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ORIGINAL ARTICLE

RESEARCHES REGARDING THE VARIATION OF THE MONOCALCIC PARACASEINATE AMOUNT PROBIOTIC CHEESE TELEMEA*

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The coagulum obtained at the rennet curdling (the dicalcic paracaseinate) is transformed gradually, under the lactic acid action, in monocalcic paracaseinate which is soluble in 5% NaCl solution at 50 – 55^{O}C. This proteic fraction, in the presence of the salt in cheese, has an adhesive capacity, higher than other paracaseinates and therefore it has a notable influence over the rheological characteristics of the cheese. The proteolysis evolution in the probiotic cheese Telemea was analyzed comparing the classic cheese Telemea and the probiotic one by determining the nitrogen fractions and as well by determining the variation of the monocalcic paracaseinate.

Key words: paracaseinates dicalcic paracaseinate, monocalcic paracaseinate, classical Telemea (TC), probiotic Telemea (TB).

1. Introduction

Cheese is the most complex of the dairy products, involving chemical, biochemical and microbiological processes. In Romania, a lot of cheese assortments are made, but the Telemea chesse is the most appreciated by the consumers. After the ripening period it has a unique fl avour, taste and aroma. Cheeses similar to this type are extensively manufactured in the Balkan countries known as Kashkaval and Kasseri (Costin, 2003).

There are different types of probiotic cheeses available on the market worldwide. Bifidobacteria are the most widely used probiotic in cheese. Probiotics, as well as other nutritional supplements (antioxidants, vitamins, herbs, etc.), have been added to shredded natural cheese. Bacteria with probiotic properties could be included with cheese starters added directly to cheese milk or to the curd before hooping (NLAB, 2002). In the last two decades, research has been focused on finding new starter cultures suitable for the maturation of cheeses, and the methods to shorten the time of maturation, including the use of different packaging materials (Ross *et al*., 1999).

Cheese is a visco-elastic material. The consistency of cheese affects its eating quality, usage properties (cutting, grating, etc.), handling properties (shape retention), ease of curd fusion and rind formation, as well as eye formation (McSweeney, 2004).

During (and after) deformation, a part of the mechanical energy supplied to cheese is stored in the material (elastic part) and partly dissipated (viscous part). Rheological properties of cheese depend mainly on its composition (water, protein, fat, and salt content), pH value, protein degradation, and temperature (Costin, 2003).

2. Material and method

The cheese was fabricated using cow milk with the following characteristics: density 1.028 kg/m^3, acidity 19°T, pH 6.6 and fats 3%.

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Two experimental varieties of Telemea cheese: with classical (TC) and probiotic culture (TB) were analyzed after pressing and salting every 5 days during the 40 days maturation by the Kjeldahl method.

3. Results and discussions

The coagulum obtained during the rennet curdling – the dicalcic paracaseinate – is transformed gradually, under the lactic acid action, in monocalcic paracaseinate which is soluble in 5% NaCl solution at 50.5°C. This proteic fraction, in the presence of the salt from cheese, has an adhesive capacity, higher than other paracaseinates and therefore it has a notable influence over the rheological characteristics of the cheese.

If the lactose fermentation is very intense inside the coagulum and the pressed cheese, the lactic acid will remove the calcium from the monocalcic paracaseinate forming the paracasein which does not have the same adhesive capacity, thus obtaining cheeses with friable texture paste. The transition rate of the bicalcic paracaseinate in monocalcic paracaseinate and then in paracasein influences decisively the rheological characteristics of the cheese. Therefore, it is important to determine the proportion of monocalcic paracaseinate for different stages of the telemea cheese fabrication.

The data shown in table 1 and figures 1 and 2 does not reveal differences between the two types of cheese in terms of the monocalcic paracaseinate evolution. It represents only 0.90% of the pressed cheese and 0.82% of the total nitrogen.

Table 1. The variation of the monocalcic paracaseinate content for the Telemea cheese fabrication

Fabrication stage	Nitrogen in monocalcic paracaseinate							
	% cheese		% D.S.		% NT		% water soluble nitrogen	
	TC	TB	TC	TB	TC	TB	TC	TB
After pressing	0.027	0.023	0.074	0.067	0.90	0.82	0.95	0.85
After salting	0.116	0.114	0.295	0.299	3.60	3.65	3.85	3.79
After 5 days	0.300	0.284	0.739	0.715	9.01	8.73	9.74	9.12
After 10 days	0.582	0.542	1.408	1.346	17.17	16.43	18.65	17.64
After 15 days	1.312	1.336	3.171	3.201	38.67	39.08	42.17	42.48
After 20 days	1.504	1.589	3.635	3.697	44.32	45.02	49.60	50.00
After 25 days	1.685	1.838	4.071	4.129	49.65	50.41	59.34	59.31
After 30 days	1.818	1.960	4.392	4.401	53.57	53.98	64.40	63.48
After 35 days	1.970	2.204	4.762	4.948	58.07	60.42	70.03	71.97
After 40 days	2.027	2.273	4.902	5.102	59.79	62.30	72.09	74.20

*TC – classical Telemea, *TB – probiotic Telemea

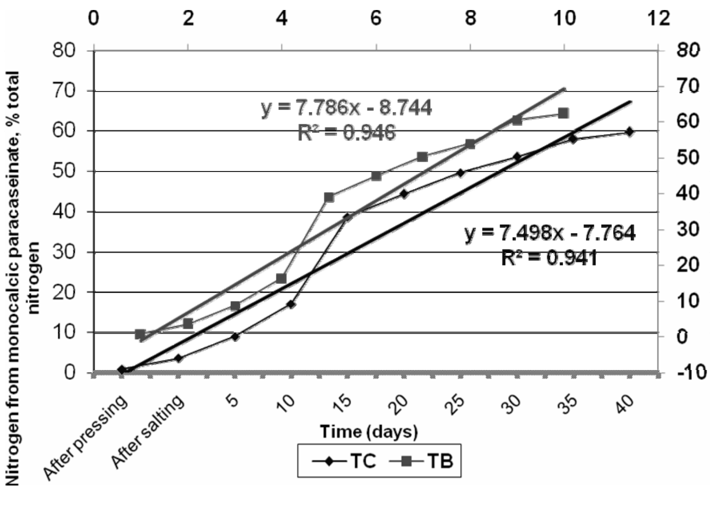

Figure 1. The monocalcic paracaseinate evolution (%NT)

Because of the increased acidity during salting, the monocalcic paracaseinate content increases approximately 4.0 times in the classical cheese and 4.5 times in the probiotic cheese towards the pressed cheese. The forming of the monocalcic paracaseinate during the first 15 days of maturation is intense, its content being 10 times increased in both types of cheese. Afterwards, the forming of the monocalcic paracaseinate is slowing down. After 25 days of maturation the nitrogen in the monocalcic paracaseinate represents 50% of the total nitrogen. It is interesting to point out that after 40 days; 72-74 % of the total fractions insoluble in water represents the nitrogen in the monocalcic paracaseinate. According to figures 1 and 2 it can be evaluated that a linear correlation between the evolutions of the monocalcic paracaseinate (% total N and % water soluble N) during the fabrication of the probiotic cheese Telemea does exist, since the factor $R^2 > 0.9$ in both cases.

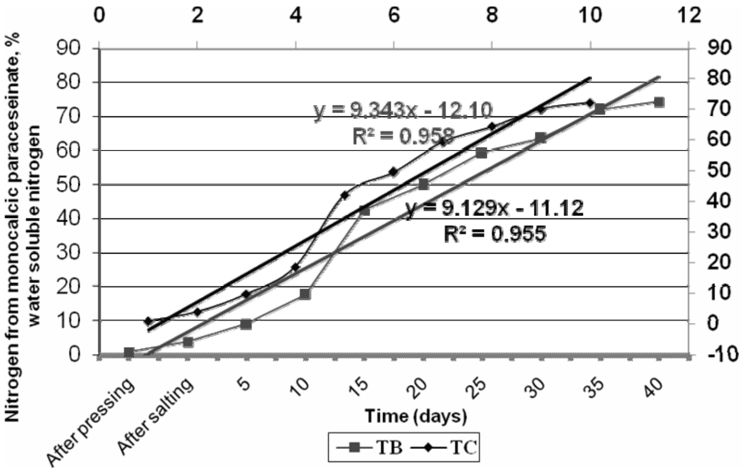

Figure 2. The monocalcic paracaseinate evolution (% water soluble nitrogen)

4. Conclusions

As a final consideration, it is concluded that the dicalcic paracaseinate is transformed gradually, under the lactic acid action, in monocalcic paracaseinate.

This proteic fraction, in the presence of the salt in the cheese, has an adhesive capacity, higher than other paracaseinates and therefore it has a notable influence over the rheological characteristics of the cheese.

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The forming of the monocalcic paracaseinate during the first 15 days of maturation is intense, its content being 10 times increased in both types of cheese. After 25 days of maturation the nitrogen from the monocalcic paracaseinate represents 50% of the total nitrogen. After 40 days, 72-74 % of the total fractions insoluble in water, represent the nitrogen in the monocalcic paracaseinate.

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