

Microbiological analysis of “Minas frescal” cheese commercialized in free fairs

Análises Microbiológicas e Físico-Químicas de Queijos Minas Frescal comercializados em feiras livres

Patrícia Faria Barbosa¹, Larissa Albuquerque Siqueira¹, Ana Elisa Barreto Matias¹

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RESUMO

Objetivo: avaliar o Queijo Minas Frescal comercializados em feiras livres, na cidade satélite do Gama no estado do Distrito Federal, a fim de verificar os limites microbiológicos e físico-químicos de acordo com os padrões e órgãos competentes. **Método:** Foram analisadas 2 amostras de Queijo Minas Frescal comercializados na cidade Gama-DF. As amostras foram acondicionadas em caixa isotérmica. Foram realizadas as análises microbiológicas e físico-químicas em laboratórios de microbiologia e bromatologia. Avaliaram-se coliformes totais e fecais ou termotolerantes, contagem de aeróbios mesófilos e psicrotróficos, além das análises físico-químicas avaliando acidez, pH, umidade e cinzas. **Resultados:** as análises comprovam o índice de contaminação microbiológica, bem como a não conformidade aos parâmetros físico-químicos essenciais como, por exemplo, a presença de substâncias inorgânicas apontadas pelas análises de determinação de cinzas e a variação na acidez. **Conclusão:** evidencia-se a falta de padrão e controle da qualidade da matéria-prima na produção de queijos.

Descritores: Queijo; Análises microbiológicas; Controle de qualidade.

ABSTRACT

Objective: to assess the Minas Frescal Cheese commercialized in open air markets, in Gama- the surining area of Brasília, Federal District, in order to verify the microbiological and physical-chemical limits according to the patterns and governantal organisms. **Method:** We assessed 2 samples of Minas Frescal Cheese commercialized in Gama-DF. These samples were saved in isothermic boxes. Microbiological and physical-chemical analysis were performed in microbiology and bromatology laboratories. We analysed total and fecal coliforms or thermotolerants, mesophiles and psychrotrophs aerobious counting, and the physical-chemical assessment of acidity, PH, umidity and ashes. **Results:** finding attest that the microbiological contamination index, and the disagreement with physical- chemical parameters, such as presence of inorganic substances evidenced for the ashes determination analysis and acidity variation. **Conclusion:** we confirm the lack of pattern and quality control for the raw material in cheese production.

Descriptors: Cheese; Microbiological Analysis; Quality Control.

ORIGINAL

Introduction

The Minas Frescal Cheese originated in the state of Minas Gerais, in the 17th century produced mainly in the city of Serro.¹⁻²

The dairy industry has as one of its biggest activities the elaboration of cheeses. Particularly in Brazil, the Minas Frescal Cheese is one of the types of higher production and consumption concentrated mainly in the South and Southeast, in small and medium-sized industries.³

Between 2017 and 2026, cheese production should increase by 20.5%, corresponding to 2.1% per year, reaching 915.83 thousand tons at the end of this period.⁴ According to the Brazilian Association of Cheese Industries (Abiq) in Brazil, there is also a prospect of growing production from the current 5.4 kilograms per capita to 9.6 kilos of cheese per inhabitant/year up to 2030, especially the Minas Frescal Cheese is one of the most popular in the country.⁵⁻⁶

The manufacture of this type of cheese presents a high yield and its processing is simple, since there is no maturation of the final product. In this way, a quick return on investment is obtained, with lower costs for the consumer.^{1,3,7} The Minas Frescal type cheese is a product widely consumed in Brazil and most often made with raw milk, in an artisanal way. Several problems can be associated with the process of manufacturing Minas cheese as manufacturing and storage using inappropriate temperatures, risks of microbiological contamination of the raw material, recontamination of post-pasteurized milk.⁸ Thus, the guarantee of a quality product depends on the good practices of manufacturing and sanitation measures.^{3,9-10}

The microbiological quality of the cheese is a paramount aspect, after all it is related to public health. There are reports that possible diseases can be transmitted due to certain conditions of milk and its derivatives. The microorganisms of the Enterobacteriaceae family should be monitored, since they can indicate both fecal contamination and also imply in infectious processes, emphasizing a considerable degree of hygienic-sanitary deficiency in the elaboration of the product. These microorganisms have a considerable organic resistance and behave as opportunists and can increase the degree of contamination, especially in some categories of ingesters (children, elderly, undernourished, etc.), since they are typically more vulnerable.¹⁰⁻¹¹

The Minas Frescal Cheese is classified according to the moisture content of the mass: High humidity (46%), very high humidity (55%), abundant and viable lactic bacteria and also higher humidity (55%), without the action of lactic and viable bacteria.¹² In order for the product to be considered suitable for consumption, there are limits on the counting and presence of the main microorganisms associated with the Minas Frescal Cheese, according to RDC No. 12.¹²

The legislation does not establish parameters for acidity and pH, however, these factors are of great importance in order to evaluate the conditions and the quality of the cheese, as they help in indicating the state of degradation of the product. In dairy products, acidity determines the amount of lactic acid present and also allows the indirect evaluation of other compounds such as

calcium, magnesium, calcium, phosphates, phosphates, citrates, carbonates and sulfates. The pH measures the concentration of hydronium ions in the food, thus allowing to evaluate its biological and biochemical modifications.¹³

The aim of this study was to evaluate the Minas Frescal Cheese commercialized in open markets in the satellite city of Gama in the state of Distrito Federal, in order to verify the microbiological and physicochemical limits according to the standards and competent bodies.

Method

Two samples of Minas Frescal Cheese commercialized in the city of Gama-DF were analyzed. The samples were packed in isothermal box and transported to the academic practice center of the UNICEPLAC campus Gama. Microbiological and physico-chemical analyzes were carried out in the microbiology and bromatology laboratories, respectively. The containers were disinfected with 70% alcohol and all the autoclaved material. The experiment was conducted in duplicates to determine all analysis.

By serial decimal dilutions, the 25 g volume of the cheese sample was checked and transferred to an erlemeyer containing 225 mL of 0.85% saline (10-1 dilution). After dilution 1 mL was withdrawn and transferred to a test tube containing 9 mL of 0.85% saline (10-2 dilution). Subsequently, 1 mL was withdrawn and transferred to another test tube containing 9 mL of 0.85% saline (10-3 dilution). All procedures were performed near the Bunsen nozzle lit.

Microbiological analysis were based on the methodologies described at the Adolf Lutz Institute (IAL). Total and fecal coliforms were analyzed using the Multiple Tubes (TM) method, counting of mesophilic and psychrotrophic aerobes. The analyzes of total and fecal or thermotolerant coliforms were made in VBBL broth and EC broth by incubation in bacteriological stove at 35 oC for 48 hours.

The mesophyll aerobic count was done by surface scattering in Standard Agar for Counting (PCA) and incubation with inverted plates at a temperature of 35 oC for 48 hours. For counting of psychrotrophs, a surface was also used in Standard Agar for Counting (PCA). Plates are incubated at 7 ° C for 7 to 10 days.

The physico-chemical analyzes were based on the methodologies described at the Adolf Lutz Institute (IAL) with the aid of the reference values described in the Brazilian Food Composition Table - TACO.

Results

The results obtained in the analysis of samples of the Minas Frescal type cheeses for enterobacteria and mesophilic aerobic bacteria are presented in Table 1. The cheese sample I was obtained at the fair of the Goianos located in the Eastern Sector of the Range and the sample of cheese II was obtained in the permanent fair, located in the West Sector of the Gama-DF.

Table 1 - Counting of mesophilic and psychrotrophic aerobic bacteria.

Sample	Mesophiles Count	Psychrotrophic Counting
Cheese I	48 UFC/g	98 UFC/g
Cheese II	86 UFC/g	55 UFC/g

The results obtained for physicochemical analyzes are presented in Table 2.

Table 2 – Determination of acidity, moisture, pH and ash.

Sample	Cheese I	Cheese II
ACIDITY	0,16%	0,22%
HUMIDITY	50,99%	53,20%
pH	5,53	5,55
ASHES	2,75%	4,16%

Discussion

According to the results obtained in the microbiological analyzes, it can be observed positive for coliforms at 45 ° C, in which the tubes presented gas and turbidity of the medium. Counts of mesophilic bacteria and psychrotrophic counts had values higher than allowed by current legislation. The presence of coliforms in cheeses has become increasingly worrisome due to the outbreak of food poisoning.¹⁴ Food poisoning is due to the ingestion of toxins produced by microorganisms present in food.¹⁵

Physical-chemical analyzes indicated compliance in pH determination (mean of 5.54) reference value 5-7.5; Humidity (average of 52.09%) reference value 56.1%; Determination of acidity with high values both samples (I 0,16%) (II 0,22%) and determination of ashes sample I (2,75%) within the allowed value and sample II (4,16%) above the value allowed reference according to Brazilian Food Composition Table - TACO.

In a previous study¹⁶, the analyzes presented acidity ranging from 0.14 to 0.57 for artisanal cheeses, a much higher index when compared to this study. Coliforms are usually environmental micro-organisms and even counting is not required by current health legislation, its high count characterizes deficiency in the hygienic-sanitary quality of the product. These researchers analyzed samples of Minas Artesanal do Serro cheese and found that 80% of the samples had total coliforms above the established standards.¹⁷

Conclusion

Results obtained allow us to conclude that the Minas Frescal Cheese, marketed in open markets in the city of Gama, due to the fact that they were handcrafted, probably not following the good manufacturing practices, besides the incorrect storage of these products, they cause them to be deficient in hygienic sanitary quality through high microbiological indices found evidencing non-

compliance with acceptable microbiological standards, as well as inadequate hygienic-sanitary conditions, and may cause food poisoning in those who consume it. In general, the poor hygienic quality and sanitary conditions of these products create risks to the health of the consumer, especially the children, elderly, pregnant and immunocompromised who are adepts to this food, since it has had a great increase of consumption for being beneficial for other cheeses.

References

1. Oliveira JS. Queijo: fundamentos tecnológicos. 2. ed. Campinas: Ícone;1986.
2. Behmer MLA. Tecnologia do leite. 13.ed. São Paulo: Nobel; 1984.
3. Pinto PSA, Germano MIS, Germano PML. Queijo minas: problema emergente de vigilância sanitária. *Higiene Alimentar*.1996;10(44):22-27.
4. CONAB. [homepage na internet]. Perspectivas para a agropecuária. [acesso em 2 ago 2019]. Disponível em: <http://www.conab.gov.br>
5. Sangaletti N, Porto E, Brazaca S GC, Yagasaki CA, Dalla DEA, RC, Silva MV. Estudo da vida útil de queijo Minas. *Ciênc. Tecnol. Aliment*.2009; 29(2): 262-269.
6. Zacarchenco PB, Van Dender AGF, Rego RA. Brasil dairy trends 2020.1. Ed. Campinas: ITAL; 2017.
7. Felício Filho, A. Eficiência econômica de estocagem de queijos. *Informe agropecuário*.1984;10(21):6-11.
8. Furtado, M.M. A arte e a ciência do queijo. 2 ed. São Paulo: Globo;1991.
9. Scott, R. Acidez y otros analisis químicos para el control de proceso de elaboración. 2, ed. Zaragoza: ACRIBIA; 1991.
10. Hoffmann FL, Gonçalves TMV; Coelho, AR, Hirooka EY, HOFFMANN P. Qualidade microbiológica de queijos ralados de diversas marcas comerciais, obtidos do comércio varejista do município de São José do rio Preto, SP. São Paulo: *Rev. Hig. Alimentar*.2004;18(122):62-66.
11. Fernandes AM, Andreatta E, Oliveira CAF. Ocorrência de bactérias patogênicas em queijos no Brasil: questão de saúde pública. *Rev. Hig. Alimentar*.2006;20(144):4-56.
12. Brasil. Resolução RDC no 12, de 02 de janeiro de 2001 da Agência Nacional de Vigilância Sanitária. REGULAMENTO TÉCNICO SOBRE PADRÕES MICROBIOLÓGICOS PARA ALIMENTO. Brasília (DF); 2001 JAN 02. Disponível em: <http://e-legis.bvs.br/leisref/public/showAct.php?id=144>. Acesso em 28.08.2006.
13. Amiot J, Almudí , RO. Ciencia y tecnologia de la leche. Zaragoza: Acribia;1991.
14. Almeida PMP, FRANCO RM. Avaliação bacteriológica de queijo tipo Minas Frescal com pesquisa de patógenos importantes à Saúde Pública: *Staphylococcus aureus*, *Salmonella sp* e *Coliformes Fecais*. *Rev. Hig. Alimentar*. 2003;17 (111):79-85.

15. Franco BDGM, Landgraf M. Microbiologia dos alimentos. São Paulo: Ed. Atheneu; 2003.
16. Ricardo NR, Souza JF, Godoi FS, Prado JV. Análise físico-química de queijos minas frescal artesanais e industrializados comercializados em Londrina-PR. Revista Brasileira de Pesquisa em Alimentos. 2011; 2(2):89-95.
17. Brant LMF, Fonseca LM, Silva, MCC. Avaliação da qualidade microbiológica do Queijo Minas Frescal do Serro – MG. Arquivo Brasileiro Medicina Veterinária e Zootecnia. 2007;59(6):1570-1574.

Autor correspondente:

Patrícia Faria Barbosa

Centro Universitário do Planalto Central Aparecido dos Santos

Área Especial para Indústria Lote 2/3, Sct. Leste Industrial.

CEP: 72445-020 . Brasília, Distrito Federal, Brasil

farmacpat@gmail.com