



VEGETABLE FATS INFLUENCE ON THE PHYSICO-CHEMICAL AND SENSORIAL PROPERTIES OF “TELEMEA” CHEESE

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Abstract: *The aim of this paper is to study the influence of the milk fat substitution with vegetable fats into the “Telemea” cheese, a Romanian traditional cheese. The milk fat was substitute with vegetable fats in two percentages (50 % and 75%). The three samples have been made at industrial scale and their properties have been analysed from physicochemical (acidity, pH, fat, fat acidity) and sensorial properties: texture (consistency, compactness, firmness, cohesiveness, creaminess, gumminess and cheese severity), the taste (sweet, bitter, salty and sour), colour, smell, the exterior aspect and the section aspect. The vegetable fats are rich in vitamin E and carotenoids, vitamin A precursors; the three class of substances being natural antioxidants, which protect the organism from the free radical actions. The vegetable fats are the most stables fats used in food industry, keeping their properties for a greater time. The addition of vegetable fats to the “Telemea” cheese do not change noticeable the values of the physicochemical and sensorial properties of cheese.*

Keywords: *milk, vegetable fats, substitution physicochemical, sensorial properties*

1. Introduction

The “Telemea” cheese is a type of cheese fermented into brine. Cheese is a concentrated source of nutrients that come from milk used in it manufacture. The main nutrients are represented by milk casein, minerals, lipids and fat-soluble vitamins.

“Telemea” cheese is a nutritious and versatile food that can play an important role because it is a balanced nutritional food. Actually this cheese is a product that is “popular” because of its positive and healthy image appreciated by consumers as having beneficial effects on health. This cheese, in many ways, it is an ideal food: nutritional flexible in use and application, the touch is appreciated by a large number of consumers. The product is reducing the

illness risk, and it is considered relatively safe.

The cheese is an unfermented or fermented products formed, in principal consisting casein which forms a protein matrix where are embedded fats, lactose, mineral salts and vitamins [1].

Nowadays there is a growing tendency to consume low-fat cheeses around the world. Despite the known benefits for human health, the reduction of the lipid content has a negative effect on the sensory characteristics of food products. Consequently, some strategies can be used in the cheese-making process in order to improve the texture of low fat cheeses, being one example the addition of microparticulated whey proteins as fat replacers [2].

The contribution of the fat replacer to improve the textural and functional properties of cheeses, however, varies. Such compounds can be derived from carbohydrate, protein, lipid and synthetic chemical groups.

The use of carbohydrate based fat replacers in foods is of particular interest as they appear to closely impart the desired effects lost after the removal of fat.

This occurs due to the bulking effect associated with moisture retention [3,4].

Sensory evaluation is one means of measuring and quantifying the relationship between the sensory characteristics of food and its consumer references. Techniques such as descriptive sensory analysis, cluster analysis and external preference mapping have been applied to cheese study. Descriptive sensory analysis is a research tool to characterize the aromas and flavors in cheese [5,6].

The aim of this study is to find the influence of the milk fat substitution with vegetal fats for the production of “Telemea” cheese by physicochemical a sensorial point of view.

2. Materials and methods

2.1. Materials

Milk, vegetable fats, *Streptococcus termophilus* and *Lactobacillus bulgaricus* lactic bacteria, Purac 80 from *Enzymes and Derivates*, Piatra Neamt, Romania. NaOH, sulphuric acid, izoamilic acid reagents for purchased from Sigma Aldrich

2.2. Experimental

The samples have been prepared as follows: Sample A – blank sample made using milk, Sample B – sample with 50% milk fat and 50% vegetable fats, and Sample C – 25 % milk fat and 75 % vegetable fats.

2.3. Cheese preparation

The milk was pasteurized at 72 °C for 20-30 minutes, after it was added the lactic acid (Purac 80) and lactic bacteria (*Streptococcus termophilus* and *Lactobacillus bulgaricus*).

The coagulation process has been made into coagulation tub using CHI-MAX rennet. The mix is kept for 30-40 minutes into the tub. After the coagulation takes place, the curd is divided into pieces.

2.4. Physicochemical determinations

The fat content has been measured using ISO 1211/FIL 1:2010 method [7], the moisture content has been determined using the oven method, the acidity was measured using an titrimetric method (with 0.1 n NaOH), the fat acidity index was measured using a titrimetric method (with 0.1 n NaOH), the pH was measured using a pH meter,

2.5. Sensorial analysis

The sensorial analysis is the only method used for appreciate the quality of “Telemea” cheese. The three samples have been analysed by 5 tasters.

The method used for the sensorial analysis consisted into unitary point scale. The sensorial properties analysed were: texture (consistency, compactness, firmness, cohesiveness, creaminess, gumosity and cheese severity), the taste (sweet, bitter, salty and sour), smell, the exterior aspect and the section aspect.

2.6. Statistical analysis

The statistical analysis was made using the next software packs: Excel 2007. The variables were weighted with the inverse of the standard deviation of all objects in

order to compensate for the different scales of the variables.

3. Results and discussions

In table 1 are presented the physicochemical parameters analysed for the milk and for the three “Telemea” cheese products made. Comparing to the parameters of the milk used for the cheese production, cheese parameters have not suffered noticeable modifications.

Table1.
Physicochemical parameters of milk and “Telemea” cheese

	pH	Acidity (°T)	Fat (%)	Fat acidity mg KOH/g
Milk	6.57	15	3.2	11.2
Sample A	5.10	170	42.8	14.5
Sample B	5.23	180	42.4	13.4
Sample C	5.26	170	42.2	14.5

As shown in the table above, all the parameters have not changed noticeable after the cheese processes occurred. The few changes were made to the parameter values indicating acidity (pH, acidity) changes due to the activity of lactic acid bacteria starter cultures who consumed milk lactose turning it into lactic acid, thus

decreasing pH and increases acidity within certain limits.

Different additives applied to samples of “Telemea” cheese influenced fermentative processes, but and the proteolysis, lipolysis, fermentation, protein coagulation, without changes in the physicochemical and sensorial properties of the product.

Regarding pH changes, for each sample analysed, decreases with the increasing of the acidity due to the metabolism of lactic acid by the bacteria from selected cultures. The decrease of pH was due to the effects of additives on the metabolism of lactic acid bacteria present in the starter culture which was inoculated into the milk.

The acid value of the fat is an indicator of lipolysis, a greater acid number would indicate a high amount of free fatty acids in the final product, so a higher degree of glycerides dissociation under the influence of the lipolytic enzymes present in the product.

The taste, colour, consistency, flavour, whey elimination and section aspect of the three samples analyzed into the table 2. The taste of the cheese have not changed due to the substitution of the milk fat with vegetable fat, the taste is corresponding to the cheese.

Table 2.
Taste, colour, consistency, whey elimination and section aspect of the three samples of “Telemea” cheese

	Taste	Colour	Consistency	Flavour	Whey elimination	Section aspect
Sample A	Good, Specific to cheese from cow milk	White	Firm, is breaking easy without shatters	Good	Without whey	Uniform
Sample B	Good	White-yellow	Compact, elastic	Good	Without whey	With random holes
Sample C	Good, salty	White-yellow	Firm, is breaking easy without shatters	Good	Without whey	Uniform with random holes

Regarding to the colour of the samples, it seems that the substitution of the fat is change the colour, appearing yellow tones. The yellow tones come from the yellow pigments presented into the vegetable fats. The consistency is firm, compact, without shatters, the flavour is characteristics, neither one of the samples present whey

elimination, while the section aspect is uniform, just the samples with vegetable fats present random holes.

In the table 3 are presented the consistency, compactness, firmness, cohesiveness, creaminess, guminess and cheese severity of the “Telemea” cheese samples.

Table 3.
Consistency, compactness, firmness, cohesiveness, creaminess, guminess and cheese severity of the “Telemea” cheese samples

Sample	Consistency	Compactness	Firmness	Cohesiveness	Creaminess	Guminess	Cheese severity
A	24.0	16	14.4	8.8	8.2	2.6	2.2
B	26.4	18.4	12	8.8	7.4	2.2	2.2
C	24.0	14.4	13.2	9.2	7.0	2.6	2.4

It cannot be observed differences according to the degree of substitution of the milk fat with vegetable fats between the consistency, compactness, firmness, cohesiveness, guminess and cheese severity of the “Telemea” samples.

In the figure 1 is presented the radial representation of consistency, compactness, firmness, cohesiveness, guminess and cheese severity of the “Telemea” samples.

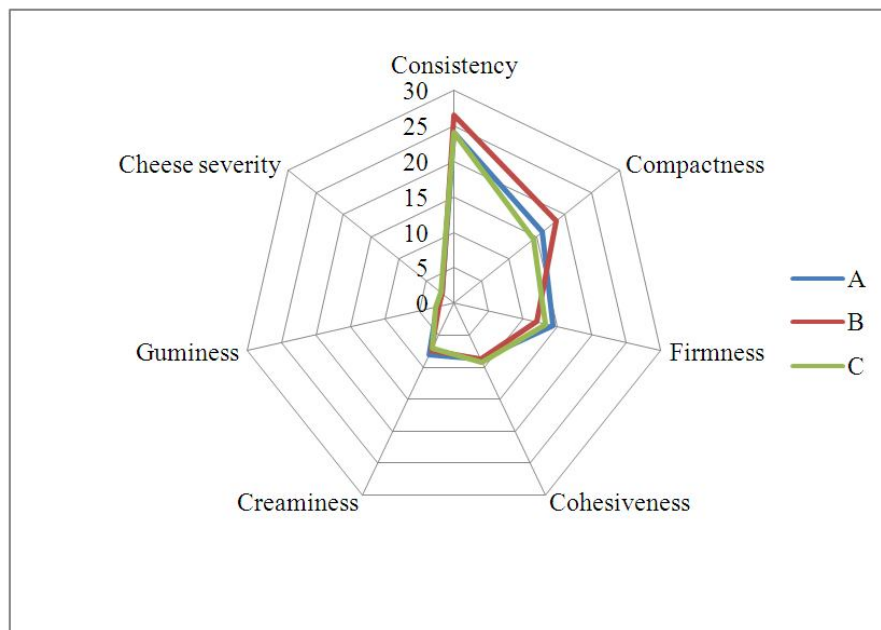


Fig.1. Radial representation of consistency, compactness, firmness, cohesiveness, creaminess, guminess and cheese severity of the “Telemea” cheese samples
 A- Sample A, B- Sample B, C- Sample C

For the gustatory evaluation we used the method of characteristics profile that includes a number of shades which states taste intensity using the following scale: 0 - not noticeable, 1 - to be significant 2 - Moderately perceptible 3 - Strong noticeable.

The five panelists tried successively three samples of “Telemea” cheese, so specifying the intensity of each sensation (components) taste: sweet, bitter, sour, salty using the scale of 0-3; the results are presented in Table 4.

Table 4.
Gustatory properties of “Telemea” cheese

Sample	Sweet	Bitter	Sour	Salty
A	1	1	1.4	2.8
B	0.8	1	1.2	2.4
C	1.2	1	1.4	2.4

The sweet, bitter, sour and salty scores of the “Telemea” cheese do not change noticeable. In figure 2 is presented the radial representation of the scores for sweet, bitter, sour and salty.

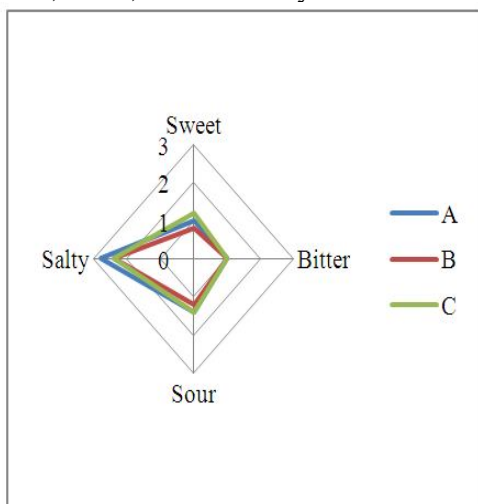


Fig.2. Radial representation of the “Telemea” cheese gustatory properties,
A- Sample A, B- Sample B, C- Sample C

The odor characteristic of the “Telemea” cheese is of lactic fermentation and diacetyl flavor. In evaluating the odor and flavor of the cheese was used the rank ordering method which consists of: classifying samples by the intensity of the sensory characteristics, each taster evaluates the samples placed in an order determined performing a preliminary classification; all the results are processed in the same time. The smell and aroma scores of the “Telemea” cheese are presented in the table 5.

Table 5.
Smell and aroma of “Telemea” cheese

Sample	Smell and taste
A	2.6
B	2.6
C	2.2

The substitution of the milk fat with vegetable fats does not influence the smell and aroma scores. In the case of the samples with 50% milk fat and 50% vegetable fats the smell and the taste obtains a lower score.

In the figure 3 is presented the radial representation of the smell and aroma of “Telemea” cheese.

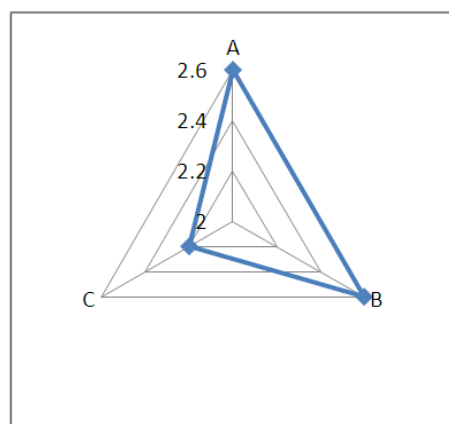


Fig. 3. Radial representation of smell and aroma of “Telemea” cheese
A- Sample A, B- Sample B, C- Sample C

To assess the exterior aspect of the “Telemea” Cheese it was used the rank

ordering method. The results are presented into table 6.

Table 6.
Exterior aspect of “Telemea” cheese

Sample	Exterior aspect
A	2.6
B	2.6
C	2.2

Just in the case of the sample with 25% milk fat and 75% vegetable fats has a lower score for the exterior aspect.

4. Conclusions

The influence of substitution of milk fats with vegetable fats for the production of “Telemea” cheese can be considered a good for its production. The physicochemical parameters of the three samples do not change noticeable with the degree of substitution. The samples maintained the same physicochemical parameters. From the sensorial points of view, the five tasters do not felt high differences between the samples. In conclusions the “Telemea” cheese obtained with vegetable fats presents the same properties like the authentic one.

5. References

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