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COMPARISON BETWEEN THE MAXIMUM INCLUSION OF ESSENTIAL FATTY ACIDS IN YOGHURT COMPARED TO MATURED SPUN PASTE CHEESE

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Abstract

The aim of this study was to obtain dairy products enriched in essential fatty acids ω3 and ω6. Two products were chosen from two different classes of dairy products, from the class of acidic dairy products and cheeses, respectively yogurt and matured cheese with scalded paste. Aceste produse au fost fabricate în system de manufactură. As raw material was used sheep's milk from the first lactation period to which was added fish oil, rich in essential fatty acids in a proportion of 0.05%;0.10% and 0.15%. To incorporate the fish oil into the fat globule of the milk, it was homogenized. The technological processes for obtaining dairy products were the classic ones, but in the case of cheese, the maturation was accelerated by increasing the temperature by 2-3 ° C to protect the essential fatty acids. Thus, three samples of yogurt and three samples of ripened spun paste cheese enriched in essential fatty acids were obtained. It has also been made, and a control sample, without the addition of fish oil to comparaţie.

The fatty acids were analyzed by gas chromatography. The concentration of fish oil added to milk at the maximum limit of incorporation of three essential fatty acids that are specific for both the composition of sheep's milk and fish oil has been determined statistically. Thus, in the case of yogurt for the three essential fatty acids, the following values were obtained: for linoleic acid 2.8978, linolenic acid 1.2708 and ***γ****-linolenic acid has no maximum limit. In the case of ripened spun paste cheese, the situation is as follows: for linoleic acid 0.2250, linolenic acid 1.3741 and* ***γ*** *–linolenic acid 1.3002.*

Key words: ripened spun paste cheese, sana, essential fatty acids

INTRODUCTION

Acidic dairy products are important sources of probiotics due to their content in live lactic acid bacteria. Also, both acidic dairy products and cheeses are prebiotics because they are rich in proteins rich in essential amino acids that favor the action of probiotics in the body but are also beneficial for the optimal functioning of the human body.

Lactic acid bacteria (LAB) are prestigious bacteria that have reserved their position as a biotechnological tool due to the probiotic properties that characterize many of them, as well as the ability of LAB to

produce many valuable compounds with significant applications in the food and pharmaceutical industry. Bacteriocins are one of the important products produced by various bacteria and also by LAB. Bacteriocins are peptides that have different applications in the processing and preservation of food and many marketed products. More than that,, current and future applications of bacteriocins are expanding in the pharmaceutical and medical fields as promising agents of resistant anti-drug bacteria, anticancer agents and antivirals agents. (Ghoson M. Daba, 2020).

The diversity of non-starter lactic acid bacteria (NSLAB) isolated from various artisanal dairy products made from raw cow's, sheep's or goat's milk in the countries of the Western Balkans is extensive. 28 species of non-starter lactic acid bacteria and a large number of strains belonging to the genera Lactobacillus, Lactococcus, Enterococcus, Streptococcus, Pediococcus, Leuconostoc and Weissella were isolated from different dairy products. Over 3000 LAB strains have been obtained and characterized for their technological and probiotic properties, including milk acidification and coagulation, aromatic compound production, proteolytic activity, bacteriocin production and competitive exclusion of pathogens, exopolysaccharide production, aggregation capacity and immune effect. (Amarela Terzić-Vidojević, 2020).

A by-product of the cheese industry - whey, is often used as a source in the production of microbiological lactic acid. However, a microbial activity that occurs naturally in whey causes an imbalance in the microbiological processes in the technological process. Thus, the whey solution containing lactose was indicated as a suitable medium for the production of lactic acid, these being a good preservative. (Magdalena Lech, 2020).

The serum proteins in the milk composition can be extracted by incorporating lactic acid into their hydrophobic structure. They can find applications in wound healing but can also be used as growth factors during bone or cartilage regeneration. (Josephine Delmote, 2017).

Antioxidant micronutrients and extra intake of essential fatty acids appear to have a protective effect in some diseases such as cardiovascular disease, cancer and asthma (Miriam Isabel Souza dos Santos Simon, 2020).

Fish is a pure protein resource but also an essential fatty acid. For a balanced diet, Romanians should eat about two meals of fish a week. According to statistics, at the moment in Romania we consume, on average, a fish meal every three weeks, which is extremely low given the benefits of this food among consumers of all ages categories (Morna Anamaria, 2017).

The enrichment of products in fats rich in essential fatty acids also determines the improvement of their qualities from a rheological point of view. (Morna Anamaria, 2018).

MATERIAL AND METHOD

In order to obtain two milk products for analysis was used sheep milk collected from a sheep farm in Bihor. It chose april because this period is characterized by a low content of milk components. In particular, the fat concentration of the milk is taken into account because it is intended to incorporate essential fatty acids into the fat globules of the milk. Therefore, to enrich the products in essential fatty acids, tuna liver oil is added to milk. After that, the mixture of fish oil and sheep's milk is homogenized in a three-stage homogenizer. This operation aims to incorporate the fat of the fish oil together with the lactic fat into the fat globule of the milk. This product will be the raw material for the manufacture in the manufacturing system of 4 samples of yogurt and 4 samples of matured spun paste cheese. The concentration of fish oil is progressive because it will appreciate both the organoleptic characteristics of the products obtained but especially the maximum point of incorporation of essential fatty acids in the fat globule in the composition of sheep's milk.

For milk raw material, the acidity was determined, using the titratable acidity analysis method, the fat percentage using the acid-butyrometric method, the density with the areometric method. Also the physico-chemical parameters of the milk were analyzed in electronic system using the LatoStar machine and in order not to block the machine it was necessary to determine the acidity of the milk with the boiling test.

In order to protect the unsaturated fatty acids from the composition of dairy products, the technological process was intervened by reducing the maturation period of the cheese samples. The acceleration of the ripening of the cheese was obtained by increasing the ripening temperature by approximately 2-3 °C .

Both the yogurt and ripened spun paste cheese samples were analyzed, from an organoleptic point of view, by 5 unauthorized persons. S-a urmărit gustul, aroma dar și textura produselor.

The acidity of the finished products was performed with the titratable method, the determination of the fat percentage by the acid-butyrometric method and the percentage of dry matter by the oven drying method. The percentage of salt in the cheese was determined using the Mohr method.

19 fatty acids from the composition of the dairy samples were analyzed by gas chromatography. In particular, the proportion of essential fatty acids is taken into account.

Statistical analysis of the data was performed using the Anova method of comparison between samples but also samples with control sample, without the addition of fish oil. Pentru determinarea limitei maxime

de ulei de pește adăugat în lapte pentru înglobarea acizilor grași esențiali în globula de grăsime a laptelui s-au folosir curbele R.O.C. (Receiver Operator Characteristic).

RESULTS AND DISSCUSIONS

The coding of the samples is presented in table no.

Table 1

Coding of samples

No. crt.	Add fish oil %	Sample code	
		Yogurt	Ripened spun paste cheese
1	0	I_0	Cm_0
2	0,0,5	$I_{0,05}$	$Cm_{0,05}$
3	0,10	$I_{0,10}$	$Cm_{0,10}$
4	0,15	$I_{0,15}$	$Cm_{0,15}$

From the point of view of physico-chemical differences were not observed between the samples with the addition of fish oil and those without added.

Dairy products were sensory analyzed by three unauthorized persons. The taste and aroma of fish oil is perceived, but it disappears, in the case of yogurt after 2 days of storage and in the case of cheese when ripe.

Gas chromatography analyzed 19 grouped fatty acids depending on the category, in saturated fatty acids (SFA), monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA).

The evolution of these three groups of fatty acids in the samples is shown in Figure1.

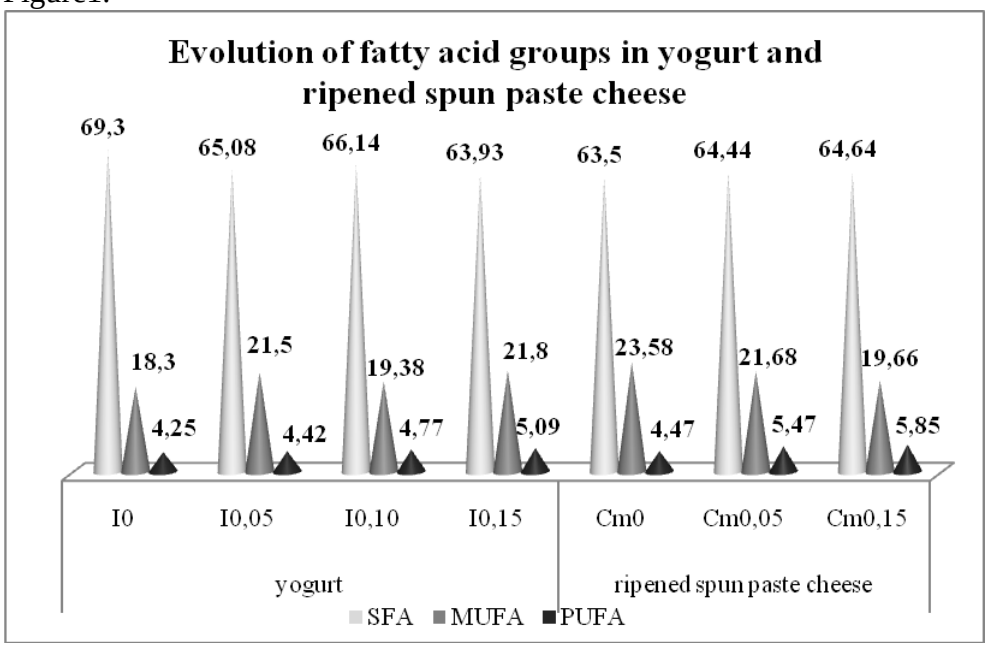

Figure 1. Evolution of fatty acid groups in yogurt and ripened spun paste cheese samples with and without added fish oil

Figure 1 shows that the proportion of SFA in sample I_0 is 5.8% higher than in Cm_0, in $I_{0.05}$ it is higher by 0.64% than $Cm_{0.05}$ in and in sample $I_{0.15}$ it is lower than in $Cm_{0.15}$ with 0.71%. The proportion of MUFA evolves as follows: In in sample I_0 it is lower by 2.14 compared to Cm_0, in $I_{0.05}$ it is lower by 0.18% than $Cm_{0.05}$ in and in sample $I_{0.15}$ it is higher by 21.4 than in $Cm_{0.15}$ while the proportion of MUFA is higher in all cheese samples compared to yogurt.

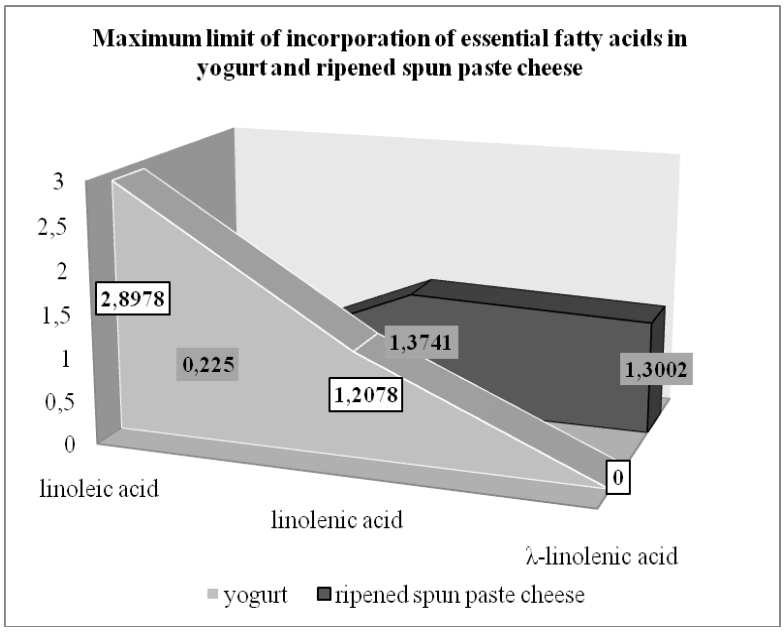

Figure 2. Maximum limit of incorporation of essential fatty acids in yogurt samples compared to those of ripened spun paste cheese

Figure 2 shows that in the case of yogurt there is no maximum globular limit of λ-linolenic acid. This is probably due to the high temperature pasteurisation of milk which can lead to thermal cleavage of the fat globule membrane. As can be seen, the maximum limits for the incorporation of the three essential fatty acids are higher in yogurt samples compared to those of ripened spun paste cheese.

CONCLUSIONS

Comparing the process of obtaining yogurt with that of ripened spun paste cheese enriched with essential fatty acids, it turns out that although the limit of entrainment of essential fatty acids is higher in the case of yogurt compared to ripened spun paste cheese, the proportion of polyunsaturated fatty acids is higher in all samples.

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