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ANALYSIS MAXIMUM OF EMBEDDING ESSENTIAL FATTY ACIDS FROM GETTING YOGURT COMPARED TO RIPENESS CHEESE IN BRINE

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Abstract

In order to analyze the threshold of incorporation of unsaturated fatty acids in yogurt production compared to obtaining mature cheese in brine has been used sheep milk to which encapsulated fish oil was added. During the process, the fish oil was released from the capsules and it was intended to include it in the lactic fat globule. This process aims at increasing the biological value of dairy products obtained by enriching them in mono fatty acids but especially polyunsaturated fatty acids.

In the study, three essential fatty acids are found for the analysis, both in the composition of the raw sheep's milk used in production and in the fish oil: linoleic acid, linolenic acid and γ-linolenic acid. The concentration in fish oil of milk was analyzed both at the lower limit and at the superior limit of incorporation of these three essential fatty acids and the following results were obtained: the fish oil concentration at the lower limit of inclusion is 0.8174 for yogurt and 0.0829 for matured cheese in brine and the superior embedding limit of 2.6657 for yogurt and 0.2871 for the production of cheese in brine enriched with essential fatty acids

Key words: brânză telemea maturară iaurt acizi grași nesaturați

INTRODUCTION

The new concept of functional foods has led to the diversification of food production that is not just a food for the body but can also guarantee health and longevity. Yogurt has become one of the widespread choices and considered healthy food because it provides excellent sources of essential nutrients. The applications and roles of yogurt probiotics, prebiotics and synbiotics, as well as the effects of phytochemicals added to innovative yoghurt products, increase yogurt's biological value (Nurul Farhana Fazilah, 2018).

The manufacture of yoghurt are always looking for ways to improve the sensory and nutritional quality of it. Yogurt containing phytocianin is beneficial to health because of its antibacterial properties and has a very good consistency (Elyas Mohammadi-Gouraji, 2018).

It was investigated and the volatiles sensory properties of the yogurt with the addition of buttermilk. Addition of buttermilk and whey powder has increased sensory qualities of dietetic yoghurt. It can thus correct the dry matter content of the milk used in the manufacture of yoghurt (Lili Zhao, 2018).

During its manufacture yogurt there is significant precooling it prevents syneresis and improves curd consistency. Also, these qualities are influenced to maintain the product at a temperature of 4 °C for 24 hours (V. Guénard-Lampron, 2018).

The concentrations of trace elements such as Ca, K, Mg, Na and Zn are superior in natural yoghurt, compared flavored yoghurt or yoghurt with powdered milk (Sidnei O. Souza, 2018).

Cheeses in brine are especially produced in the countries around the Mediterranean and in the Balkan countries. Some of the best-known cheese varieties in brine are Beyaz peynir, Domiati, Fetta, Halloumi and in Romania the most popular is Telemea cheese (A. Adnan Hayaloglu, 2107).

By obtaining cheeses in brine it increases the period of preservation of nutrients in milk and thus can be stored safely for long periods of time at high temperatures (B. Özer, 2014).

Enriching dairy products with essential fatty acids has beneficial effects on the body. The omega-3 fatty acid therapy decreases cholesterol and triglycerides (Harold E. Bays, 2012).

Fish oil is rich in essential fatty acids. The fish oil encapsulation has the role to stabilize the unsaturated fatty acids (PUFAs) in its composition and to optimize the level of absorption of ω-3 in the body (Paul Joyce, 2018).

MATERIAL AND METHOD

For the manufacture of yoghurt, sheep's milk was used in April, to which fish oil was added at 0.05; 0.10% and 0.15%. The raw material milk was analyzed physically and chemically and the fatty acids were analyzed by gas chromatography (Mierliţă D., 2009).

The incorporation of essential fatty acids from fish oil in the fat globules of the milk was carried out by homogenization. Yogurt was made using the classic process.

Yogurt analysis was performed organoleptically, physico-chemical and gas-chromatographic.

Sensory analysis: was analyzed appearance, consistency, flavor and taste by 5 unauthorized persons.

Physico-chemical properties: was determined the titratable acidity and fat content by the acid-butyrometric method.

Gas-chromatographic analysis of fatty acids was performed after esterification with methyl alcohol and isolation of fatty acid methyl esters.

The cheese was obtained according to the classic technological scheme that adapted to the purpose of incorporating essential fatty acids from the fish oil into the fat of the product. The milk homogenization operation was included and the maturation operation accelerated by raising the temperature by about 2 ° C.

Analysis of ripened cheese in brine rich in fatty acids was carried out in terms of sensory and physico-chemical and the concentration of fatty acids was performed by gas chromatography.

Sensory analyzes were performed by five unauthorized persons.

From the physicochemical point of view, the titratable acidity was determined, the concentration in sodium chloride by the Mohr method and the percentage of fat using the acid-butyrometric method.

Gas chromatographic analysis of fatty acids was performed after extraction of the fat by solubilization in organic solvents, esterification of fatty acids with methyl alcohol and isolation of fatty acid methyl esters.

After determining fatty acids, the resulting values were validated using statistical analysis methods ANOVA type. For comparison with the control sample, the Dunnet test was used and Fisher test was used for the comparison of samples. In order to determine the minimum and maximum limits of oil concentrations for inclusion of fatty acids in the product, curves R.O.C. (Receiver Operator Characteristic) were used (Teusdea, A, 2008, 2009).

RESULTS AND DISSCUSIONS

This study was carried out in the process of obtaining yoghurt and matured cheese, and the degree of incorporation of the essential fatty acids from the fish oil added to raw sheep's milk in the increasing concentration of 0.05% was followed; 0.10% and 0.15%.

It was also considered that biochemical maturation of milk in the manufacture of yoghurt and maturation of cheeses in brine leads to biochemical transformations that can affect the concentrations in essential fatty acids studied. The study was performed on 4 variants (control and three samples with added fish oil) gave the following results. The limits of incorporation of the three essential fatty acids studied in yoghurt and matured cheese, taking into account the concentration of fish oil in the raw milk, is shown in Table 1.

The statistical analysis results that γ-linolenic acid it does not have the limit of embedding in the fat globule molecule of the fatty substance of

yogurt.

Table 1

Concentrations of fatty acids at the limit maximum
incorporation in a samples from yogurt and ripened cheese in brine

Fatty acids	**Concentration of fish oil (%)**		**The threshold asymptotically**
	Ripened cheese in brine	Yogurt	
Linoleic	0.0950	2.8978	of the regression values
Linoleic	0.1150	2.8979	of the regression derived values
Linoleic	0.2868	0.7294	theoretical
Linolenic	0.1050	1.2708	of the regression values
Linolenic	0.1250	1.2711	of the regression derived values
Linolenic	0.3185	1.3825	theoretical
γ -Linolenic	0.1250	-	of the regression values
γ -Linolenic	0.1450	-	of the regression derived values
γ -Linolenic	0.3494	-	theoretical

Theoretically, the limit of incorporation of the three essential fatty acids in the ripened cheese in brine as compared to yogurt is as follows: linoleic acid has a 2.54-fold inclusion limit in yoghurt compared to ripened cheese in brine, linolenic acid about 4.3 times higher. Multiple comparisons between the maximum incorporation levels of fish oil in dairy products are shown in Table 2.

Table 2

Concentrations in fish oil of raw milk at the maximum limit of
embedding essential of fatty acids in ripened cheese in brine compared to yogurt

Fatty acids	**Concentration of fish oil (%)**	
	Ripened cheese in brine	Yogurt
Linoleic	0.1656	2.1750
Linolenic	0.1828	1.3081
γ -Linolenic	0.2065	

If we take into account the maximum limit of incorporation of fatty acids into matured cheese in brine, compared to yoghurt samples, the results are as follows: Linoleic acid has a maximum enclosure limit of about 10 times in yogurt compared to cheese, and in the case of γ -linolenic acid the situation is approximately the same. The analysis of both the lower limit and the upper limit of incorporation of the three essential fatty acids in the yoghurt and matured cheese in brine samples is shown in figures 1 and 2 above in figure 3.

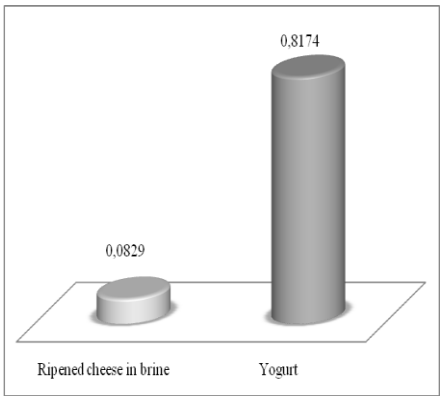

Figure 1 Concentrations % in fish oil of raw milk at the lower limit of incorporation of essential fatty acids in ripened cheese in brine samples compared to yoghurt

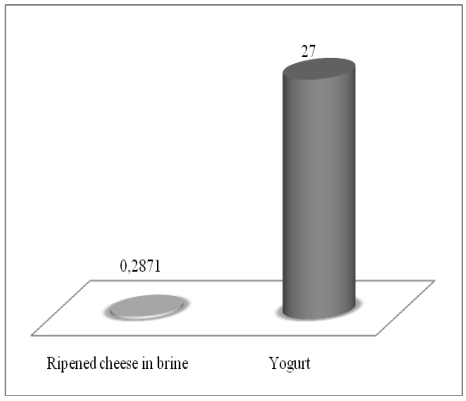

Figure 2 Concentrations % in fish oil of raw milk at the superior limit of incorporation of essential fatty acids in ripened cheese in brine samples compared to yoghurt

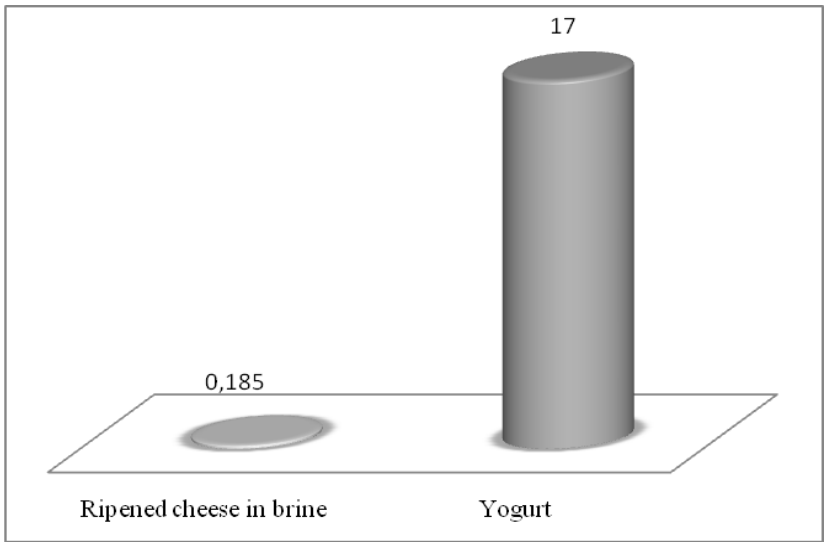

Fig. 3 Concentrations % in fish oil of raw milk at the average limit of incorporation of essential fatty acids in ripened cheese in brine samples compared to yoghurt

The fish oil concentration of the raw milk is at the lower limit of about 10 times the yoghurt compared to matured cheese in brine, and at the superior and average limits this ratio is maintained at approximately 10.

CONCLUSIONS

In conclusion, fatty acids are incorporated into yogurt much more efficiently than ripened cheese in brine, with a comparison ratio of approximately 10. This is the cause loss of fatty acids in the whey and brine.

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