the monitoring realised on three lots received shows that cheeses conservation at a constant temperature of 13 ° C, populations of this organism hygiene indicator decreased regularly during storage to a level less than 10 CFU / g, as shown in the diagram below.



In conclusion, for the 3 lots of Brie de Meaux subject to study aging in stable conditions of temperature at 13 ° C for at least 39 days, a regular reduction of *E. coli* and *S. aureus* populations was observed.