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Traditional Technology of Fresh Cheese Production with Added Spices as a Functional Value-Added Dairy Product

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ABSTRACT

Fresh cheese represents an important segment of traditional dairy products, with significant potential for innovation through the development of functional and value-added foods. This study focuses on the traditional technology of fresh cheese production with added spices as a functional value-added dairy product. The objective of the research was to analyse the production process, evaluate the influence of selected spices on the physicochemical and sensory characteristics of fresh cheese, and assess its functional potential.

Fresh cheese was produced using traditional methods based on high-quality cow's milk, followed by the incorporation of selected natural spices. Standard analytical methods were applied to determine basic quality parameters, including moisture content, fat, protein, acidity, and sensory properties. The addition of spices contributed to improved sensory acceptability and enhanced functional characteristics, without adversely affecting the technological stability of the product.

The results indicate that traditional fresh cheese production can be successfully combined with functional ingredients to obtain a value-added dairy product with increased nutritional and market value. This approach supports the preservation of traditional dairy practices while enabling innovation aligned with modern consumer demands for functional foods. The findings provide a scientific basis for the development of functional fresh cheese within sustainable and smart dairy production systems.

Keywords: fresh cheese; functional dairy product; spices; physicochemical properties; sensory characteristics.

INTRODUCTION

Milk represents one of the most complex and nutritionally valuable natural foods, containing a balanced composition of proteins, lipids, lactose, minerals, vitamins, and bioactive compounds that contribute to human nutrition and health. Owing to its unique physicochemical and biological properties, milk has served as a fundamental raw material for dairy production since the earliest civilizations and continues to be of central importance in modern food systems. Its structural organization, particularly the casein micelle system and milk fat globules, enables the development of a wide range of

dairy products with diverse textures and functionalities (Walstra, Wouters & Geurts, 2006; Fox et al., 2017).

Among dairy products, fresh cheese occupies a significant position due to its high nutritional value, mild sensory profile, and relatively simple production technology. Fresh cheese is defined as a soft, unripened dairy product obtained through the coagulation of milk proteins, primarily caseins, followed by whey drainage. It is characterized by high moisture content, soft and spreadable texture, mild acidic flavor, and high digestibility (Fox et al., 2017; Tamime, 2006). From a technological standpoint, fresh cheese production requires minimal ripening time, which makes it particularly suitable for small-scale and traditional manufacturing systems, while still allowing for product innovation through formulation adjustments and the incorporation of functional ingredients.

In recent decades, increased consumer awareness regarding the relationship between diet and health has stimulated growing interest in functional foods—products that provide health benefits beyond basic nutrition. The dairy sector has responded by developing novel products enriched with probiotics, prebiotics, plant extracts, and aromatic herbs (Granato et al., 2010). Spices and medicinal herbs represent particularly promising functional additives due to their natural origin and their content of biologically active compounds, including phenolic constituents, flavonoids, and essential oils. These compounds exhibit antimicrobial, antioxidant, and anti-inflammatory activities, thereby contributing not only to improved shelf-life and safety but also to enhanced nutritional value (Burt, 2004). The incorporation of such natural additives into traditional dairy matrices offers a strategic opportunity to increase product differentiation and market competitiveness while preserving the authenticity of traditional processing methods.

Thyme (*Thymus vulgaris L.*) is one of the most extensively studied aromatic herbs, widely recognized for its high content of essential oil components, particularly thymol and carvacrol. These phenolic monoterpenes demonstrate strong antimicrobial and antioxidant activities against a broad spectrum of spoilage and pathogenic microorganisms (Burt, 2004; Viuda-Martos et al., 2010). In addition to its preservative potential, thyme contributes distinctive sensory attributes, including characteristic aroma and flavor notes that may enhance consumer acceptance when properly incorporated into dairy products.

The present study investigates the application of traditional fresh cheese technology enriched with dried thyme (*Thymus vulgaris L.*) as a functional, value-added dairy product. Fresh cheese was produced under controlled laboratory conditions using raw cow's milk as the primary raw material, with dried thyme incorporated during the production process. The final product was subjected to comprehensive physicochemical analyses, including evaluation of active and titratable acidity, as well as sensory assessment to determine the influence of thyme addition on product quality, stability, and overall acceptability.

The results demonstrate that the incorporation of thyme positively influences the sensory profile of fresh cheese without compromising its technological performance or physicochemical stability. These findings support the concept that the integration of traditional dairy technology with scientifically validated functional ingredients represents a viable approach for the development of innovative, health-oriented dairy products aligned with contemporary consumer demands for natural, functional, and value-added foods (Tamime, 2006).

MATERIALS & METHODS

Milk. Raw cow's milk was used as the primary raw material for the production of fresh cheese enriched with thyme. The milk

was obtained from local producers and processed without prior pasteurization in order to preserve its indigenous microbiota and native enzymatic activity, both of which may influence coagulation dynamics and final product characteristics. The use of fresh, high-quality milk is a critical prerequisite for achieving optimal organoleptic, nutritional, and technological properties in fresh cheese, particularly in products manufactured according to traditional processing principles (Walstra, Wouters & Geurts, 2006; Fox et al., 2017).

The chemical composition and hygienic quality of raw milk directly affect curd formation, moisture retention, texture, and yield (Lucey, 2002). Therefore, prior to processing, the milk was subjected to physicochemical evaluation. Basic compositional parameters (milk fat, protein, lactose, solids-not-fat, and density) were determined using a Lactoscan S60 milk analyzer, based on ultrasonic measurement principles.

Active acidity (pH) was measured using a calibrated digital pH meter (Type PT100 electrode) at 20 ± 1 °C. Titratable acidity was determined according to the standard Soxhlet–Henkel method and expressed in degrees Soxhlet–Henkel (°SH), which reflects the buffering capacity of milk and provides an indirect estimation of lactic acid content, (Walstra et al., 2006). Monitoring both active and titratable acidity is essential, as these parameters significantly influence rennet activity, coagulation time, and syneresis during fresh cheese manufacture.

All analyses were performed in triplicate to ensure analytical reliability and reproducibility. Only milk samples meeting acceptable physicochemical quality criteria were used for cheese production.

Dried thyme (*Thymus vulgaris L.*) was incorporated as a functional additive in the production of fresh cheese. Thyme was selected due to its well-documented antimicrobial and antioxidant properties, primarily attributed to its essential oil components, including thymol and carvacrol (Burt, 2004; Viuda-Martos et al., 2010). In addition to its biological activity, thyme contributes characteristic aromatic and sensory properties that enhance product differentiation. Prior to incorporation, the dried thyme was finely comminuted to ensure uniform particle distribution and homogeneous dispersion within the cheese curd. The herb was added during the curd handling phase and thoroughly mixed to achieve even distribution throughout the matrix. The quantity of thyme was determined empirically based on preliminary sensory trials, aiming to obtain a balanced flavour profile that preserved the intrinsic dairy aroma while introducing a distinctive herbal note. Practical sensory pre-evaluation confirmed that the selected concentration resulted in harmonious flavour integration without overpowering the base product.

The use of dried plant material provides technological advantages, including improved stability and extended shelf life due to its low moisture content, which limits microbial growth and enzymatic degradation (Shahidi & Zhong, 2010). Moreover, phenolic compounds present in thyme may contribute to oxidative stability within the cheese matrix, potentially enhancing product shelf life (Viuda-Martos *et al*., 2010).

The incorporation of thyme into fresh cheese thus represents a dual-function strategy: (i) sensory enrichment through characteristic aroma and flavor, and (ii) functional enhancement via natural bioactive compounds. This approach enabled the development of a value-added fresh cheese with improved nutritional, technological, and sensory attributes, aligned with contemporary consumer demand for innovative, minimally processed, and health-oriented dairy products (Granato *et al*., 2010; Tamime, 2006).

Technological Procedure

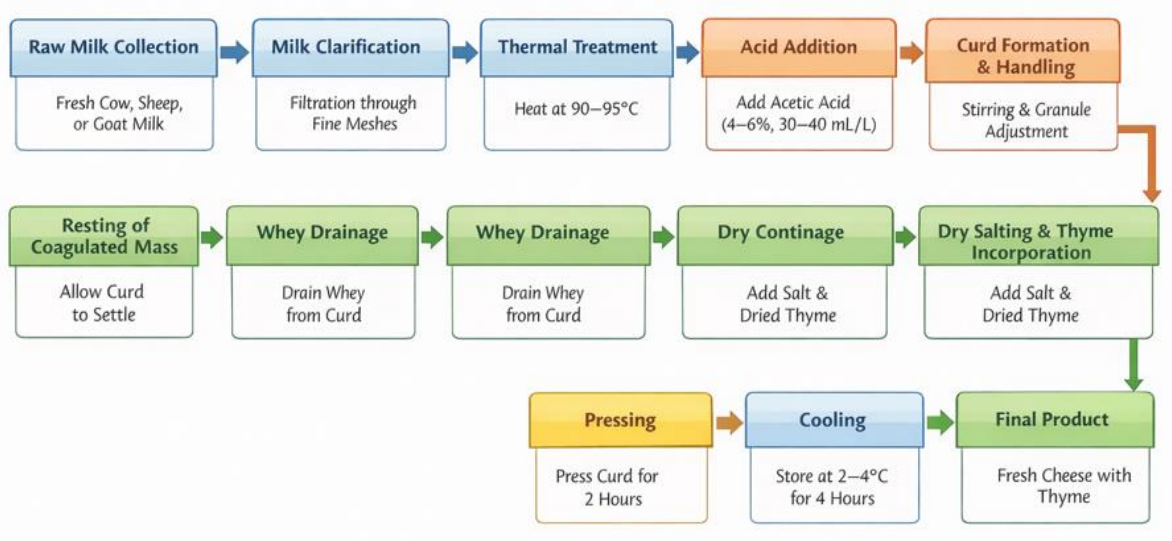

Figure 1. Technological Flowchart for the Production of Fresh Cheese with Added Spices (Dimitrovska, G. & Makarijoski, B. 2021)

Description of Each Technological Operation

Raw Material for Homemade Fresh Cheese Production. Milk represents the fundamental raw material in fresh cheese manufacture and may originate from cows, sheep, or goats, depending on regional tradition, availability, and desired compositional characteristics. The physicochemical composition of milk—particularly fat, protein (casein-to-whey protein ratio), and total solids—directly determines cheese yield, texture, and sensory properties (Walstra, Wouters & Geurts, 2006; Fox et al., 2017). High-quality milk must comply with established hygienic standards, including acceptable total bacterial count and somatic cell count, to ensure product safety, technological stability, and optimal coagulation performance. Strict quality control of the incoming raw material is essential for achieving consistent and reproducible cheese characteristics.

Raw Material Clarification. The first technological operation involved clarification of the milk by filtration through fine meshes or sterile cheesecloth to remove mechanical impurities such as straw fragments, dust particles, and other extraneous materials. Although this step does not alter the chemical composition of milk, it significantly improves hygienic quality and prevents physical contamination of the final product. Clarification contributes to improved product safety and visual quality while maintaining the native structure of milk components.

Thermal Treatment (90–95°C). Milk was subjected to high-heat treatment at 90–95°C for a short holding period. The objectives of this operation were threefold: (i) inactivation of pathogenic and spoilage microorganisms, (ii) deactivation of undesirable endogenous enzymes, and (iii) enhancement of microbiological stability.

Heat treatment at elevated temperatures also induces partial denaturation of whey proteins, particularly β-lactoglobulin, which subsequently interact with κ-casein on the surface of casein micelles. This interaction improves water-holding capacity and contributes to a firmer, more cohesive curd structure (Walstra et al., 2006; Lucey, 2002). Such protein interactions are especially relevant in acid-coagulated cheeses, where whey protein incorporation enhances yield and texture.

Addition of Acetic Acid (4–6%, 30–40 mL per Liter of Milk). Coagulation was induced by the addition of 4–6% acetic acid at a dosage of approximately 30–40 mL per liter of milk. Acidification lowers the pH toward the isoelectric point of casein (pH ≈ 4.6), leading to destabilization of casein

micelles and precipitation of milk proteins (Fox et al., 2017).

This stage represents the structural foundation of cheese formation. Precise dosing of acetic acid is critical, as excessive acidification may result in overly brittle curd, excessive whey expulsion, and undesirable sour taste. Controlled acid addition ensures optimal curd firmness and balanced sensory attributes.

Curd Handling. Following coagulation, the curd was gently agitated and cut to facilitate uniform whey separation. Curd particle size is a decisive technological parameter influencing moisture retention and final texture. Smaller curd granules increase surface area and promote greater whey expulsion, resulting in firmer cheese. Conversely, larger particles retain more moisture and yield a softer, creamier texture, (Walstra *et al*., 2006).

Resting of the Coagulated Mass. After cutting, the curd was allowed to rest for several minutes to stabilize and consolidate. During this resting phase, gravitational forces promote additional whey drainage, and the protein matrix undergoes structural rearrangement. This operation enhances curd uniformity and contributes to consistent texture in the final product.

Whey Drainage. Whey drainage constitutes a critical step in fresh cheese production, as it determines the moisture content and water activity of the final product. The coagulated mass was transferred into cheesecloth or perforated molds to allow controlled liquid outflow. The extent of whey removal directly influences cheese firmness, sliceability, and shelf life (Fox *et al*., 2017). Adequate drainage ensures structural stability while preserving the desired soft texture characteristic of fresh cheese.

Dry Salting and Incorporation of Spices. Dry salting was applied directly to the curd through manual distribution to ensure uniform coverage. Salt serves multiple technological functions: enhancement of flavour, reduction of water activity, inhibition of undesirable microbial growth, and stabilization of protein structure (Fox *et al.,* 2004). The quantity and homogeneity of salt distribution significantly affect sensory perception and product preservation. Simultaneously, dried thyme (*Thymus vulgaris L*.) was incorporated uniformly throughout the curd mass. Beyond its aromatic contribution, thyme provides bioactive phenolic compounds with documented antimicrobial and antioxidant properties, (Burt, 2004; Viuda-Martos *et al*., 2010). Uniform incorporation was essential to achieve consistent flavor distribution and functional performance.

Pressing (Approximately 2 Hours). The salted and seasoned curd was subjected to mechanical pressing in designated molds for approximately two hours. Pressing facilitates further whey expulsion, enhances curd fusion, and contributes to the formation of a compact and homogeneous structure. Pressing intensity and duration directly influence density, firmness, and mechanical resistance of the cheese matrix.

Cooling (2–4°C, 4 Hours). After pressing, the cheese was stored at 2–4°C for approximately four hours. Cooling stabilizes the protein network, enhances firmness, and significantly inhibits the growth of spoilage microorganisms. Refrigerated storage allows the cheese to attain its final structural integrity and sensory stability prior to analysis and consumption.

Final Product and Analytical Procedures. The completed technological process resulted in fresh cheese characterized by mild aroma, soft yet cohesive texture, and balanced flavour. The incorporation of thyme contributed additional herbal notes and functional value. The final product was subjected to physicochemical evaluation, including determination of active acidity (pH) and titratable acidity, using the same standardized procedures applied for milk analysis. Monitoring acidity is essential in fresh cheeses due to its direct influence on texture, microbial stability, and shelf life. Sensory evaluation was performed according to the scoring method described by Kochoski (2009), assessing aroma, texture, flavour, appearance, and overall

acceptability. The thyme-enriched fresh cheese was monitored over a seven-day storage period. Analyses were conducted at the Milk Laboratory of the Faculty of Biotechnical Sciences – Bitola. Physicochemical testing focused primarily on changes in active and titratable acidity during storage, enabling assessment of product stability and short-term shelf life under refrigerated conditions.

RESULTS AND DISCUSSION

Milk Quality Assessment. The milk used for the production of fresh cheese enriched with thyme exhibited physicochemical characteristics consistent with high-quality raw cow's milk intended for cheese manufacture. The milk fat content was 3.94%, indicating a relatively high energy value and favorable technological potential. Milk fat plays a crucial role in determining cheese yield, texture, mouthfeel, and flavor development, as it becomes embedded within the casein matrix during coagulation (Walstra, Wouters & Geurts, 2006).

The protein content was 3.22%, representing an adequate level for efficient curd formation. Protein concentration—particularly casein content—is one of the most decisive parameters influencing coagulation efficiency, curd firmness, and overall cheese yield (Fox *et al*., 2017). A sufficient casein fraction ensures the development of a stable three-dimensional gel network following acidification or enzymatic coagulation.

Lactose content was determined to be 4.18%, providing an appropriate substrate for lactic acid bacteria (LAB) metabolism during acidification. Lactose fermentation into lactic acid is the primary biochemical mechanism responsible for pH reduction and curd stabilization in acid-coagulated cheeses.

The freezing point of the milk was –0.525°C, which falls within the physiological range for unadulterated cow's milk and does not indicate dilution with water. Freezing point depression is widely recognized as a reliable indicator of milk authenticity and compositional integrity.

Active acidity was measured at pH 6.5, a value characteristic of fresh cow's milk and indicative of good hygienic quality and absence of premature fermentation. Titratable acidity was 7°SH, which corresponds to fresh, wholesome milk suitable for cheese production. The combination of normal pH and titratable acidity values confirms that the milk met the technological prerequisites for stable coagulation and optimal curd formation.

Cheese Quality and Acidification Dynamics During Storage. Based on the analysed parameters, it can be concluded that the milk used in this study fulfilled the compositional and technological criteria required for the production of high-quality fresh cheese, (Sulejmani & Amedi, 2025). The evolution of active and titratable acidity in fresh cheese enriched with thyme during a 7-day storage period reflects the typical biochemical processes associated with post-production acidification. As presented in Figure 2, the pH of the cheese gradually decreased from 5.24 on day 1 to 5.10 on day 7, indicating a controlled and progressive acidification. This decline in pH is attributable to the continued metabolic activity of residual lactic acid bacteria, which ferment remaining lactose into lactic acid during early refrigerated storage (Lucey, 2002).

Although the cheese was stored at low temperature (2–4°C), psychotropic or mesophilic LAB may retain limited metabolic activity, contributing to further acid development. The gradual nature of the pH decrease suggests microbiological stability and absence of uncontrolled fermentation.

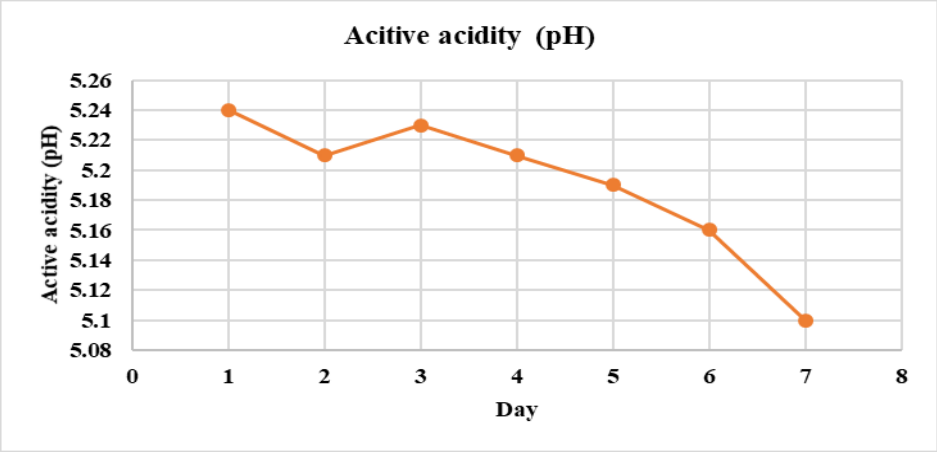

Figure 2. Dynamics of active acidity (pH) in fresh cheese with thyme during a 7-day period

Concurrently, titratable acidity increased from 53.6 °SH to 63.5 °SH over the same storage period, indicating accumulation of total acidic compounds within the cheese matrix (Figure 3). The observed increase in titratable acidity, despite the relatively moderate decline in pH, is consistent with the established understanding that titratable acidity measures the total buffering capacity of milk proteins and dissolved salts, whereas pH reflects only the concentration of free hydrogen ions in solution (Fox et al., 2017; Walstra et al., 2006).

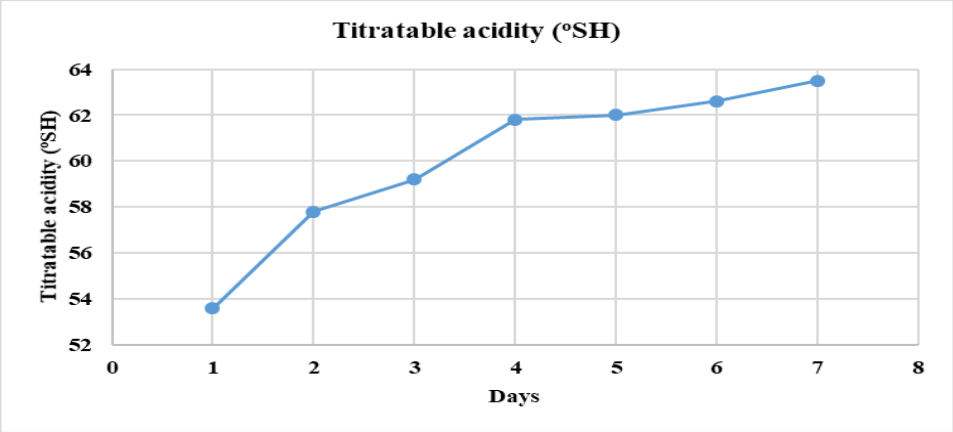

Figure 3. Dynamics of titratable acidity (°SH) in fresh cheese with thyme during a 7-day period

Therefore, the combined evaluation of pH and titratable acidity provides a more comprehensive interpretation of acidification dynamics. The results obtained in this study demonstrate a typical and technologically acceptable pattern of post-manufacturing acid development in fresh cheese. Moreover, the presence of thyme did not negatively affect acidification stability, suggesting compatibility between the herbal additive and the dairy matrix.

Overall, the physicochemical evolution observed during storage confirms that the thyme-enriched fresh cheese-maintained stability, appropriate acidification kinetics, and satisfactory technological performance throughout the monitored period.

The gradual acidification observed during the 7-day storage period is of particular technological importance in fresh cheeses enriched with aromatic herbs such as thyme (*Thymus vulgaris L.*). In acid-coagulated dairy systems, controlled post-manufacturing acid development contributes to structural stabilization of the protein matrix, enhancement of flavour complexity, and inhibition of undesirable microorganisms.

Moderate acidification is desirable in fresh cheeses, as it imparts the characteristic mild tanginess associated with consumer acceptance while simultaneously lowering pH to levels that restrict the growth of spoilage and pathogenic microorganisms. The reduction in pH, combined with increased titratable acidity, improves microbiological safety by creating unfavourable conditions for many Gram-negative bacteria and common contaminants, (Fox *et al.,* 2017).

The incorporation of thyme may further contribute to microbiological stability due to the presence of phenolic compounds such as thymol and carvacrol, which exhibit well-documented antimicrobial and antioxidant activity (Burt, 2004; Viuda-Martos *et al*., 2010). These bioactive constituents can disrupt microbial cell membranes, interfere with enzyme systems, and reduce oxidative reactions within the cheese matrix. However, the observed pattern of gradual acid development indicates that lactic acid bacteria (LAB) remain the primary drivers of acidification, while thyme likely plays a complementary, supportive role in enhancing product stability rather than fundamentally altering fermentation kinetics.

From a sensory perspective, balanced acidification in combination with herbal aromatic notes may positively influence overall organoleptic perception. Excessive acidification could result in overly sharp flavour and textural brittleness, whereas insufficient acid development may compromise safety and flavour intensity. The results obtained in this study demonstrate an optimal acidification trajectory, maintaining both functional integrity and desirable sensory characteristics throughout the monitored storage period.

Overall, the acidification dynamics over seven days suggest that fresh cheese enriched with thyme retains its technological stability, microbiological safety, and sensory appeal. These findings provide a scientifically grounded basis for optimizing storage conditions, refining formulation parameters, and predicting shelf life in fresh herb-enriched cheeses intended for functional and value-added dairy markets.

Sensory evaluation. Sensory analysis of fresh cheese with added spices represents an important method for both objective and subjective evaluation of its organoleptic properties—taste, aroma, consistency, external appearance, colour and overall consumer acceptability. The incorporation of spices not only enriches the sensory profile of the cheese but can also contribute to enhancing its biological and functional value through the presence of antioxidant and antimicrobial components.

The primary objective of this analysis was to assess the degree of consumer acceptability of the product, to identify characteristics that improve quality or cause deviations, and to provide relevant data for the optimization of the recipe, production technology, and market potential.

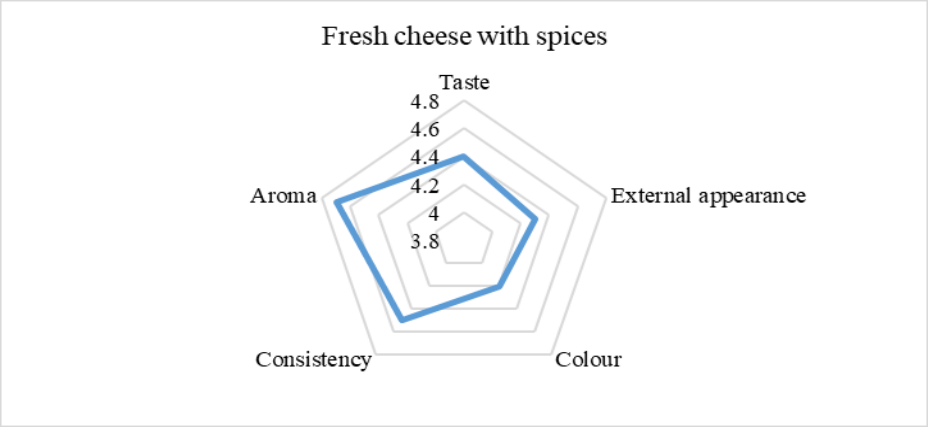

Figure 4. Sensory evaluation – fresh cheese with spices

Based on the results of the conducted sensory evaluation (Figure 4), the fresh cheese enriched with thyme demonstrated a high level of overall acceptability among panellists. The obtained scores indicate a favourable perception of both the core dairy attributes and the added herbal component, confirming the technological and sensory compatibility of the formulation.

The highest score was recorded for the parameter aroma intensity and quality (4.7), reflecting a pronounced and positively perceived aromatic profile. This result suggests that the incorporation of thyme significantly enhanced the sensory complexity of the product without masking the intrinsic dairy notes. Aromatic perception is a critical determinant of consumer preference in fresh cheeses, particularly when functional ingredients are incorporated.

Consistency (4.5) was also highly rated, indicating that the texture was perceived as pleasant, cohesive, and appropriate for this category of fresh cheese. Texture plays a central role in consumer satisfaction, as it reflects both moisture retention and protein matrix stability—parameters closely linked to coagulation dynamics and whey expulsion (Fox *et al*., 2017).

The flavour harmony (4.4) score confirms a balanced integration between the mild lactic acidity of the cheese and the herbal notes of thyme. This balance is essential; as excessive herbal intensity or acid sharpness could negatively influence overall acceptability. The results suggest that the selected thyme concentration achieved sensory equilibrium.

External appearance (4.3) and colour (4.2) received slightly lower, yet still satisfactory scores. These parameters may reflect minor variability in the visual distribution of thyme particles or slight heterogeneity in surface structure. Although these values remain within a high-quality range, they indicate potential for optimization in terms of particle size uniformity and distribution within the curd matrix.

The calculated weighted mean value of 4.45 ± 0.22 further confirms the high overall sensory quality of the product. Additionally, the cheese achieved 89.90 ± 5.45% of the maximum possible quality score, demonstrating strong panel acceptance and consistent evaluation results. The relatively low standard deviation indicates good agreement among evaluators, supporting the reliability of the sensory assessment, (Figure 5).

Overall, the sensory findings demonstrate that fresh cheese enriched with thyme is well accepted and possesses strong potential for market positioning as a value-added, functional dairy product. The positive evaluation of aroma, texture, and flavour balance, combined with satisfactory visual attributes, supports further development and potential commercialization within the segment of spices-enriched fresh cheeses.

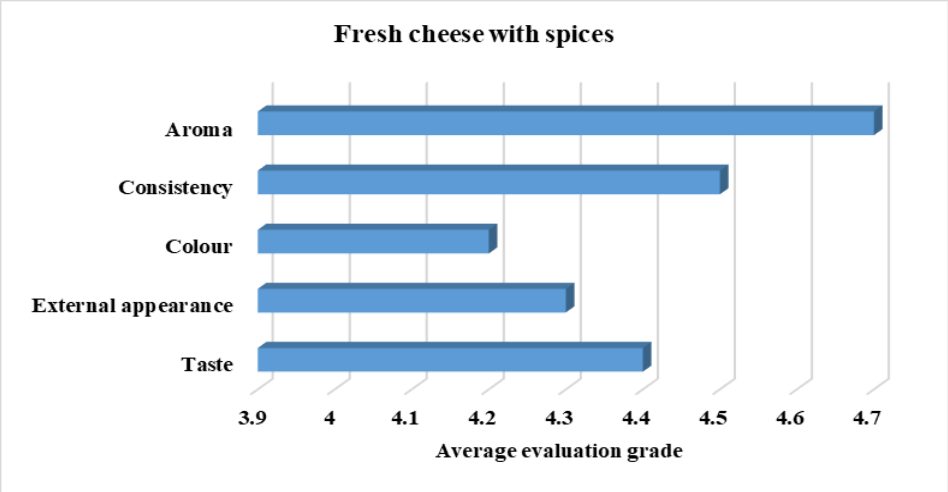

Figure 5. Average values of quality parameters

Potential for practical application. The addition of spices and spices to fresh cheese opens a wide range of opportunities for the development of innovative dairy products with higher added value. This approach not only enhances the organoleptic properties but also allows the enrichment of the nutritional and functional composition of the product. Spices, as natural sources of bioactive compounds, can contribute to increased antioxidant activity, improved digestive health, and the reduction of synthetic additives.

Industrial Potential. The production of fresh cheese with added spices represents a realistic opportunity to diversify the dairy product range without requiring significant changes in the technological process. The procedure is simple and can be easily integrated into existing production capacities without major capital investment or specialized equipment (Tamime, 2006). This model is particularly suitable for small and medium-sized dairies, which can create new products with a unique character and higher added value with minimal investment. Furthermore, this strategy enables producers to respond to modern market demands and differentiate themselves from competitors through innovation and authenticity.

Market Attractiveness. Consumer trends indicate a growing interest in products with new flavours, natural ingredients, and innovative combinations. In this context, fresh cheeses with added spices and spices provide variety, freshness, and differentiation compared to conventional dairy products. Such products can appeal to a broad consumer base, regardless of age or dietary habits. Studies show that consumer acceptance is particularly strong when the natural and health-promoting characteristics of these cheeses are emphasized (Burt, 2004). Therefore, the market attractiveness of this type of product is based on a combination of sensory uniqueness, health benefits, and the potential to create new market segments.

Health and Functional Benefits. The addition of spices such as thyme, mint, or rosemary to fresh cheese contributes not only to enhanced taste and aroma but also to improved health and functional properties. These spices contain bioactive compounds with antioxidant and antimicrobial effects, which enhance product safety and shelf-life. Consequently, such cheeses can be classified as functional foods—products that, in addition to fulfilling nutritional needs, contribute to maintaining and improving consumer health. This aspect is essential for market positioning, as modern consumers increasingly seek functional and natural dietary solutions.

Recommendations for Future Production and Research. To fully exploit the potential of fresh cheese with added spices, several practical and scientific guidelines should be followed:

- Selection of spices: It is recommended to use spices characteristic of the local region (e.g., thyme, basil, mint, rosemary, oregano, red pepper) to achieve authenticity and additional market recognition.
- Standardization of quantities: Optimal concentrations of added spices should be determined to balance flavour, texture, and microbiological stability of the product.
- Marketing strategy: The product should be promoted as a combination of traditional cheese and modern functional food, emphasizing health benefits and natural composition.
- Shelf-life studies: Further research is required on the impact of different spices on the shelf-life, safety, and stability of fresh cheese.
- Consumer research: Survey studies and sensory analyses are recommended to identify preferences across different age groups and socio-economic segments.
- Export potential: By adapting formulations to international standards and trends, these products can be

developed as competitive export items with added value.

Following these recommendations enables the further development and commercialization of fresh cheese with added spices, creating a product that combines tradition with contemporary market needs while being both innovative and health-promoting.

CONCLUSION

The production of fresh cheese enriched with thyme (*Thymus vulgaris L.*) demonstrated that combining traditional cheese-making techniques with modern consumer preferences for functional and health-oriented foods is both feasible and effective. The incorporation of thyme did not disrupt the technological process; instead, it enhanced the overall value of the final product by improving sensory and functional characteristics.

Physicochemical analyses, including measurements of pH and titratable acidity, remained within expected ranges for fresh cheese, indicating stability in coagulation and early maturation processes. These results confirm that thyme addition does not negatively affect product quality and that the developed technology can be readily applied in practical settings.

Sensory evaluation highlighted the positive impact of thyme on the organoleptic profile of the cheese, particularly regarding aroma and flavour, which were perceived as pleasant and well-balanced by the panellists. The results suggest that thyme-enriched fresh cheese has strong market potential, capable of appealing to consumers seeking distinctive, naturally flavoured dairy products.

From a functional perspective, thyme is a natural source of bioactive compounds, including phenolic constituents with antimicrobial and antioxidant properties. Consequently, this cheese combines the traditional nutritional benefits of fresh cheese with additional functional attributes, aligning with contemporary trends toward healthy, natural foods.

Overall, the study demonstrates that fresh cheese with thyme offers high potential for industrial application and consumer acceptance. Its production requires minimal adjustments to conventional technology, while providing significant added value both economically and nutritionally. This research supports the development of innovative dairy products that integrate local traditional heritage with modern dietary trends, paving the way for wider adoption and commercialization in the functional dairy sector.

Declaration by Authors

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Conflict of Interest: No conflicts of interest declared.

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