

Obtaining and characterization of a new variety of buffalo brined cheese with mint

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Abstract

Brined cheese is a dairy product appreciated by consumers, available in a wide variety on the market. Mint, recognized for its therapeutic and culinary properties, is added in finely chopped form to the brined cheese. This study aimed to qualitatively assess both plain brined cheese and brined cheese with added mint, without the use of probiotics and starter cultures, prepared according to a traditional recipe. The results indicate that the classic buffalo brined cheese was most organoleptically appreciated. However, the sample with added mint is valued for its color, freshness, and aroma. Physicochemical analysis shows a higher moisture content in the mint sample due to the contribution of the plant. Microbiological analysis indicates that with the addition of mint and salt, the total number of germs decreases. Brined cheese made from buffalo milk with added mint could be an alternative appreciated by consumers.

Keywords: mint, brined cheese, buffalo, microorganisms

1. Introduction

The world milk supply is provided by cattle in proportion of 83%, bubalines 13%, goats 2%, sheep 1% and camels 0.4% [8]. The difference of 0.6% being represented by equidae (horses, donkeys), yaks and reindeer [18].

Buffalo milk and dairy products are rich in nutrients, provide energy and essential substances in the development of the body, being considered a superior raw material for Western and traditional dairy products [6].

Buffalo milk dairy products are firm in texture due to a high content of total solids (TS), proteins, fats, high concentration of conjugated linolenic and linolenic acid [16], as well as lactose, casein, amino acids and calcium [23].

Dairy products and buffalo milk help prevent metabolic syndrome, chronic diseases, type 2 diabetes, hypertension and cardiovascular disease due to higher amounts of fatty acids and amino acids [12].

The quality of buffalo brined cheese is influenced by its texture, which depends on the composition of the milk, the technological process of production as well as the biochemical processes that take place [3, 4]. Being rich in lactose and casein, buffalo milk is recommended in obtaining fatty cheeses [20].

Quality requirements are influenced by sensory characteristics, physico-chemical and microbiological hygiene [17].

Medicinal plants are important sources of agents, with antimicrobial effect against a large number of pathogenic bacteria [22]. Some families of plants, such as Lamiaceae, have not only antimicrobial but also antioxidant properties, such as *Mentha longifolia*. Its essential oil contains pulegon, cineole, linalool, menthol, carvone, pipertone, thymol, beta-caryophyllene, being compounds with antimicrobial properties [9, 19].

The objective of the research was based on the qualitative assessment of buffalo brined cheese by organoleptic, physico-chemical and microbiological

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examination, for the simple version as well as for the one with added mint, prepared according to a traditional recipe.

2. Materials and methods

As a working material, buffalo milk from the farm "Cărpinișana" from Cărpiniș village, Maramureș county, was used. Buffalo brined cheese was obtained through the traditional recipe using unpasteurized buffalo milk with 9.5% fat.

In order to achieve the desired goal, two types of buffalo brined cheese were prepared according to the following recipe: simple buffalo brined cheese numbered (1) (10L buffalo milk, 2 ml liquid rennet) and buffalo brined cheese with traces of mint numbered (3) (2.5 L buffalo milk, 0.5 ml liquid rennet, 2g mint).

The buffalo milk was cooled and filtered, cooled to 32°C, and then the liquid rennet was added. In the

case of the mint version, the shredded mint was added, stirred until a good homogenization then left to rest for about 1 hour. After curdling it was stirred until the curd broke, then the coagulated milk was placed in a clinker over the gauze, and a weight was put to eliminate the whey completely. After about 3 hours, the formed buffalo brined cheese was cut into equal pieces and placed in a bowl of cold water.

For both curds, the simple buffalo brined cheese and the mint one, salty samples were created (simple salted buffalo brined cheese numbered 2 and buffalo brined cheese with added salted mint numbered 4), by introducing pieces of buffalo brined cheese in brine mixture (45%) for 5 hours. Buffalo brined cheese was placed on a cotton towel for draining, after which packaging in polyethylene bags was carried out. The samples for which organoleptic, physico-chemical and microbiological analyses have been elaborated can be seen in figure 1.



(1)



(2)



(3)



(4)

Figure 1. Simple unsalted buffalo brined cheese (1), Simple salted buffalo brined cheese (2), Unsalted buffalo brined cheese with mint (3), Salted buffalo brined cheese with mint (4)

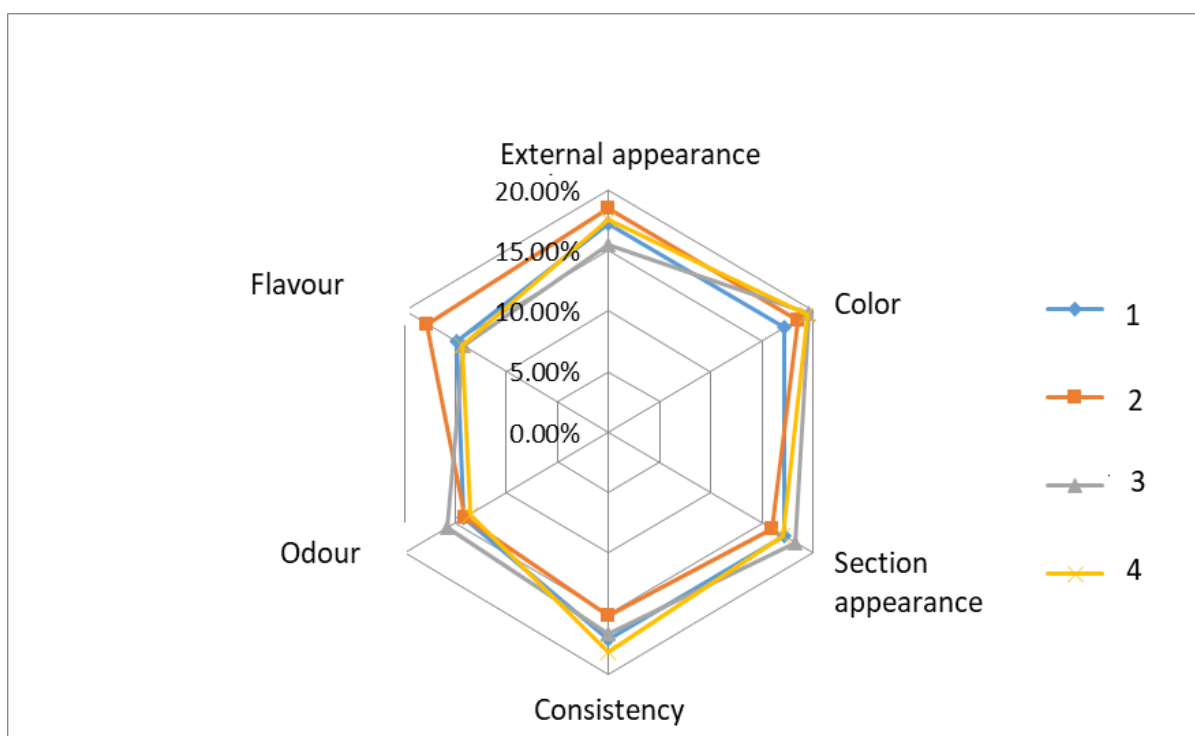


Figure 2. Results of the organoleptic analysis

The evaluation of sensory quality was performed by analyzing the external appearance, section appearance, color, consistency, smell and taste through grading scales from 0-5. The pieces of buffalo brined cheese with uniform surface and color, hard consistency, compact mass without crumbling, pleasant smell and taste, were denoted with 5p, and at the opposite pole with 0p were the pieces of buffalo brined cheese with very moldy surface, non-specific color with impurities, cracks in the paste, crushed, moldy smell and bitter taste.

The physicochemical analysis aimed to determine the sodium chloride and calcium content of each studied sample. For NaCl, 2 g of cheese was weighed, grounded with 30 ml hot distilled water until a suspension was obtained, and left to stand for 10 minutes. Then it was filtered and about 0,5 ml potassium chromate solution was added to the sample. It was titrated with a solution of silver nitrate, stirring continuously, until the yellow color changed to reddish-brown with a scarlet hue. The volume used for titration was related to the mass taken for analysis. The Ca content was determined by titration with EDTA solution in the presence of murexide.

Microbiological analysis involved determining the total number of germs and coliforms. The total plate count (NTG/ml) was achieved by working the technique and interpretation of results in accordance with STAS ISO 4833-2003 [1]. The number of coliforms was obtained according to STAS ISO 4831/1992, on selective enriched media [1].

3. Results and discussions

For the organoleptic analysis (external appearance, section appearance, color, consistency, taste, smell) the four assortments of buffalo brined cheese were tasted and appreciated by a number of 10 subjects, the results being observed in figure 2.

According to figure 2, it can be seen that buffalo brined cheese with the addition of unsalted mint was the most appreciated in terms of smell, section appearance and color, due to the addition of mint that gives a specific look and aroma. Other studies show that essential oils, extracts and powders of herbs are compounds that can be added to buffalo brined cheese to increase its sensory properties [13]. Considering the external appearance and taste, the highest score was granted for the simple salted buffalo brined cheese.

For the physicochemical analysis (determination of humidity, dry matter, NaCl and Ca content), the results can be seen in figures 3,4,5.

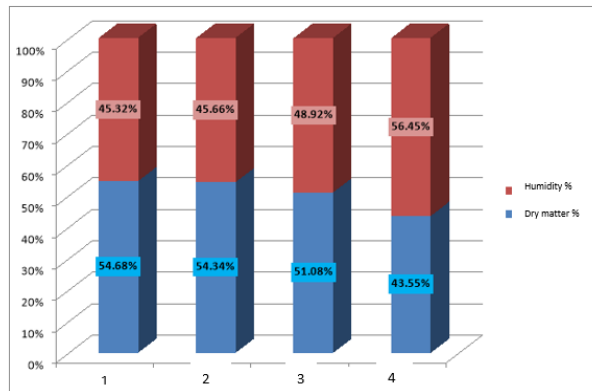


Figure 3. Values registered for humidity and dry matter

In figure 3 it can be seen that simple unsalted buffalo brined cheese has the highest dry matter content of 54.68 %, followed by simple salted buffalo brined cheese, with 54.34 %. By adding mint, the water intake increases, so the dry matter content decreased to 51.08%, while for the mint and salt sample it reached a value of 43.55%.

The dry matter content of the buffalo cheeses varied between 43.55%-54.68%, values close to those described in the literature where the amount of dry matter reached values between 49%-53% [7]. As shown in figure 4, the highest NaCl content was found in the salted mint buffalo brined cheese, followed by simple salted buffalo brined cheese.

The high NaCl content of the sample with the mint and salt addition is probably due to the high humidity it had registered (56.45%).

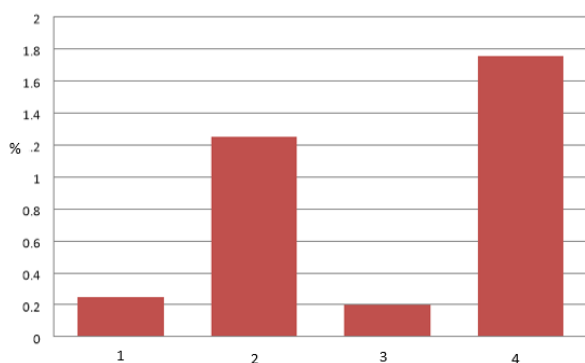


Figure 4. Values for the NaCl amount of the curds

The dairy industry is looking for alternative ways to reduce salt content while maintaining consumer satisfaction. Salt plays an important role in cheese production affecting technological and sensory

aspects, in addition to providing flavor control, enzymatic activity, microbial growth [5, 10].

According to figure 5, it is observed that the values recorded for the Ca amount are higher in the samples with added salt, which preserves Ca better, not being eliminated through whey in such a large amount as in the case of unsalted samples.



Figure 5. Values of the Ca amount

According to the study written by [11, 21], the highest concentration of Ca was in the camel milk, followed by yak milk and then buffalo milk.

Considering the microbiological analysis, the total number of germs (NTG) and coliforms were determined, and results that can be seen in figures 6,7.

Figure 6 shows that NTG varied in the buffalo brined cheese samples, with a gradual decrease with the addition of brine. Salt has the role of inhibiting bacterial proliferation, being added to increase the degree of preservation. The addition of shredded mint leaves gave a higher freshness, considerably reducing the number of germs in the sample together with the addition of salt, due to the antimicrobial properties of these therapeutic plants.

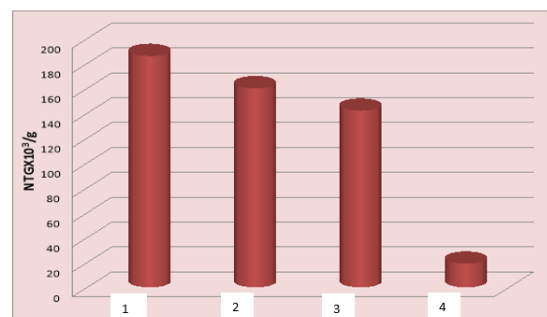


Figure 6. NTG values for the buffalo brined cheeses

Coliform bacteria are indicators of fecal contamination of food, their presence in milk and dairy products is frequent due to multiple sources of multiplication.

Depending on the preparation steps and ripening state, there is a possibility of contamination with various spoilage and disease-causing bacteria including *E. coli*, *S.aureus*, *L. monocytogenes* of the cheeses [2].

The recorded results shown in figure 7, illustrate that in unsalted buffalo brined cheese the number of coliforms was high, exceeding the maximum permissible value of 100 bacteria/g, compared to other samples to which salt and mint were added. The addition of mint also indicates an antibacterial effect in the curd, because in the sample with mint and salt addition, the number of coliforms was reduced, being below 10 bacteria / g product.

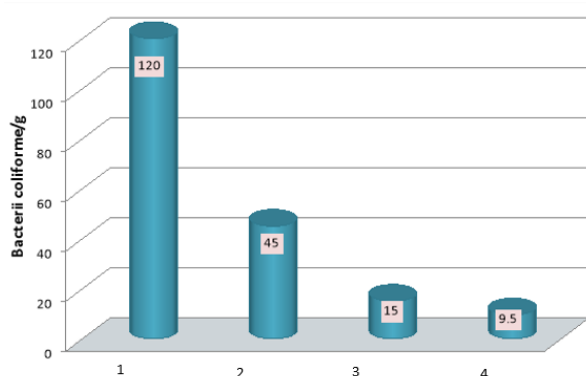


Figure 7. Values for the coliform bacteria

According to other studies [14,15], essential oils and extracts have natural antimicrobial activity against a large number of pathogenic bacteria, while the phenolic groups of these compounds can have a flavoring and preserving effect.

4. Conclusion

The results of the conducted research on the buffalo brined cheeses from an organoleptic point of view, show us that the most appreciated in terms of smell, section appearance and color was buffalo brined cheese with addition of unsalted mint, while following the external appearance and taste, the highest score was recorded by the simple salted buffalo brined cheese.

The physicochemical analysis of the dry matter and moisture shows a higher dry matter content in simple salted and unsalted buffalo brined cheese, while in the one with added mint the water content increases, due to the intake brought by the plant.

The highest NaCl content is found in the salted mint buffalo brined cheese, followed by simple salted buffalo brined cheese, the difference between the

two being due to the high humidity offered by the addition of plants. The amount of Ca was approximately the same in all analyzed samples.

Microbiological analysis indicates a degree of samples contamination, especially simple ones, but by adding mint and salt the total number of germs and coliforms is reduced.

Buffalo brined cheese with added mint can be an alternative to the classic type of buffalo brined cheese, being appreciated by consumers. Also mint has an antimicrobial effect, which makes us consider that it can be recommended on the market.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

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