STUDY ON THE QUALITY OF SOME CHEESE PRODUCED WITHIN A TRADITIONAL SPECIFIC UNIT

STUDIU CU PRIVIRE LA CALITATEA UNOR BRÂNZETURI OBŢINUTE ÎN CADRUL UNEI UNITĂŢI CU SPECIFIC TRADIŢIONAL

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Abstract: *In the current paper, we proposed to study some quality parameters that characterize two traditional products for which, at the moment, there is a particularly high demand. Thus, we initially determined the quality of raw milk and later that of Telemea Cheese and Dalia Cheese assortments. The main indicators studied were percentage of water, dry matter, fat, salt, respectively acidity and density.*

Keywords: raw milk, quality, chemical indicators, traditional

Rezumat: *Prin intermediul lucrării de faţă ne-am propus studierea unor parametri de calitate ce caracterizează două produse tradiţionale faţă de care, în momentul actual, există o cerere deosebit de mare. Astfel, iniţial am determinat calitatea laptelui materie primă şi ulterior cea a sortimentelor Brânză Telemea, respectiv Caşcaval Dalia. Principalii indicatori luaţi în studiu au fost reprezentaţi de: procentul în apă, substanţă uscată, grăsimi, sare, respectiv aciditatea şi densitatea.*

Cuvinte cheie: lapte materie primă, calitate, indicatori chimici, tradiţional

INTRODUCTION

In a general way, we can mention the fact that food is a determining factor of the health, nutritional status and productivity of the population (Simeanu, 2015). Thus, it is essential that food that people eat to be healthy and safe (Davidescu *et al.*, 2021a; 2021b).

Both food safety and quality are essential, on the one hand in the more or less approved perception of the final consumer, but especially at the level of their production and processing on a large scale (Muehlhoff *et al.*, 2013). Initially, many foods were processed at home; however, advances in technology and processing, higher incomes of the population, and superior purchasing power have triggered the creation of a wide variety of processed foods (Abdel Moniem *et al.*, 2012). Their safety must be monitored and evaluated, which has led to the emergence of various institutions that perform physicochemical and microbiological analyses to guarantee the quality of the products (Avarvarei *et al.*, 2019; Usturoi *et al.*, 2019).

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Regarding cheese quality, several attributes must be analysed, including appearance, texture, functionality, flavour, safety, and nutritional value. Cheeses are the final products of a long and complex process that can take up to several months, and their quality depends on a multitude of factors (Usturoi *et al.*, 2019).

Overall, when we discuss cheese quality, the main constituents that influence both yield and quality are the fat and casein content of raw milk (Avram *et al.*, 2020). Compared to these parameters, distinct seasonal trends were reflected in the cheese yield (Usturoi, 2012). Under certain conditions, the fat content of milk can be considered a major factor influencing cheese production, because the casein content of milk is relatively constant (Raţu *et al.*, 2015; Usturoi *et al.*, 2019).

MATERIAL AND METHOD

Working material was represented by samples collected from two varieties of cheese taken in the study and the raw material milk from which they were obtained. Ten samples related to each assortment and manufacturing batch were studied to obtain a clear picture of the properties of cheeses and raw milk, a number of 10 samples related to each assortment and manufacturing batch were worked on.

Acidity was determined by Thörner titration, which is based on neutralization of milk acid by titration with NaOH in the presence of a colour indicator. The formula used to determine the milk acidity is as follows:

$$A = 10 * V \ (°T)$$

where: V= volume (mL) of 0.1 n NaOH used for titration.

Density was determined using the areometric method with a thermolactodensimeter.

The analysed milk was homogenized and heated to 20°C; without foaming, it was introduced into a glass cylinder. The thermolactodensimeter was then inserted into the 1.030 graduation and allowed to float for approximately 30 seconds to stabilize, taking the reading.

Fat content was determined using the acid-butyrometric method.

The method is based on the separation of milk fat by centrifugation, after which all protein substances are dissolved under the action of sulphuric acid and isoamyl alcohol.

The working method involved adding 10 cm³ of sulphuric acid, 11 cm³ of milk and 1 cm³ of isoamyl alcohol, shaking the butyrometer, and centrifuging at 1000-1200 rpm for 4 min.

To read the fat content, the butyrometer was held vertically with the meniscus at the eye level so that the line between the acid and fat was aligned at 0.

Determination of dry matter (D.M) was based on the drying of cheese samples.

Fifteen grams of sand were weighed into a weighing vial and dried to a constant weight, noting the final weight of ampoule + sand. Three grams of cheese was weighed, placed in ampoules, and homogenized with sand.

Drying was performed at +50 to +60°C for 2-3 hours and then at +103°C for 4-5 hours, then the samples were cooled and weighed until a constant weight was reached.

Calculation:

$$\text{Dry matter content (\%)} = \frac{m1 - m2}{m1 - m0} x100$$

where: m_0 = weight of the ampoule with sand (g);

m_1 = weight of the ampoule with sand and product (g);

m_2 = weight of the ampoule with sand and residue (after drying) (g).

Determination of water content was carried out through the following relationship:

$$\text{Water (\%)} = 100 - \text{D.M}$$

Acidity was determined by the Thörner method

Materials and reagents: mortar with pestle, Erlenmeyer flask, analytical balance; graded cylinder, distilled water, sodium hydroxide (n/10), and phenolphthalein (2% alcoholic solution).

Working method: Ten grams of the sample to be analysed were mixed with 20-50 cm^3 of distilled water in a mortar and homogenized until a homogeneous suspension was obtained, and then the suspension was quantitatively transferred into an Erlenmeyer flask. Phenolphthalein (1 cm^3, 2% alcoholic solution) was introduced and titrated with sodium hydroxide (0.1 N) until a pale pink colour appeared, which persisted for 1 min.

$$\text{Acidity (°T)} = \frac{V}{10} x100$$

where: V = volume of 0.1 n sodium hydroxide solution used in the titration (cm^3);

10 = mass of the product taken for analysis (g).

Salt content was determined using the Mohr method, which is based on the precipitation of chlorides from cheese with silver nitrate in the presence of potassium chromate as an indicator.

Apparatus and reagents: porcelain capsule, balloon cone, funnel, filter paper, silver nitrate solution 2.906% (1 cm^3 solution corresponds to 0.01 g of sodium chloride) and potassium chromate (10% solution).

Working technique: cheese (2 g) was weighed in a porcelain capsule (mortar) and homogenized with 30 cm^3 of hot distilled water until a homogeneous suspension was obtained.

The sample was allowed to stand for 10-15 minutes (with occasional mixing) and then filtered through a filter paper into a conical flask. Potassium chromate solution (0.5 mL) was added to the filtrate, after which it was titrated with a silver nitrate solution until the colour changed to brick red.

Calculation:

$$\text{NaCl (\%)} = \frac{V}{m}$$

where: V – volume of the 2.906% silver nitrate solution used in the titration (cm^3);

m – mass of the product used for analysis (g).

RESULTS AND DISCUSSIONS

Results regarding the quality of raw material milk

The qualitative indicators of the raw milk used in the study were fat content (%), acidity (°T), and density (g/cm^3).

Regarding the fat content, an average value of 4.15±0.25% was identified, with oscillation limits between 3.90 and 4.5%; the calculation of the coefficient of variation allowed us to characterize this parameter as very homogeneous. The acidity of raw milk was at the level of an average value of 17.23±0.18°T, falling within the limits imposed by the unit's standard; in this case, the homogeneity of the character was observed (tab. 1).

The density was identified using a thermo-lacto densimeter, with average values of 1.031±0.002 g/cm^3 and limits that varied between 1.029 and 1.033 g/cm^3 (tab. 1).

Table 1

Physical-chemical properties of raw milk

Parameter	Company standard	Statistical estimators				
		n	$\bar{X} \pm s_{\bar{X}}$	V%	Min.	Max.
Fat (%)	min. 3.4		4.15±0.25	2.18	3.90	4.50
Acidity (°T)	15–19	10	17.23±0.18	3.15	17.05	17.45
Density (g/cm³)	min. 1.029		1.031±0.002	0.12	1.029	1.033

Results regarding the quality of Telemea Cheese

In general, by analysing the results of the qualitative parameters obtained for Telemea Cheese, we can affirm that this assortment fell within the requirements generated by the company standard.

The percentage in water for the variety studied had an average value of 54.32±1.14%, varying between a minimum of 53.18% and a maximum of 55.46%; this parameter fell within the company standard (max. 57%), and the characteristics were homogeneous (tab. 2).

The dry matter was within the limit of admissibility (min. 43%), with an average value of 46.68±1.26%, and variations between 45.22% and 47.94%.

The average fat percentage registered an average value of 40.22±0.19%, being below the maximum allowed limit (max. 42%) under the conditions of determining a variation coefficient of only 1.08 (very homogeneous character) (tab. 2).

Table 2

Physical-chemical properties of Telemea Cheese

Parameter	Company standard	Statistical estimators				
		n	$\bar{X} \pm s_{\bar{X}}$	V%	Min.	Max.
Water (%)	max. 57	10	54.32±1.14	1.46	53.18	55.46
Dry matter (%)	min. 43	10	46.68±1.26	2.16	45.22	47.94
Fat (%)	max. 42	10	40.22±0.19	1.08	40.03	40.30
NaCl (%)	2.0–3.5	10	2.45±0.05	2.44	2.40	2. 50
Acidity (°T)	max. 150	10	131 ±0.04	2.65	130	131

A particularly important parameter is represented by the percentage of salt because it directly influences the quality of the product as well as the purchase decision. We thus observed the presence of a moderate percentage of this compound, of 2.45±0.05%, with a lower limit of 2.40% and an upper limit of 2.50%. The character homogeneity was very good (V% = 2.44) (tab. 2).

The acidity of the variety used in the study was at an average level of 131±0.04°T; it fell within the company standard, with the character being very homogeneous (V% = 2.65).

Results regarding the quality of Dalia cheese

The second assortment studied was Dalia cheese, another product in which many consumers show high interest.

The analysis of the quality of the assortment started from the identification of the average percentage in water, which was 42.46±1.16%, and that in the dry substance, which was at the level of 57.54±1.22%. For both monitored indicators, the values identified for the coefficients of variation highlight the very good homogeneity of the character. The oscillation limits fluctuated in very small ranges, these being 41.30-43.62% for the water, respectively 56.32-58.76% for the dry substance (tab. 3).

The identification of the fat percentage revealed an average value of 43.26±1.08%, which falls within the company standard, that is, a maximum of 45%. No significant differences were revealed between the batches, with the character being very homogeneous (V% = 1.35) (tab. 3).

Table 3

Physical-chemical characteristics of Dalia cheese

Parameter	Company standard	Statistical estimators				
		n	$\overline{X} \pm s_X$	V%	Min.	Max.
Water (%)	max. 45	10	42.46±1.16	1.34	41.30	43.62
Dry matter (%)	min. 55	10	57.54±1.22	1.24	56.32	58.76
Fat (%)	max. 45	10	43.26±1.08	1.35	42.18	44.34
Acidity (°T)	max. 190	10	184.0±0.02	0.85	184	185
NaCl (%)	max. 3.5	10	3.02±0.24	1.16	2.78	3.26

The acidity of Dalia variety had an average value of 184.0±0.02°T, with limits from 184°T to 185°T, and the character was very homogeneous (tab. 3).

Similarly, we also observed the constancy of the percentage of salt in the 10 analysed samples, with an average value of 3.02±0.24%, which is approximately 0.5% less than the standard. The good homogeneity of the character is also highlighted in this case.

CONCLUSIONS

Carrying out, the study allowed the following conclusions which are presented below.

1. Regarding the quality of raw material milk:
➢ fat content was at the level of 4.15±0.25%;
➢ average acidity was 17.23±0.18°T;
➢ average density values were 1.031±0.002 g/cm^3.

2. Regarding the quality of Telemea Cheese:
➢ percentage in water had an average value of 54.32±1.14%;
➢ dry substance was within the limits of admissibility (min. 43%);
➢ average fat percentage was 40.22±0.19%, below the maximum limit;
➢ a moderate percentage was observed in salt (2.45±0.05%);
➢ acidity was 131±0.04°T.

3. Regarding the quality of Dalia cheese:
➢ average percentage in water was 42.46±1.16%, and that in the dry matter was 57.54±1.22%;
➢ fat percentage had an average value of 43.26±1.08%;
➢ acidity was at the level of 184.0±0.02°T;
➢ percentage of salt was constant, with an average value of 3.02±0.24%.

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