THE RIPENED CHEESE IN BRINE CONTAINING ESSENTIAL FATTY ACIDS Ω3 AND Ω6

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Abstract

World food problems are more current. It takes into account both the composition biological and nutrients in foods and food while keeping their quality. This paper aims to study the evolution of essential fatty acids during ripening in brine cheese made from sheep's milk with added fish oil. To protect the fatty acids, ω3 and ω6, mix and pasteurization milk, using selected lactic cultures, and cheese ripening temperature increases by about 3°C. These processes are intended to reduce the curing time of approximately ten days to protect these essential fatty acids. The review compared the concentration of the fatty acid composition of fresh cheese and ripened cheese from milk of sheep with progressive addition of fish oil: 0%, 0.05%, 0.10, 0.15%. The analysis is carried out by gas chromatography and the following results are obtained for fatty acid percentage ω3 and ω6: fresh cheese-4,73; 4,75; 4,91; 5,06 and ripened cheese:5,07;5,45;5,71;5,94.

Key words: fresh and ripened cheese in brine

INTRODUCTION

Cheese maturation is a complex biochemical process in which all the components that are part of the composition of cheese from both biochemically and microbiologically. The maturation is seeking to obtain a product more easily digested by the body and a high biological value, increased product stability by partial drying and preservative role lactic acid formation, forming consistency, taste and aroma of the cheese made specific. During cheese ripening suffering substances in the following transformations: protein -proteolysis, deamination, decarboxylation; fat - lipolysis and fatty acid degradation; lactose-glycolysis, fermentation and lactic acid fermentation.

The maturation have not been identified quantitative differences between peptide profiles of all cheese samples, but the percentage of unsaturated fatty acids and decreased cholesterol content without being

charged or rancid bitter taste in the cheese matured.(Seher Arslan et all, 2010).

Important for the biological value of cheese is keeping unsaturated fatty acids in the finished product. Thus we investigated the concentration of conjugated linoleic acid (CLA). The results showed that modifications of CLA and its isomers were insignificant during the period of maturation. (Pilar Luna edt all, 2007).

Accelerated aging was achieved by pasteurization of milk and cheese have similar characteristics, obtained from raw milk and pasteurized milk.. (Li Juan Yuet all, 2010). Increase temperature to 18 º C was shown to accelerate the cheese ripening process with increased lipolysis and increasing the percentage of free fatty acids lead to their degradation.(Guillermo A.et all, 2007). Using enzyme in cheese κ-carrageenan was used in encapsulated form to protect that during the technological process. β casein has increased proteolysis, cheese characteristics thus obtained were not affected. (K. Kailasapathy et all, 2005). To accelerate the ripening of cheese was investigated treatment with β-cyclodextrin (β-CD). Accelerated aging was obtained by obtaining short-chain fatty acids and amino acids. At the same time to reduce cholesterol in the cheese produced by about 90%. Have improved and sensory characteristics while reducing the duration of maturation avoiding risk of bitter and rancid taste. (K.H. Seon et all, 2009). Recent research has taken place on cheese ripening by the action of lactic bacteria was used to inoculate Propionbacterium, Streptococcus thermophilus, Lactobacillus helveticus and Lactobacillus paracasei. Microbial activity of these species varies with temperature. Lactobacillus is therefore to develop and propionbacterim tempearatură lower temperature and higher towards the end of cheese ripening after lactate was metabolized. Therefore accelerate cheese ripening due to lactic acid bacteria culture must be carefully controlled to obtain specific sensory characteristics produced range. (Hélène Falentin et all, 2010).

From contemporary environmental conditions are increasingly affected by pollution. This stress increases with the amount of toxins in the body affect health. A healthy diet with an increased content of polyunsaturated fatty acids may decrease inflammation processes and disease in the body (Lei Wang et all, 2008).

MATERIAL AND METODS

Products are analyzed in comparison with fresh cheeses in brine and ripened cheese from sheep's milk with added fish oil percentages: 0%; 0,05%; 0,10%; 0,15%. To protect the unsaturated fatty acids is carried out homogenization, pasteurization of milk and ripening using selected lactic culture manufacturing type R 703 Christian Hansen. Coagulation is performed at a higher temperature to facilitate removal of whey and avoid loss of essential fatty acids. Also increase the temperature of cheese ripening by 3℃ to decrease the ripening period and the protection of essential fatty acids.

Analytical methods

Physical-Chemical milk:- lactostar device; Sampling media for cheese analysis- S.T.A.S. 9535/-74; Storing and preparing samples for analysis- S.T.A.S. 6343-81; Sensory analysis- S.T.A.S. 6345-74; Determination of moisture cheese- S.T.A.S. 6344/58; Determination of fat content of cheese- S.T.A.S. 6352/2-73; Determination of titratable acidity- S.R. ISO 6091/2008; Determination of the percentage of NaCl in cheese- S.T.A.S. 6354-70; Determination of total nitrogen, Kjeldahl method (Velp SCIENTIFIC leaflet)

Analysis of fatty acids by gas-chromatographic method:- Weigh 1 g of cheese sample and break it up with 10 ml distilled water. Take 1 ml of dilution obtained were mixed with 0,6 ml ammonia 25%, 2ml EtOH, 4ml Ethyl ether and 4 ml hexane and then agitated for 2-3min. After this process the lower layer (the ammonia layer) was discarded. Following this step the mixture was passed through a cellulose filter with Na2So4 and then brought to dryness.

Transesterification::Fatty acids were converted to methyl esters by reaction with boron trifluoride/methanol at 80ºC for two hours in a closed Pyrex glass tube. The content was transfered into a separatory funell.

The methyl ester extraction:The extraction was made using 10 ml hexane. The hexanic fractions collected were dried using anhydrous sodium sulfate, filtered, concentrated under a nitrogen stream and finally re-eluted in 1 mL hexane. Fatty acids were analyzed by gas chromatography (GC) with flame ionization detection (FID). A 1μL sample was injected into the Shimadzu GC-17A series gas-chromatograph, equipped with a 30m polyethylene glycol coated column (Alltech AT-WAX, 0.25mm I.D., 0.25μm film thickness). Helium was used as the carrier gas at a pressure of 147 kPa. The injector and detector temperatures were set at 260ºC. For the oven temperature the following program was used: 70ºC for 2 min. then raised to 150ºC at 10ºC/ min. rate and held at 150ºC for 3min., then further raised up to 235ºC at a 4ºC/min. Fatty acids were analyzed by gas chromatography

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RESULTS AND DICUSSION

Sensory Analysis: Appearance and consistency- raw cheese after pressing and salting has consistency elastic and is little pressing goals. Cosistență creamy cheese has matured without fermentation goals Taste and smell- taste and flavor of cheese is affected by fish oil adoaosul different in terms of percentage of fish oil added. In determining the taste and aroma of the product was analyzed by 5 people. The results in terms of percentage of fish oil are added: 0%- sweet aroma of fresh cheese obtained by coagulating; 0,05%- not charged fishy; 0,10%- little perceptible fishy; 0,15%- perceptible fishy. Ripened cheese does not taste like fish or even that he used to milk with added 0.15%.

Evolution's main physico-chemical parameters comparatirv ripened cheese with raw cheese are presented in table no.1 not have semnifiative differences compared to cheese made at nominal parameters.

Table No.1

Physico-chemical parameters for cheese in brine fresh and ripened

Cheese in brine									
Fresh			Ripened						
Acidity ºT	NaCl %	Humidity %	Humidity %	Dry %	Fat %	Dry/ Fat %	Salt %	Acidity cheese ºT	Acidity whey ºT
138	2,6	60,9	55,2	44,8	22,5	50,22	3,4	234	142
140	2,4	61,8	54,9	46,1	23,0	49,9	3,2	242	134
142	2,6	61,2	55,5	44,5	22,5	50,6	3,2	230	144
144	2,2	60,6	55,3	44,7	22,5	50,34	3,4	240	146

Evolution of aging after 15 days at a temperature of 17-18 is about the same as after 25 days at a temperature of 14-16, ie time and temperature normal for cheese in brine. The concentration of total nitrogen, protein substances, soluble nitrogen and degree of maturation are presented in table no. 2.

Table 2

Total nitrogen, protein, soluble nitrogen and degree of cheese ripening

Cheese in brine ripened	Total nitrogen %	Protein %	Soluble nitrogen %	Degree of cheese ripening
0% fish oil	3,07	19,6	0,48	15,6
0,05% fish oil	3,16	20,1	0,49	15,5
0,10% fish oil	3,17	20,2	0,48	15,1
0,15% fish oil	3,16	20,1	0,49	15,5

Analysis of fatty acids is carried out by gas chromatography and is reported percentage of the total fatty acids%. The results are presented in Table No.3. It may be noted that while the concentration of saturated and monounsaturated fatty acids decreases, the concentration of polyunsaturated fatty acids increases.

Table 3

Fatty acid concentration in groups of sheep milk and cheese

Groups fatty acids	Cheese in brine							
	Fresh				Ripened			
	0 %	0,05 %	0,10 %	0,15 %	0 %	0,05 %	0,10 %	0,15 %
S.F.A.	64,37	62,41	64,63	64,06	66,03	64,14	64,64	63,57
M.U.F.A.	26,51	22,29	22,00	22,47	24,43	20,55	20,43	21,15
P.U.F.A.	4,73	4,75	4,91	5,06	5,07	5,45	5,71	5,94

S.F.A. – Saturated Fatty Acids ;
M.U.F.A. – Mono Unsaturated Fatty Acids ;
P.U.F.A. – Poly Unsaturated.

Individual fatty acids are presented in figure 1,2 and table 4 for both fresh cheese in brine and ripened cheese.

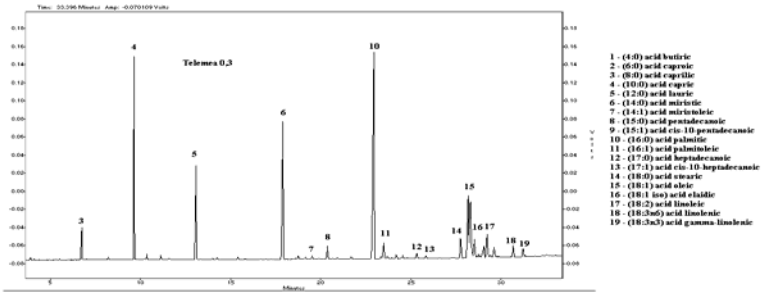

Figure no.1 The concentration of fatty acids in cheese from milk without added fish

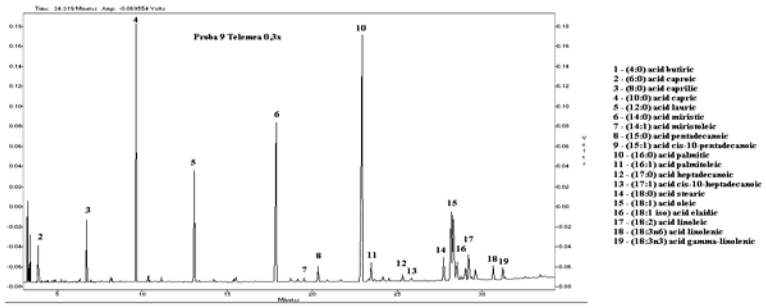

Figure no.2. The concentration of fatty acids in cheese from milk with added 0.15%

Table 4

Concentration of fatty acids of sheep milk cheese

Fatty Acid	Abrev iation	Cheese in brine							
		Fresh				Ripened			
		0%	0,05%	0,10%	0,15%	0%	0,05%	0,10%	0,15%
Butyric	4:0	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Caproic	6:0	n.d.	n.d.	n.d.	n.d.	4,17	1,36	1,83	1,93
Caprilic	8:0	1,77	1,60	0,58	1,57	1,57	2,45	2,37	2,36
Capric	10:0	10,22	10,29	6,30	11,02	5,84	10,78	10,54	10,07
Lauric	12:0	6,83	7,27	5,86	7,44	4,83	7,32	7,07	6,93
Miristic	14:0	13,27	14,13	13,55	13,87	11,89	13,53	13,40	13,37
Miristoleic	14:1	0,27	0,31	0,67	0,32	n.d.	0,35	n.d.	0,32
Pentadecanoic	15:0	1,20	1,25	1,42	1,24	1,28	1,19	1,20	1,18
Cis-10-pentadecanoic	15:1	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Palmitic	16:0	25,92	26,69	28,59	26,17	26,59	24,81	24,77	24,57
Palmitoleic	16:1	1,70	1,83	1,70	1,79	1,46	1,75	1,61	1,64
Heptadecanoic	17:0	0,53	0,53	0.70	0,53	0,59	0,48	0,50	0,51
Cis-10-heptadecanoic	17:1	0,35	0,37	n.d.	0,34	n.d.	0,33	0,33	0,33
Stearic	18:0	2,64	2,26	7,32	2,75	9,23	2,18	2,92	2,61
Oleic	18:1	17,96	18,03	22,83	17,76	21,57	16,35	16,82	17,02
Elaidic	18:1iso	2,35	2,29	1,30	2,11	1,39	2,09	1,99	2,17
Linoleic	18:2	3,58	2,87	2,80	2,82	5,,07	2,99	2,97	3,08
Linolenic	18:3n6	0,31	1,24	0,84	1,09	n.d.	1,26	1,33	1,43
γ-Linolenic	18:3n3	0,85	0,95	1,07	0,99	n.d.	1,20	1,39	1,42

CONCLUSION

As seen with long-chain saturated fatty acids percentage in the cheese matured descrec and short-chain fatty grşicu that the human body digests maiuşor i increase. Importantly, the percentage increase u3 essential fatty acids (linoleic) and U6 (g linnolenic and linolenic) are not affected during cheese ripening and biological value of the product by giving the important functions they perform in the human body.

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