



**HAL**  
open science

## Effect of enriching milk with native micellar casein upon the quality and biological values of Kashkaval cheese

Zh Simov, Jean-Louis Maubois, E Simova, Marie-Hélène Famelart

### ► To cite this version:

Zh Simov, Jean-Louis Maubois, E Simova, Marie-Hélène Famelart. Effect of enriching milk with native micellar casein upon the quality and biological values of Kashkaval cheese. IUFoST 13th World Congress of Food Science and Technology, Sep 2006, Nantes, France. hal-02215924

**HAL Id: hal-02215924**

**<https://hal.science/hal-02215924>**

Submitted on 31 Jul 2019

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## Effect of Enriching Milk with Native Micellar Casein Powder Upon the Quality and Biological Values of Kashkaval Cheese

Simov, Zh.<sup>1</sup>, Maubois, J-L<sup>2</sup>., Simova, E.<sup>3</sup>, Famelart, M-H<sup>2</sup>

<sup>1</sup> University of Food Technologies, 26 Maritza Blvd, 4002 Plovdiv, Bulgaria,  
simov\_z@yahoo.com

<sup>2</sup> UMR 1253 Science and Technology of Milk and Eggs, INRA – Agrocampus Rennes, 65  
Saint-Brieuc str, 35042 Rennes Sedex, France

<sup>3</sup> Institute of Microbiology, Bulgarian Academy of Science, 26 Acad. G. Bonchev str, 1113  
Sofia, Bulgaria

### Introduction

The Kashkaval is traditional Bulgarian cheese made by curd cheddaring and heat treating in hot salt solution (Carič, 1993; Kojev, 2002). Development and application of new native micellar casein concentrates for regulation the casein content of the milk for production of different types cheeses – traditional and new is a matter of special interest. That problem has particularly actuality in using of caw milk with low casein content during some seasons.

### Materials and Methods

The experimental work was carried out in LRTL – Rennes, France. The following raw materials have been used: skim caw milk, thermized at 63 – 65 °C for 15 – 20 sec and cooled to the temperature of 4 °C with casein content - 21 g kg<sup>-1</sup> and fat content– 0.5 g kg<sup>-1</sup>; pasteurized and cooled cream with fat content 380 g kg<sup>-1</sup>; native micellar casein concentrate powder, obtained by tangential microfiltration of skim milk. Caw milk casein standardization (27 g kg<sup>-1</sup>) was carried out by using of native micellar casein powder water solution with casein content of 125 g kg<sup>-1</sup>. The fat mater standardization of milk was carried out for maintaining the casein/fat mater ratio – 0.78. Starter culture including *Lc. lactis* ssp. *lactis* C2, *S. thermophilus* P23 and *Lb. casei* ssp. *casei* RP5 in quantity of 5 g kg<sup>-1</sup> was used.

The level of proteolysis (%) during ripening was measured by the ratio pH 4.6-SN/NT (%) and depth of proteolysis – 12% TCA-SN/pH 4.6-SN (%). The free amino acids concentration was determined by using of automatic amino acid analyzer Pharmacia LKB, Alpha Plus Series 2.

The Kashkaval cheese microstructure at D+1 and D+30 days was examined by means of scanning electron microscope SEM, Philips XL 20.

### Results and Discussion

Starter bacteria in Trial Kashkaval (A) manifested more dynamic growth, leading to faster

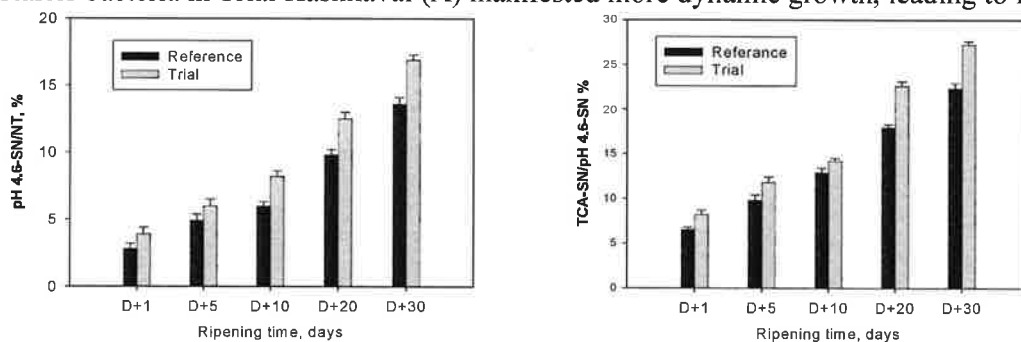
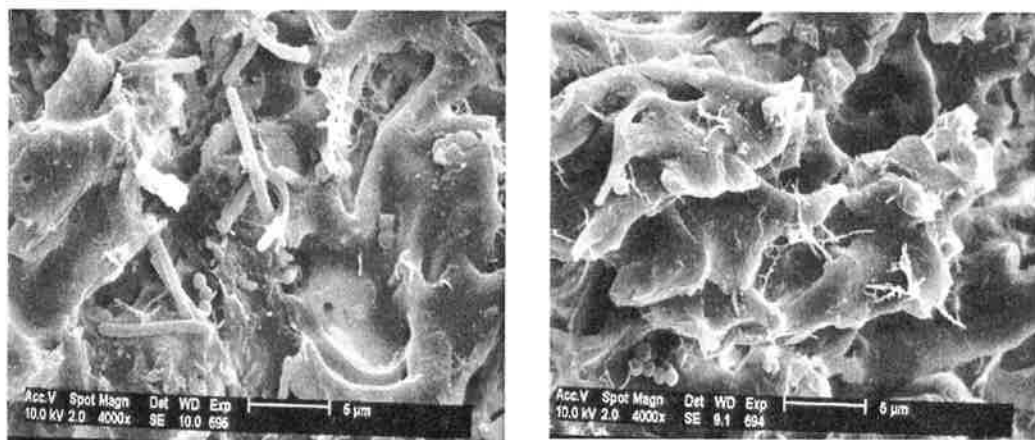


Figure 1. Changes in pH 4.6-SN/NT and 12% TCA-SN/pH 4.6-SN during ripening of Trial Kashkaval (A) from casein standardized caw milk (27 g kg<sup>-1</sup>) and Reference Kashkaval (B) from non casein standardized caw milk (21 g kg<sup>-1</sup>).

cheddaring of the curds and high cell concentration in the ripening Kashkaval ( $7.4 \times 10^8$  cfu  $g^{-1}$  –mesophilic bacteria and  $3.0 \times 10^8$  cfu  $g^{-1}$  –thermophilic streptococci).

The participation of cocci decreased during ripening, while *Lb. casei* RP5 increased to 97% in 90-day-old Kashkaval A. Kashkaval A ripened faster and at day 30 had a level of proteolysis 16.9% compared to 13.6% in Kashkaval B, depth of proteolysis 27.2% compared to 22.3% in Kashkaval B (Figure 1). Higher concentration of free amino acids – 521.6 mg (100 g) $^{-1}$  in Kashkaval A was observed.

It can be seen that the Trial Kashkaval protein matrix (Figure 2b) had pronounced longitudinal fibrillar orientation compared to the Reference (Figure 2a).



a - Reference

b - Trial

Figure 2. Microstructure (SEM) of young Kashkaval cheese, magnification 4000 x.

The protein matrix of ripened Kashkaval cheese loses its fibrillar structure to a significant extent as a result of the casein proteolysis.

### Conclusions

There was established higher water soluble nitrogen fractions values during ripening of Trial Kashkaval cheese produced by casein standardized ( $27 \text{ g kg}^{-1}$ ) raw milk. The level of proteolysis expressed as pH 4.6 - SN/NT ratio reaches 16.9 % at the 30-th day of ripening and depth of proteolysis (12 % TCA-SN/pH 4.6-SN) – 27.2 %.

The higher concentration of free amino acids –  $521.6 \text{ mg (100g)}^{-1}$  in Trial Kashkaval is an indicator for its greater nutritional and biological value.

The protein matrix of the Trial Kashkaval cheese (D+1) day had pronounced longitudinal fibrillar orientation compared to the Reference, which loses significantly its fibrillar structure as a result of the casein proteolysis.

**Acknowledgements:** The authors wish to thank Mrs. Berrier from the department of Electron microscopy INRA-Rennes for the technical assistance during performance of the Electron microscopy investigations.

### Reference

1. Carič, M. 1993. Ripened cheese varieties native to the Balkan countries. in Cheese: Chemistry, physics and microbiology, vol. 2., 2nd ed. Chapman & Hall, London, 263-280
2. Kojev A. 2002. Kashkaval. Hot-brined cheese, pp. 55-58. Ed. Kojev, A. Association of Dairy Processors in Bulgaria (ADP), Sofia, Bulgaria.