STUDY OF THE ESTATE OF BIHAR SHEEP MILK ENRICHED IN ESSENTIAL FATTY ACIDS

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***Abstract**:*
Sheep's milk is used for the manufacture of feeders. It is important to milk composition and the possibility of addition of compounds rich in essential fatty acids. His anaizat ewes from Bihar and added fish oil.
Homogenized and pasteurized milk was to be used as raw material in industry. Study was made organoleptic, physico-chemical and gas chromatographic milk by food and diurnal-night cycle. The amount of essential fatty acids: 1.85, 2.29, 3.04, 2.12, 1.31, 2.55 linoleic acid, 0.98, 1.19, 1.15, 1.00, 1.10 and 1.63 linolenic acid, 1.25, 0.96, 1.61, 1.81 γ-Linolenic acid. Analysis of raw milk compared to homogenized and pasteurized at the following levels of fatty acids determined esnțiali: linoleic acid, linolenic acid and γ-Linolenic: raw milk-2.55, 0.97, 0.84 pasteurized and homogenized milk with added 0.05% oil fish -2.65, 1.6, 0.66, 0.10% oil peşte.2, 68, 1.00, 0.72, 0.15 -3.01% fish oil, 1.10, 0.96.

Key words: Sheep milk essential fatty acids

INTRODUCTION

Its unique composition of sheep milk fat fatty acids more than 10 carbon atoms and mono-and polyunsaturated fatty acids it is easy to digratde body. Cocentration high protein substances containing all essential amino acids and oilgozaharide causes a high biological value milk products from sheep's milk.(K. Raynal-Ljutovaca et all,2008). The fat from sheep's milk has the highest amount of low molecular weight fatty acids and unsaturated fatty acids in milk compared with other species of animals like cows, goats and buffaloes. (Gheorghe Grecu, 2003). Fat cell membrane acquired a growing interest in scientific research. It has a protective role of milk fat, with a role in milk processing technology, has a high content of nutrients. Its isolation is studied to use the material obtained in increasing the nutritional value of different products. (Koen Dewettinck et all,208). It was demonstrated that the stage of lactation, quantity of milk, race is not important for the milk fatty acids esnțiali. The most important factor is nutrition (E. Tsiplakou et all,2006). Animal's natural diet rich in tannins increase the concentration of essential milk fatty acids because protects hydrogenation of unsaturated fatty acids in the rumen (A. Cabiddu et

all,2oo9). ω 3 and ω6 essential fatty acids are very important for the human body with beneficial role in inflammatory processes, infectious pathogens because strengthen the immune system. The best source for these essential fatty acids is fish oil.(D. Montero et all,2010). Fish oils have many dietary benefits, but have strong odours and are easily oxidised. For these reasons, bcyclodextrin(b-CD) a water-soluble polymer and polycaprolactone (PCL) a water-insoluble polymer wereused to encapsulate fish oil in this study. In addition, the stabilities of freeze-dried fish oil (FO) in encapsulatedcomplexes were investigated to determine fish oil release rates at different relative humiditiesand storage temperatures (Mi-Jung Choi et all, 2010).

MATERIAL AND METHODS

To analyze the raw milk we conducted a study of sheep milk Husasău area of Tinca, Bihor . We have taken into consideration: how food-animal:; diurnal cycle, night variation in the characteristics of ewe's milk.; Breed animals. In the animal feed and breed, we collected samples for analysis of milk that comes from sheep fed: natural hill pasture with no fertilizer (code Deal) Turcana breed, grazing on unfertilized soil podzolic (code Pusta) Turcana breed, fertilized pasture, manure code Sarda), Sardinian breed. In the diurnal cycle - the night we collected : evening milking milk (code Average evening) and morning milking milk (code Average morning). To increase the concentration of essential fatty acids, fish oil is added in a ratio of 0.05, 0.10, 0.15%, milk is pasteurized, homogenized and analyzed.

Physical-chemical analysis:-Determination of acidity: Soxhlet-Henkel method by Daniela Borda, 2007, and Torner method by Valentina A. Guzun 1988; Determine the percentage of: proteins, fatty substance, lactose, fat-free dry and freezing temperature were determined electronically with your LACTOSTAR.; Determination of density: areometry metod by State Standards and Methods for Analysis 1984

Gas-chromatographic analysis of fatty acids:

Milk fat was extracted by using the following protocol: About 1ml of milk samples 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.

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RESULTS AND DICUSSION

Physico-chemical analysis:- Parametears of physical- chemical characteristics differences are not significant in terms of concentration in non-fat dry and milk components by grazing and race. The senior notes parameters versus evening milking dairy milk because the animals are fed morning milking and at night. The percentage of fat varies between 6-7. During lactation fat percentage increased to 12% approx. Density of sheep milk is analyzed 1035 - 1037 g / l at 20 ºC. The high density is due to the high proportion of milk protein and lactose. Concenrața protein range from 4.2 to 4.6%. This rule promotes the manufacture of cheese consumption is lower than for cheese made from cow's milk. The amount of lactose expressed as a percentage ranges from 6 to 6.6 %. (table 1)

High percentage of lactose favors conservabilitatea cheese increased due to the formation of lactic acid fermentation of lactose by lactic acid bacteria selected lactic culture. Training and specific aroma of sheep's milk cheese is also due to secondary fermentation of lactose by heterofermentative bacteria. Freezing point gives information about the counterfeit milk. If it rises to 0 indicates the addition of water. If milk is not considered falsified.

Table 1

Physico-chemical parameters of sheep milk

Cod	Quantity milk	Sheep numbers	acidity		Fat %	Temperature °C	Density 20 °C g/l	Protein substances %	Non-fat dry %	Lactose %	Freezing point ° C	Degree of contamination	Sensory examination
			°Sh	°T									
Deal	36	120	10	25	7.10	29	1036.7	12.16	12.16	6.59	–0.706	II	normal
Pusta	110	350	9	22/23	6.71	31	1035.9	11.77	11.77	6.38	–0.681	I	normal
Sarda	43	140	8	20	6.09	29	1036.4	11.54	11.54	6.27	–0.660	I	normal
Average evening	1300	-	8	20	6.94	3	1036.5	11.71	11.71	6.35	–0.677	0	normal
Average morning	1200	-	8	20	6.06	29	1034.9	11.10	11.10	6.02	–0.635	0	normal

The concentration of fatty acids seventh sheep is different depending on diet and diurnal-nocturnal cycle as follows:
The concentration of fatty acids according alimntație: Saturated fatty acids (S.F.A.)- unfertilized pasture hill> grass podzolic soil> unfertilized pasture hill> pasture fertilized with manure; Monounsaturated fatty acids (M.U.F.A.)- grass podzolic > pasture fertilized with manure; Polyunsaturated fatty acids (P.U.F.A)- pasture fertilized with manure> grass podzolic> unfertilized pasture hill. It appears that sheep milk has a high biological quality pasture-fed animals are treated with manure. Increases in the concentration of mono-and polyunsaturated fatty acids. Concentrațiaîn fatty acids in sheep milk by diurnal-night cycle of lactation: S.F.A. - average morning > average evening; M.U.F.A.- average evening > average morning;P.U.F.A. - average evening > average morning. It found that morning milking milk is richer in unsaturated fatty acids because the animals are rested.(table 2, 3)

Table 2

Percentage of fatty acid of sheep milk analysis

Fatty Acid	Deal	Pusta	Sarda	Average evening	Average morning	Raw milk	Pasteurized milk with fish oil		
							0,05	0,10	0,15
Butyric	0.14	0.52	0.13	0.16	0.42	n.d.	n.d.	n.d.	n.d.
Caproic	1.48	1.95	1.53	1.58	1.73	0.88	n.d.	0.31	0.67
Caprilic	1.84	2.00	2.08	2.02	1.93	3.05	1.84	2.24	2.51
Capric	6.49	5.72	6.91	6.22	6.27	14.00	10.96	11.71	11.45
Lauric	3.92	3.17	3.74	3.49	3.65	8.91	7.30	7.76	7.55
Miristic	11.20	3.48	10.59	10.05	10.88	14.97	13.83	14.12	13.80
Miristoleic	0.44	0.14	0.14	0.01	0.17	0.34	0.36	0.31	0.32
Pentadecanoic	1.19	1.18	0.97	1.21	1.24	1.22	1.25	1.21	1.19
Cis-10-pentadecanoic	0.30	0.14	0.25	0.30	0.30	n.d.	n.d.	n.d.	n.d.
Palmitic	23.71	22.00	23.97	23.02	25.59	24.99	26.20	25.52	25.14
Palmitoleic	1.07	0.98	0.93	1.07	1.20	1.71	1.65	1.63	1.77
Heptadecanoic	0.86	0.95	0.71	0.87	0.93	0.45	0.54	0.52	0.50
Cis-10-heptadecanoic	0.34	0.35	0.28	0.33	0.37	0.32	0.34	0.33	0.33
Stearic	11.00	12.83	11.17	12.17	13.45	1.69	2.75	2.33	2.07
Oleic	23.61	24.71	20.62	24.16	19.11	14.45	17.65	17.03	17.04
Elaidic	0.82	1.11	2.21	1.12	1.61	1.78	2.16	2.22	2.17
Linoleic	1.85	2.29	3.04	2.12	1.31	2.55	2.65	2.68	3.01
Linolenic	0.98	1.19	1.15	1.00	1.10	0.97	1.06	1.00	1.10
γ-Linolenic	1.63	1.25	0.96	1.61	1.81	0.84	0.66	0.72	0.96

Table 3

Percentage of fatty acids groups of sheep milk analys

Fatty acids groups	Deal	Pusta	Sarda	Average evening	Average morning	Raw milk	Pasteurized milk with fish oil		
							0,05%	0,10%	0,15%
S.F.A.	61.98	59.86	61.85	60.84	66.14	69.30	65.08	64.65	64.63
M.U.F.A.	26.26	27.09	24.17	26.68	22.42	18.30	21.50	21.54	22.67
P.U.F.A.	4.47	4.74	5.16	4.74	4.23	4.37	4.42	4.96	5.11

n.d. – not detected
S.F.A. – Saturated Fatty Acids
M.U.F.A. – Mono Unsaturated Fatty Acids
P.U.F.A. – Poly Unsaturated Fatty Acids

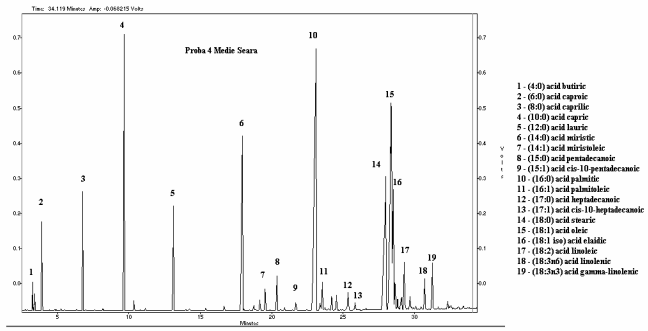

Fig . 1 The concentration of fatty acids from average evening milk

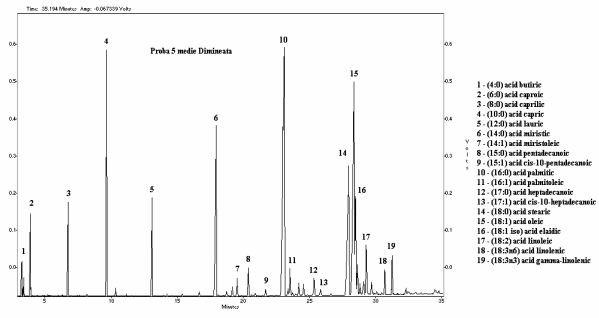

Fig . 2 The concentration of fatty acids from average morning milk

CONCLUSION

Given the deficiency of essential fatty acids in the diet of the population is proposing the addition of fish oil rich in Ω-3 fatty acids and Ω-6 in the raw milk used in industry. There the problem is not the taste of fish approved by the public. There is fish flavored milk with 0.15% fish oil. Sheep's milk is not consumed as such but is used for industrialization with the possibility to reduce this inconvenience by deodorizing milk and cheese ripening. The homogenization of milk and its aging refrigeration temperature for 12 hours to ensure inclusion of fish oil globules of milk fat. It is recommended that milk pasteurizationfor milk products acid at 85 ° C for 30 min. and for cheese at 65 º C for 30 min. There is a considerable improvement in taste and flavor with a beneficial effect on the taste and aroma of finished products. Although sheep milk has a high content of protein substances is found that it can be heat treated to high pasteurization system without protein to precipitate even after 24 hours of milking stored at refrigeration temperature.

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