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

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Abstract

The presence of essential fatty acids in the diet is all the more necessary for a healthy life. This study aims to enrich the ω3 and ω 6 fatty acids of cheese by the addition of fish oil in sheep's milk used in manufacturing. The research aims of the fatty acid composition of milk and fresh cheese after salting wet. The concentration of fatty acids that results from gas chromatography analysis varies depending on the percentage of fish oil added to milk used in manufactured:-0%; 0,05%; 0,10%; 0,15%. Add fish oil in different percentages to analyze the sensory qualities of the finished product and determine the optimal percentage to schmbe not taste the cheese. In raw milk concentration of polyunsaturated fatty acids was:In raw milk concentration of polyunsaturated fatty acids was: 4,25%; 4,54%; 4,78%; 5,08. The concentration of polyunsaturated fatty acids in cheese after wet salting: 4,73; 4,75; 4,91; 5,06.

Key words: brine cheese, sheep's milk, omega 3,6.

INTRODUCTION

Cottage cheese has a more distant origin, first as a sliced cheese stored in brine.

Due to fluctuating raw material supply cheesemaking milk is important for the recovery period due to increased raw material storage. Indigenous breeds of livestock and food conditions have created conditions which have the effect of adjusting the production of products characteristic of certain geographic areas. (M.F. Scintu et all 2007). Differences were associated with the two feeding patterns. Fresh pasture grazing in spring enhanced the formation of esters and alcohols and lowered the proportion ofcarbonyl compounds. Important active compounds detected by olfactometry in winter and spring cheeses were butanoic acid, ethyl butanoate, ethyl hexanoate and 2-heptanone. Coinciding with fresh pasture grazing in spring, the odour impact ratios of esters and alcohols increased indicating that spring cheeses might have more intense fruity and sweet overtones in comparison with winter cheeses. (Eunate Abilleira et all). An

experiment was conducted to evaluate the effect of the volatile fraction of milk and cheese by including Chysanthemum coronarium (Asteracea) in pasture by planting this plant. This has significantly influenced the volatile fraction of milk and cheese, mainly due to the emergence terpenic hydrocarbons that have passed directly from grass to milk and dairy products. In conclusion Chysanthemum coronarium (daisies) print product taste and smell the cheese matured. (M. Addis, 2006 et all).

Apart from their sensorial impact on small ruminant milk cheeses, short- and medium-chain fatty acids may also be of nutritional significance. The review also made clear that there is a lack of information concerning the impact of cheese making not only on vitamins and minerals but also on some particular molecules such as oligosaccharides. K. (Raynal-Ljutovaca et all, 2008). The free amino acid content of Teleme cheese was considerably affected by the kind of milk used, the kind of culture added and the ripening time. The total free amino acid (TFAA) content increased with ripening time. The TFAA contents were highest in cheeses made with the thermophilic culture and lowest in cheeses made with the mesophilic culture. (Eleni C. Pappa et all, 2008)

The different proteolytic and lipolytic patterns as well as thedifferences in microbial population can explain the modification of the volatile molecule profiles and of the sensory characteristics of the different cheese types. In fact, the intense lipolysis of the cheeses obtained from homogenization milk can explain the highest release of short chain free fatty acids and the more intense piquant aroma. (Lucia Vannini et all, 2008) .Treatment with high-pressure homogenization has an effect on microorganisms in the finished product. It was found that aerobic bacteria are destroyed and is followed by pasteurisation which has the effect of increasing better storage of the finished produc. (Lin Li, 2010). Sheep cheeses reported the highest levels of CLA, LNA and TVA, and lower contents of LA and oleic acid compared with cow and goat cheeses. (Aldo Prandini et all,2011).

Consumption of cheese from sheep's milk is rich in essential fatty acids beneficial to prevent cardiovascular disease with important implications for human nutrition and food industry. (F. Sofi şi alţii 2010). His study of 150 patients was divided into four groups. It was concluded that fatty acids are involved in different biological mechanisms through changes in the fluid membrane and modulation of membrane receptors enzymes activity. and neuronal , transmitter (Sabine Riemer ,2010)

MATERIAL AND METODS

Process Technology:-Description of technological process: They use sheep's milk with added fish oil in increasing proportions of 0%, 0.05%, 0.10%, 0.15%. Sheep's milk has the following physicochemical characteristics:-fat - 6.1%;-protein substances: - 4.5%, lactose: -6.3% - SUN (non-fat solids): -11 7;-acidity:21ºT, pH: -6.67. The amount of milk used is 35 l. Operations technology of cheese are: Cleanup by filtration and centrifugal cleaning; Added Encapsulated fish oil obtained from EXPORT-IMPORT SC Hofigal SA; Trpte by mixing in homogenizer for inclusion of essential fatty acids in fish oil globule of grăsieme in order to protect their biochemical and loss in the whey; Pasteurization: Pasteurization device-plate pasteurization regimes:-T: -73 ° C-t: -25 sec; Organizing the training for:-cooling: T-39 and C-sowing of selected lactic culture manufacturing Hansen Cristien specific type cheesemaking R 703; Curing biocfimică: - t 70 min, A: 25 -28 ºT; Coagulation:-T: -37 º C, t:-45min;-curd consistency:-holding; Processing curd: curd-cutting in columns 2 cm square; 30 min rest; Remove surface whey; Draining and removing the curd in the form of perforated plastic; Pressed to shape, for 5-year return hourly hours; Acid curd after pressing: -64 ° T; Moist curing:-brine: NaCl, -20%, A: 20 and T: T: 19 º C, t: 16 hours; Characteristics of wet cheese after curing: - A: 132 º T Humidity: 61% Salt: 2.4%; Curing the dry-salt blocks cover: T: 20 ° C, t: 12 hours.

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

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 (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 programe 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.

RESULTS AND DICUSSION

Sensory Analysis: Appearance and consistency- raw cheese after pressing and salting has consistency elastic and is little pressing 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.

Physico-chemical: Physical parameters are not affected by changes performed by the technological process to avoid loss of essential fatty acids. Physico-chemical analysis results are presented in Table 1 and 2

Table 1

Physico-chemical parameters for raw sheep's milk

Raw sheep's milk					biochemical maturation		
Fat %	Acidity ºT	Density 20ºC g/l	Non-fat dry %	Fish Oil %	Lactic culture	Time min	Acidity ºT
6,4	20	1036,3	11,3	0	R703	70	25
6,5	21	1036,5	11,3	0,05	R703	65	27
6,6	22	1035,5	11,6	0,10	R703	70	27
6,7	21	1035,5	11,7	0,15	R703	60	28

Table 2

Physiochemical parameters for technological flow and finished product

Coagulation		Press		Wet salted			Finished product		
Temperature ºC	Time min	Humidity %	Acidity ºT	NaCl %	Temperature ºC	Time h	Acidity ºT	NaCl %	Humidity %
37	40	61,1	116	20	15	16	138	2,6	60,9
37	40	61,8	120	21	16	16	140	2,4	61,8
37	45	62,1	118	21	15	16	142	2,6	61,2
37	40	62,2	118	20	16	16	144	2,2	60,6

Cocentration of fatty acids compared with fresh cheese from sheep milk used to manufacture, parameters that results from gas chromatographic analysis Satuarți fatty acids are generally lower proportion than in milk from fresh cheese is made. The concentration of monounsaturated fatty acids in cheese is higher percentage than in raw milk. The fresh cheese made from sheep's milk pasteurized and homogenized and fish oil without the addition of the percentage of polyunsaturated fatty acids in cheese is generally lower than in milk. Addition of fish oil increased their percentage in the cheese. These results are presented in table 3,4 and the chromatograms in figures 1,2.

Table 3

Fatty acid concentration in groups of sheep milk and cheese

Groups fatty acids	Raw sheep's milk				Fresh cheese in brine			
	Raw milk	Pasteurized milk			0 %	0,05 %	0,10 %	0,15 %
		0,05%	0,10%	0,15%				
S.F.A.	69,30	65,75	64,92	64,72	64,37	62,41	64,63	64,06
M.U.F.A	18,30	21,21	21,32	21,83	26,51	22,29	22,00	22,47
P.U.F.A.	4,25	4,54	4,78	5,08	4,73	4,75	4,91	5,06

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

Table 4

Concentration of fatty acids of sheep milk cheese

Fatty Acid	Abrev iation	Raw sheep's milk				Fresh cheese in brine			
		Raw milk	Pasteurized milk			0	0,05%	0,10%	0,15%
			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	0,88	0,31	0,67	n.d.	n.d.	n.d.	n.d.	n.d.
Caprilic	8:0	3,05	2,24	2,51	1,84	1,77	1,60	0,58	1,57
Capric	10:0	14,00	11,71	11,45	10,96	10,22	10,29	6,30	11,02
Lauric	12:0	8,91	7,76	7,55	7,30	6,83	7,27	5,86	7,44
Miristic	14:0	14,97	14,12	13,80	13,83	13,27	14,13	13,55	13,87
Miristoleic	14:1	0,34	0,31	0,32	0,36	0,27	0,31	0,67	0,32
Pentadecanoic	15:0	1,22	1,21	1,19	1,25	1,20	1,25	1,42	1,24
Cis-10-pentadecanoic	15:1	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Palmitic	16:0	24,99	25,52	25,14	26,20	25,92	26,69	28,59	26,17
Palmitoleic	16:1	1,71	1,63	1,77	1,65	1,70	1,83	1,70	1,79
Heptadecanoic	17:0	0,45	0,52	0,50	0,54	0,53	0,53	0.70	0,53
Cis-10-heptadecanoic	17:1	0,32	0,33	0,33	0,34	0,35	0,37	n.d.	0,34
Stearic	18:0	1,69	2,33	2,07	2,75	2,64	2,26	7,32	2,75
Oleic	18:1	14,45	17,03	17,04	17,65	17,96	18,03	22,83	17,76
Elaidic	18:1iso	1,78	2,22	2,17	2,16	2,35	2,29	1,30	2,11
Linoleic	18:2	2,55	2,68	2,75	3,01	3,58	2,87	2,80	2,82
Linolenic	18:3n6	0,97	1,00	1,06	1,10	0,31	1,24	0,84	1,09
γ-Linolenic	18:3n3	0,72	0,84	0,96	0,96	0,85	0,95	1,07	0,99

n.d. – not detected

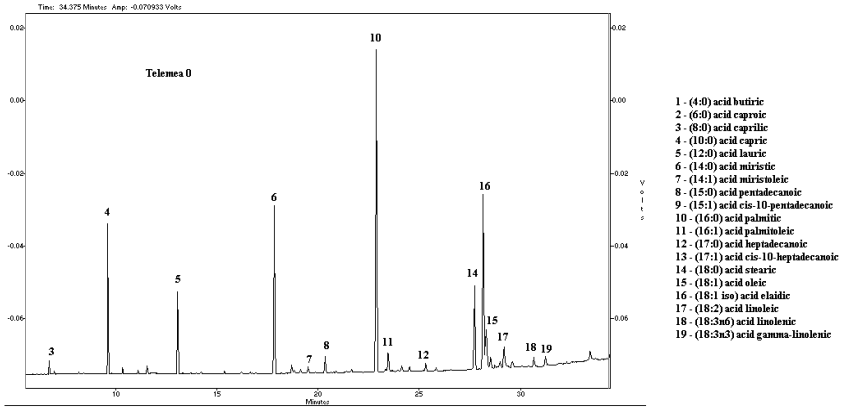

Figure no.1 The concentration of fatty acids in cheese from milk without added fish oil

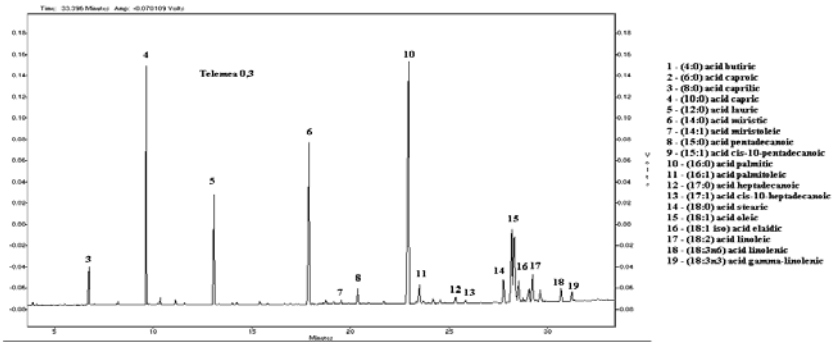

Figure no.2. The concentration of fatty acids in cheese from milk with added 0.15% fish oil

CONCLUSIONS

Addition of fish oil essential fatty acid concentration increases with the percentage added to the milk. This shows that the technological process used is not significant damage has occurred in the whey or brine ω3 and ω6 fatty acids. At the same time decreases the concentration of saturated fatty acizillor, especially long-chain saturated fatty acids C10-18, and the percentage of monounsaturated fatty acids. Therefore making cheese in brine from sheep's milk with added fish oil has the effect of increasing the biological value of the product. This has the disadvantage of fish taste of the product. This inconvenience can decrease by deodorizing milk at 70 ℃ in a vacuum.

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