

CONTRIBUTIONS TO THE KNOWLEDGE OF QUANTITATIVE MODIFICATIONS FROM CHEESES DURING MATURATION PERIOD

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Abstract

Research had in view the evolution of nutritive substances losses from cheeses during maturation. Were studied 4 assortments belonging to 2 cheeses groups (Dobrogea pressed cheese and Dalia pressed cheese from the group of cheeses with scalded paste respectively sheep feta and cow feta from the group of the ones matured in brine). Gathering of samples for establishing the protein and fat content was realised on a non-matured product and after that at each 10 days of maturation; maturation duration was the one applied in the processing unit, respectively 60 days for pressed chesses and 40 days for feta. At the end of maturation, protein content in cheeses with scalded paste was lower with 12.10%-Dobrogea and with 13.02%-Dalia face to the one obtained at the beginning of maturation, while at cheeses matured in brine the decreasing of protein quantity was much more higher, 20.41%-sheep feta and 24.51%-cow feta. Fat content from the analysed cheese assortments had a similar evolution as the proteins, with the mention that decreasing levels (related with non-matured product) were lower, only 9.12-9.61% at pressed cheeses respectively 10.30-13.12% at those two feta assortments. The obtained results show the fact that cheeses matured in brine had a high rate of nutritive substances losses in comparison with the ones with scalded paste, situation valid also for the ones made from cow milk face to the ones obtained from sheep milk.

Key words: cheeses, maturation, modification, proteins, lipids

INTRODUCTION

Maturation is a specific stage and a very important one in cheeses processing technologies, because it is responsible for inducing of some particular characteristics to each assortment, function of manifestation degree of certain complex biochemical reactions [2, 4, 5].

At the beginning of maturation period took place acidification of paste (lactose is transformed in lactic acid) and a slight degradation of casein, after that could be observed a gradual intensification of the biochemical transformations (especially for proteins and lipids), towards the end of maturation to be formed flavour (taste and smell) specific to a certain kind of cheese [1, 3, 5].

Consequence of lactic acid accumulation in the initial stage of maturation is the decreasing of pH till the level of 5 units

(higher or lower function of cheese type); subsequent, pH value will increase, the final level influencing the intensity of proteolysis processes respectively lipolysis ones in cheeses submitted to maturation [5, 6].

After proteins degradation under the action of diverse proteolytic enzymes (alkaline protease, acid protease, proteases elaborated by moulds and yeasts etc) in cheeses is accumulated protein and non-protein soluble nitrogen, consistency is modified (cheese became soft and unctuous), increase water retain capacity (by modification of paste physical structure), taste and smell are intensified (under the action of proteins' hydrolysis products) and pH increase (tends to neutral values, function of maturation degree) [3, 6, 7].

During maturation also lipids in cheeses are degraded by specific enzymes (lipoprotein-lipase, added enzymatic products, lipase secreted by moulds, lactobacillus or yeasts etc), consequence being accumulation of free fatty acids, which interfere in increasing of cheese acidity and in flavour formation; phenomenon being more intense at soft

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cheeses, where maturation took place also under the influence of moulds [5, 6].

MATERIAL AND METHOD

Investigations were carried out on samples gathered from four assortments of cheeses belonging to two different groups: cheeses with scalded paste (Dobrogea pressed cheese respectively Dalia pressed cheese) and cheeses matured in brine (cow feta respectively sheep feta).

For each of those four studied assortments of cheeses were gathered 5 samples at each effectuated control (at the beginning of maturation and after that at each 10 days of maturation). Maturation period was of 60 days for pressed cheese and of 40 days for feta, in according with the technologies applied in processing unit.

Determination of protein content was realised by using a Kjeldahl-Velp system, its working principle is based on the fact that through heating with concentrated sulphuric acid and in the presence of a catalyser, nitrogen from the organic combinations is transformed in ammonium sulphate.

To analyse the fat content was applied Van-Gulik method, which consists in fat separation in butyrometer by centrifugation, after a previous dissolution with sulphuric acid, in the presence of isoamyl alcohol (% fat/DM=F/100-W x 100, in which F=%fat content of the product; W=%water content).

RESULTS AND DISCUSSIONS

Protein content. At cheeses with scalded paste, the established fat content on fresh product was of 26.45% for Dobrogea pressed cheese and of 25.50% for Dalia.

During maturation was observed a progressive decreasing of proteins in those two assortments of analysed pressed cheeses, so at the end of maturation (day 60) to reach at the level of only 23.25% for Dobrogea respectively of 22.18% for Dalia.

Expressed in percents, difference between protein content in fresh product and the one matured for 60 days was 12.10% for Dobrogea pressed cheese and 13.02% for Dalia, with the mention that the highest protein losses were during itself maturation.

In dynamics, protein losses for Dobrogea pressed cheese were of 1.44% in day 10 face to day 0, of 2.49% in day 20 face to day 10, of 2.99% in day 30 face to day 20, of 2.72% in day 40 face to day 30, of 1.71% in day 50 face to day 40 and of 1.40% in day 60 face to day 50, and for Dalia pressed cheese of 1.57%, of 3.15%, of 3.41%, of 2.21%, of 1.78% respectively of 1.60% (tab. 1).

Table 1 Dynamics of protein content in the analysed cheeses

Maturation day	Specification	Pressed cheese		Maturated feta	
		Dobrogea	Dalia	cow	sheep
0	Proteins (%)	26.45	25.50	21.95	20.18
10	Proteins (%)	26.07	25.10	20.48	18.99
	Difference face to previous check (%)	1.44	1.57	6.70	5.89
20	Proteins (%)	25.42	24.31	19.05	17.89
	Difference face to previous check (%)	2.49	3.15	6.98	5.79
30	Proteins (%)	24.66	23.48	17.75	16.93
	Difference face to previous check (%)	2.99	3.41	6.82	5.37
40	Proteins (%)	23.99	22.96	16.57	16.06
	Difference face to previous check (%)	2.72	2.21	6.65	5.14
50	Proteins (%)	23.58	22.55	-	-
	Difference face to previous check (%)	1.71	1.78		
60	Proteins (%)	23.25	22.18	-	-
	Difference face to previous check (%)	1.40	1.60		
Total losses of proteins (%)		12.10	13.02	24.51	20.41

For cheeses matured in brine, initial protein content was of 21.95% for cow feta and of 20.18% for sheep feta, so till the end of maturation to reach levels of only 16.57% for cow feta and of 16.06% for sheep feta.

Protein total losses were situated at a level of 24.51% for cow feta and of 20.41% for sheep feta, with the mention that were fairly uniform during those 40 days of

maturation (6.65-6.98% for cow feta and 5.14-5.89% for sheep feta) (tab. 1).

Fat content. Obtained values for this parameter followed a descendant line during maturation period, at both studied cheeses groups, consequence of fat degradation by lipolytic enzymes.

So, fat content for Dobrogea pressed cheese was of 50.75%/DM for fresh product and of 46.12%/DM at the one matured for 60 days, and for Dalia processed cheese was of 49.84%/DM respectively 45.05%/DM.

Total fat losses recorded during maturation were of 9.12% for Dobrogea and of 9.61% for Dalia, with the mention that the highest lipolysis levels were during the period of itself maturation (days 10-40 of maturation) (tab. 2).

Table 2 Dynamics of fat content in the analysed cheeses

Maturation day	Specification	Pressed cheese		Matured feta	
		Dobrogea	Dalia	cow	sheep
0	Fat (%/D.M.)	50.75	49.84	48.85	50.20
10	Fat (%/D.M.)	50.19	49.24	47.25	48.73
	Difference face to previous check (%)	1.10	1.20	3.27	2.93
20	Fat (%/D.M.)	49.15	48.17	45.63	47.48
	Difference face to previous check (%)	2.07	2.17	3.43	2.57
30	Fat (%/D.M.)	48.13	47.12	43.85	46.26
	Difference face to previous check (%)	2.08	2.18	3.90	2.57
40	Fat (%/D.M.)	47.14	46.10	42.44	45.03
	Difference face to previous check (%)	2.06	2.16	3.22	2.66
50	Fat (%/D.M.)	46.62	45.56	-	-
	Difference face to previous check (%)	1.10	1.17		
60	Fat (%/D.M.)	46.12	45.05	-	-
	Difference face to previous check (%)	1.07	1.12		
Total losses of fat (%)		9.12	9.61	13.12	10.30

Cow feta cheese had a fat content related with dry matter between 48.85%/DM (fresh product) and 42.44%/DM (product matured for 40 days) and at sheep feta between 50.20%/DM respectively 45.03%/DM.

Fat losses for those two feta assortments were quite uniform on check stages, being at a total level of 13.12% for cow feta and of only 10.30% for sheep feta (tab. 2).

CONCLUSIONS

Data regarding evolution of fat and protein content in those 4 analysed cheeses assortments enlightened quantitative decreases during maturation period, due to proteolysis and lipolysis processes which are specific to this processing stage. The size of losses was influenced by the processing technology (with scalded paste respectively matured in brine), but also by the type of utilised milk as raw material (cow respectively sheep):

- sheep milk cheeses (Dobrogea pressed cheese and sheep feta) lost only 12.01% respectively 20.41% from the protein quantity determine on non-matured, while at cow milk cheeses (Dalia pressed cheese and cow feta) decreasing of fat content was a little bit higher, of 13.02% respectively of 24.51%;
- fat content from analysed cheeses assortments followed a descendant trend during maturation, but with a reduced level of losses at the ones from sheep milk (9.12% for Dobrogea pressed cheese and 10.30% for sheep feta) and more higher for cow milk cheeses (9.61% for Dalia pressed cheese and 13.12% for cow feta);
- dynamics of nutritive substances losses (proteins and fat) during maturation were different for those 2 cheeses groups, the ones kept in brine recorded constant levels, but higher of losses in proteins respectively in fat, while at cheeses with scalded paste, those ones were much more lowest, with a little bit higher intensity only during itself maturation (days 10-40).

The final conclusion of investigations was that cheeses matured in brine record higher losses in valuable nutritive substances (proteins and fat) in comparison with the ones with scalded paste.

Also, was concluded that cheeses processed from cow milk lost much more proteins and fat than the ones processed from sheep milk, due to the different molecular structure of those two components and which assure a better stability of them in sheep milk.

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