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

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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 fallowing 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^{-1} and fat content– 0.5 g kg^{-1}; pasteurized and cooled cream with fat content 380 g kg^{-1}; native micellar casein concentrate powder, obtained by tangential microfiltration of skim milk. Caw milk casein standardization (27 g kg^{-1}) was carried out by using of native micellar casein powder water solution with casein content of 125 g kg^{-1}. 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^{-1} 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

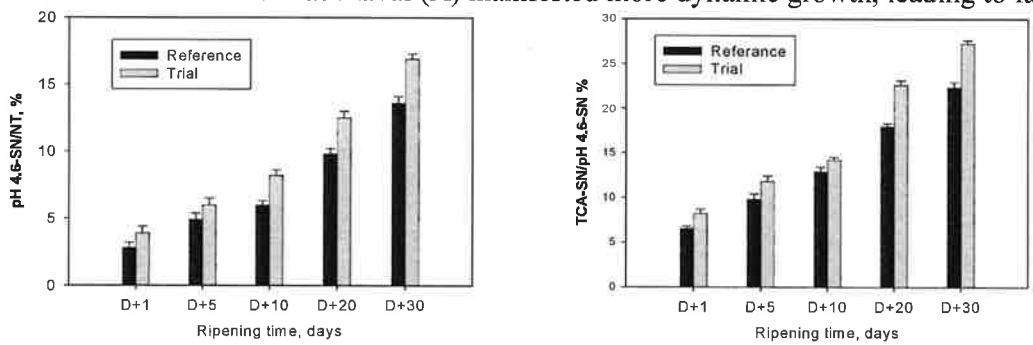
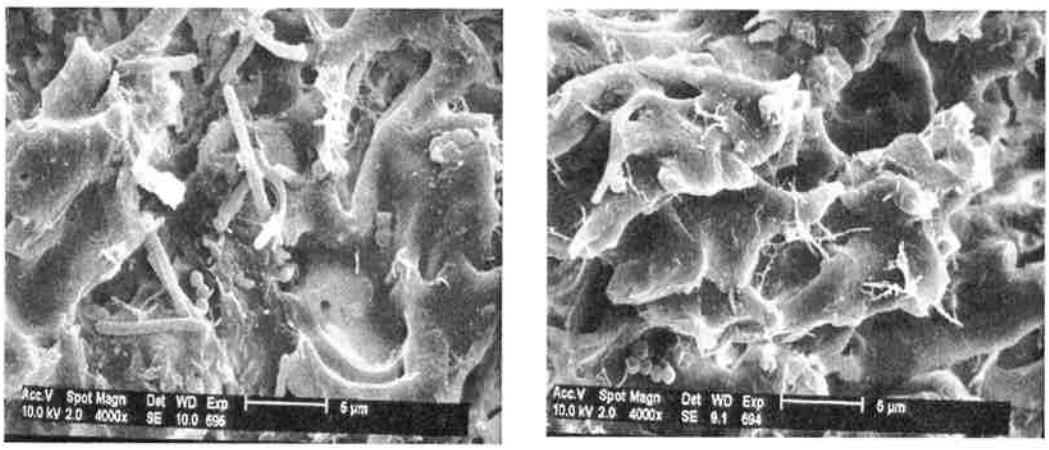


Figure 1. Changes in pH 4.6-SN/NT and 12% TCA-SN/pH 4.6-SN during ripening of Trial Kashkaval (A) from casein standardized caw milk (27 g kg^{-1}) and Reference Kashkaval (B) from non casein standardized caw milk (21 g kg^{-1}).

cheddaring of the curds and high cell concentration in the ripening Kashkaval ($7.4x10^8$ cfu g^{-1}–mesophilic bacteria and $3.0x10^8$ 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 fibrilar 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 looses its fibrilar structure to the significant extend 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 g kg^{-1}) caw 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 mg $(100g)^{-1}$ in Trial Kashkaval is indicator for its greater nutritional and biological value.
The protein matrix of the Trial Kashkaval cheese (D+1) day had pronounced longitudinal fibrilar orientation compared to the Reference, which looses significantly its fibrilar structure as a result of the casein proteolysis.

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Reference

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