GETTING SPUN PASTE CHEESE ENRICHED WITH ESSENTIAL FATTY ACIDS

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Abstract

This paper aims to embed in a spun paste cheese with essential fatty acids by adding fish oil raw sheep's milk. By homogenizing milk fat globules are formed cell splits and smaller diameter which is intended to encompass the ω3 and ω6 fatty acids from fish oil. This aims to decrease losses in polyunsaturated fatty acids during to eliminate whey and the thermal treatment curd. Also removes wet salting operation and used in heat treatment curd of 3% brine. Add fish oil in increasing percentages of 0.05% and 0.15% in order to appreciate the taste of fish printing product is approved differently by consumers. Evolution of fatty acids in milk and finished product is sought by gas chromatographic analysis. Results in percentage concentration of essential fatty acids are for milk: -4.25, 4.54, 5.08 and cheese: -4.29, 4.83, 5.15.

Key words: Cheese spun essential fatty acids

INTRODUCTION

The formatge de pasta premsada was prepared first (century III-IV) only in small pieces (0.2 ÷ 1 kg.), in the form of formatge de pasta premsada Brădet or dolls, usually smoked. Later, when the number of sheep multiplied, allowed a concentration production and true cheese appeared later Penteleu and Dobrogea.

Manufacture of cheese milk is important because keeping the freezing temperature does not affect the making of cheese. (R.H. Zhang et all 2006).

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. These results underline the important role of sheep cheese as a natural source of CLA and beneficial fatty acidsfor human health. (Aldo Prandini et all 2011)

Forage species was the,over-riding factor which affected FA profile of sheep dairy products. In particular, in both winter and spring, crown daisy

performed better than the other forages in terms of C18:2 (linoleic acid), VA, CLA and PUFA in milk and cheese. (A. Cabiddu et all 2006)

Characteristics of milk fat globules and the physico-chemical composition, rheological parameters and cheese yield. In fact, the fat globule size of sheep's milk is correlated with the milk's composition and may significantly affect the cheese yield. In particular, an increased percentage in milk fat globules with a diameter greater than 5μm is related to a worsening of cheese-making aptitude. (M. Martini et all 2008). During Pecorino Toscano P.D.O. processing, the total fatty acid contentwas not affected by milk treatment and that milk fatty acids were completely transferred into the cheese; however, changes in C18:1 and CLA isomers profile in cheese were observed due toaltering of the ratio between (A. Buccioni et all 2010)

Is clear that high-fat diet rich in unsaturated fatty acids modulates levels of growth-inhibitory and growth-stimulatory sphingolipid mediators, by stimulating degradation of ceramide and channeling the liberated sphingosine towards the synthesis of sphingosine-1-phosphate. High S1P/CER ratio decreases the susceptibility of hepatocytes to pro-apoptotic factors such as reactive oxygen species (ROS) or pro-inflammatory cytokines, and stimulates mitotic divisions. (Wing-Keong Ng et all 2010)
Such fortified dairy products maintained a constant sensory quality during 4 weeks of storage. One portion (about 30 g) of spreadable fresh cheeses, butter or processed cheeses fortified with fish oil at levels established in the study might provide 180–360 mg of omega-3 LC PUFA. 7 (Wojciech Kolanowskia et all 2007) 1248–1253.

MATERIAL AND METODS

Description of technological process: For cheese with spun paste is used sheep's milk. It is made from sheep's milk cheese with no added fish oil and with added 0.05% to 0.155 added fish oil. Milk is homogenized homogenizer three steps and pasteurizzat at a temperature of 73 ℃ for 25 seconds. Maturation to obtain milk curd was carried out using culture containing Lactococcus lactis subsp. cremoris / lactis. Lactococcus lactis was used to enhance the acidity the milk that helps curdled milk and accelerating ripening curd of cheese to obtain. Lactococcus cremoris has role as flavor and creamy structure. Coagulation was performed at a temperature of 38 ℃, about 2 ℃ higher than normal to increase the elimination of the whey in the shortest possible time. Biochemical maturation of curd to the heat treatment was performed at 25 ℃ for 16 hours to obtain optimum acidity for scalding of 174-178 º T. Blanching was carried out manually curd scalding solution with 3% salt to 100 ℃. It eliminates the wet salting process. Blanching solution

was used at 100 ℃ in contact with the curd as it crushed, the temperature drops to about 80-85 ℃, nominal temperature of scalding to obtain cheese spun. Training manual cheese was pressed to remove excess water scalding in cylindrical shapes. After training for cooling the cheese was immersed in water cooled to 10 ℃ for 30 min.

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 DISCUSSION

Sensory analysis: Appearance and consistency:- Fresh spun cheese has elastic texture, slightly creamy, without pressing goals, uniform. Taste and smell:- During the manufacturing process of cheese flavor and aroma are affected by the addition of fish oil added to raw milk because first production unit that produced cheese is not equipped with deodorized to remove volatile substances. To appreciate the taste and flavor tasting was conducted by five ordinary people and reached the following conclusions: milk cheese with no added fish oil taste less sour, slightly salty, a similar flavor of cream. In cheese made from milk with added fish oil 0.05 feels fishy, but the addition of 0.15% fish oil in the cheese milk fish taste is perceptible.

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				Coagulation	
Fat %	Acidity ºT	Density $_{20ºC}$ g/l	Non-fat dry %	Fish Oil %	Lactic culture	Time min	Temperature ºC	Acidity ºT	Temperature ºC	Time min.
6,4	20	1035,3	11,3	0	R703	70	40	23	38	45
6,5	21	1035,5	11,3	0,05	R703	65	40	24	38	45
6,7	21	1036,5	11,7	0,15	R703	60	40	23	38	45

Table 2

Physiochemical parameters for technological flow and finished product

Cheese ripening			Blanching solution		Baked cheese		
Temperature ºC	Time hours	Acidity ºT	Temperature ºC	Salt %	Acidity ºT	Humidity %	Salt %
25	16	174	100	3	182	58,0	2,2
25	16	178	100	3	190	58,6	2,0
25	16	178	100	3	192	58,5	2,2

Concentration of the fatty acids are determined by gas chromatographic analysis. Are analyzed with 4 short-chain saturated fatty acids (C0-10), 6 long-chain fatty acids(C10-28), monounsaturated fatty 6acizi and 3 fatty acids polinsatuarați (1 ω3 and 2 ω6). Study the raw milk,

cheese and spun without the addition of fresh fish oil with the addition of 0.05% and 0.15%.The results are presented in tables 3, 4 and the gas chromatograms in figures 1,2.

Table 3

Concentration of fatty acids of sheep milk and spun fresh cheese

Fatty Acid	Abrev iation	Raw sheep's milk			Spun fresh cheese		
		Raw milk	Pasteurized milk				
			0,05 %	0,15 %	0 %	0,05 %	0,15 %
Butyric	4:0	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Caproic	6:0	0,88	0,31	n.d.	n.d.	n.d.	n.d.
Caprilic	8:0	3,05	2,24	1,84	0,85	2,10	1,44
Capric	10:0	14,00	11,71	10,96	5,83	10,97	10,48
Lauric	12:0	8,91	7,76	7,30	5,40	7,43	7,65
Miristic	14:0	14,97	14,12	13,83	12,90	13,82	14,51
Miristoleic	14:1	0,34	0,31	0,36	0,60	0,32	0,28
Pentadecanoic	15:0	1,22	1,21	1,25	1,34	1,20	1,29
Cis-10-pentadecanoic	15:1	n.d.	n.d.	n.d.	n.d.	0,15	n.d.
Palmitic	16:0	24,99	25,52	26,20	28,72	25,77	26,52
Palmitoleic	16:1	1,71	1,63	1,65	1,69	1,81	1,68
Heptadecanoic	17:0	0,45	0,52	0,54	0,68	0,51	0,53
Cis-10-heptadecanoic	17:1	0,32	0,33	0,34	0,38	0,35	0,35
Stearic	18:0	1,69	2,33	2,75	7,93	2,15	2,75
Oleic	18:1	14,45	17,03	17,65	23,26	17,62	17,44
Elaidic	18:1	1,78	2,22	2,16	1,27	2,23	2,12
Linoleic	18:2	2,55	2,68	3,01	2,53	2,83	2,93
Linolenic	18:3	0,97	1,00	1,10	0,89	1,08	1,15
γ-Linolenic	18:3	0,72	0,84	0,96	0,87	0,91	1,05

n.d. – not detected

Table 4

Fatty acid concentration in groups of sheep milk and spun fresh cheese

Groups fatty acids	Raw sheep's milk			Spun fresh cheese		
	Raw milk	Pasteurized milk		0%	0,05%	0,15%
		0,05%	0,15%			
S.F.A.	69,30	65,75	64,72	63,69	63,93	65,20
M.U.F.A.	18,30	21,21	21,83	26,84	22,15	21,53
P.U.F.A.	4,25	4,54	5,08	4,29	4,83	5,15

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

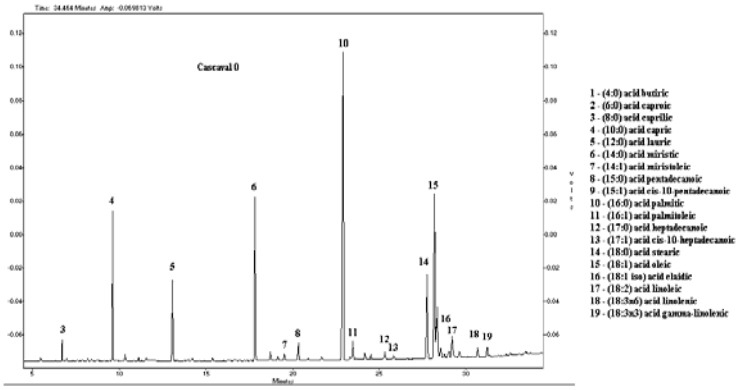

Figure no.1 The concentration of fatty acids in spun fresh cheese from milk without added fish oil

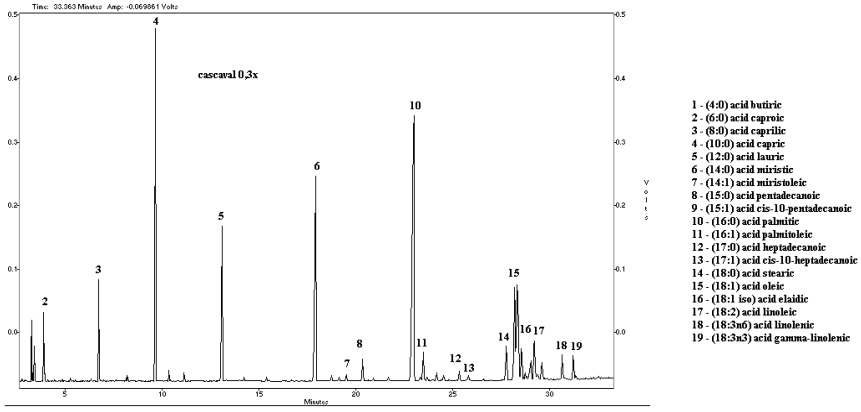

Figure no.2. The concentration of fatty acids in cheese from milk with added 0.15% f

CONCLUSION

The disadvantage of adding fish oil to milk used for making spun paste taste of fish is given by the product. This inconvenience is reduced to the operation of thermal tratamnt curd with salt solution. In sight of the production unit equipped with vacuum dezodorizatoare volatile substances in milk are largely removed.

It is undisputed that during operations in prosceul technology to eliminate scalding the curd whey and essential fatty acids are protected.

It clearly shows a percentage increase in cheese spinning, because the addition of fish oil, these substances with important physiological role in human nutrition.

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