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Evaluation of the microbiological and physicochemical quality of milk marketed in the Federal District from January 2015 to July 2017

Avaliação da qualidade microbiológica e físico-química do leite comercializado no Distrito Federal no período de janeiro de 2015 a julho de 2017

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ABSTRACT

Introduction: Milk has great importance in human nutrition. It has high nutritional value and provides macro and micronutrients indispensable for growth, development, and health maintenance. However, the presence of high water contents, proteins, fats, carbohydrates, minerals, and vitamins makes it vulnerable to physicochemical and microbiological changes. Monitoring milk quality at the trade level is a responsibility of the Brazilian National Sanitary Surveillance System. The execution of this action is a responsibility of state, district, and municipal Health Surveillance organs together with Public Health Central Laboratories (Lacen). **Objective:** To evaluate the microbiological and physicochemical parameters of pasteurized and UHT milk marketed in the Federal District (FD), using reports issued by Lacen-FD. **Methods:** Analysis included 276 samples, 228 of UHT milk and 48 of pasteurized milk, collected between 2015 and 2017. **Results:** 0.4% of the UHT milk samples had a protein content below the reference value and 37.5% of the pasteurized milk samples did not comply with physicochemical and microbiological standards, showing problems in the clot on boiling test (2.1%), assessment of acidity (12.5%), fat (6.3%), and solids-not-fat (12.5%), cryoscopic index (14.6%), coliform count (13.5%), labeling (13.5%), and sensory evaluation (6.3%). **Conclusions:** There is a need for permanent inspection by the Brazilian National Sanitary Surveillance System in partnership with other agencies to promote and carry out quality control measures, thus ensuring safe food products for consumers.

KEYWORDS: Food Sanitary Surveillance; Food Safety; UHT milk; Pasteurized Milk

RESUMO

Introdução: O leite é um alimento de grande importância na alimentação, pois possui elevado valor nutritivo e fornece macro e micronutrientes indispensáveis ao crescimento, desenvolvimento e manutenção da saúde. Contudo, a presença de alto teor de água, proteínas, gorduras, carboidratos, minerais e vitaminas o torna vulnerável a alterações físico-químicas e microbiológicas. O monitoramento da qualidade do leite no comércio cabe ao Sistema Nacional de Vigilância Sanitária. A execução dessa ação é responsabilidade dos órgãos de Vigilância Sanitária estaduais, distrital e municipais em articulação com os Laboratórios Centrais de Saúde Pública (Lacen). **Objetivo:** Avaliar parâmetros microbiológicos e físico-químicos dos leites pasteurizados e UHT comercializados no Distrito Federal (DF), por meio de laudos emitidos pelo Lacen-DF. **Método:** Foram analisadas 276 amostras, 228 de leites UHT e 48 de leites pasteurizados, coletadas entre 2015 e 2017. **Resultados:** Estavam insatisfatórias 0,4% das amostras de leite UHT, por apresentarem teor de proteína abaixo do valor de referência, e 37,5% das amostras de leite pasteurizado não atenderam aos padrões físico-químicos e microbiológicos, apresentando problemas na prova de cocção (2,1%), acidez (12,5%), teor de gordura (6,3%), SNG (12,5%), índice crioscópico (14,6%), coliformes (13,5%), rotulagem (13,5%) e avaliação sensorial (6,3%). **Conclusões:** Há necessidade de ação fiscalizadora permanente da Vigilância Sanitária em parceria com outros órgãos para realizar medidas de controle de qualidade, visando a garantir um alimento seguro ao consumidor.

PALAVRAS-CHAVE: Vigilância Sanitária de Alimentos; Segurança Alimentar; Leite UHT; Leite Pasteurizado.

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INTRODUCTION

The Brazilian population is ever more concerned with the quality of consumed foods and the health risks they may pose. This worry ranges from the level of chemical additives used in the production process, the presence of pathogenic microorganisms, toxic residues, hormones, and antibiotics, and the use of genetically modified plants and foods to the storage and manipulation of products and raw materials.

It is the responsibility of the Brazilian state, by means of the National Sanitary Surveillance System (VISA, as per its acronym in Portuguese), to watch over the services directly or indirectly related to health and products exposed to human consumption, in addition to being an active and permanent service of health protection[1,2].

In the Brazilian Federal District (FD), VISA is under the responsibility of the Health Secretariat, specifically the Health Surveillance Subsecretariat, which consists of five boards of directors and their corresponding administrations. One of these boards is the Health Surveillance Board (Divisa, as per its acronym in Portuguese), which includes the Food Management (Geali, as per its acronym in Portuguese). Geali is in charge of health surveillance actions in food trade and industry, including raw materials, technology coadjuvants, additives, packaging, and nutritional aspects of the products. Fresh foods, beverages, and animal products are regulated by VISA in their commercialization step, whereas agricultural public institutions inspect the production process[3].

To achieve this goal, Geali develops the Health Surveillance Program (PVS, as per its initialism in Portuguese) by means of a partnership with the Federal District Public Health Central Laboratory (Lacen-FD, as per its acronym in Portuguese). A team of VISA auditors performs weekly collections of foods available in the local commerce (grocery shops, supermarkets, bakeries) and food services (restaurants, snack bars) and presents the samples to Lacen-FD to monitor possible quality deviations in these products caused by the presence of physical, chemical, or biological hazards or misleading or missing information in the label contents of prepackaged foods, as determined by specific standards. The PVS covers foods classified in the scope of some Brazilian programs coordinated by the Brazilian Health Regulatory Agency (ANVISA, as per its acronym in Portuguese) and the Brazilian School Feeding Program carried out in the FD, among others[3].

The foods included in the PVS are usually a matter of complaint or widely consumed and often present high epidemiological risk or suspicion of misuse of additives, among other issues. The definition of the list of foods also takes into account Lacen's technical and operational conditions regarding the capacity of executing laboratory analyses[3].

Because of the widespread consumption of milk and the repercussion of news about irregularities and fraud in milk production, the need for a joint work of federal organizations in charge of food safety emerged to answer the questions of the population regarding the responsibility of supervisory boards. In an attempt to increase the coordination between these organizations, ANVISA, the Ministry of Agriculture, Livestock, and Food Supply (MAPA, as per its acronym in Portuguese), and the Consumer Protection and Defense Department created the Food Quality Monitoring Integrated Center – Milk (CQUALI-Leite, as per its acronym in Portuguese). Its goal is to inspect producing and manufacturing establishments in a coordinated and interinstitutional way, respecting the legal competences of each body and the legislation in force. In addition, CQUALI-Leite must monitor the conformity of pasteurized, ultra-high temperature (UHT), and powdered milk in their several classifications[4].

Milk plays an important role in human diet because it has high nutritional value and provides macro and micronutrients essential to growth, development, and health maintenance. However, the presence of a considerable quantity of water, along with proteins, fats, carbohydrates, minerals, and vitamins, makes this product vulnerable to physicochemical and microbiological alterations[5,6].

Unless otherwise specified, milk is defined as the product originating from the complete and continuous milking of healthy, well-nourished, and rested cows. Milk from other animals must be designated according to the origin species. During the pasteurization process, temperature limits and heating time must be strictly followed: between 72 ºC and 75 ºC for 15 to 20 seconds. In the subsequent refrigeration step, the maximum outlet temperature of the product must be 4 ºC. Ultra-high temperature milk is that homogenized and submitted to a temperature ranging from 130 ºC to 150 ºC for 2 to 4 seconds using a continuous flow thermal processing, immediately cooled at a temperature lower than 32 ºC, and packed under aseptic conditions in sterile and hermetically sealed packagings[7].

Brazil is among the five countries with the highest milk production worldwide and the Brazilian government is increasingly encouraging the consumption and production of dairy products, which caused the country to present one of the highest growth rates in the production of these items in the past years[8]. To expand the markets of Brazilian milk, MAPA is encouraging the increase in the domestic consumption and exports. As a result of the increased production and quality, Brazilians, who currently ingest 179 liters per person per year, may reach the level recommended by the Food and Agriculture Organization of the United Nations/World Health Organization, which is 200 liters per person per year[9,10].

Although Brazil is increasing its milk production and consumption, some studies[11,12,13,14,15,16,17,18,19,20] have shown that the milk produced in the country does not always meet legal specifications[7,21,22,23]. The risks to public health are directly related to unsatisfactory hygiene and sanitary conditions, physicochemical stability issues, and doubtful microbiological analyses[6,24,25,26].

One of the ways of making products reliable on the market is by monitoring their quality constantly, which provides updated data on their quality and their derivatives' in a certain region, indicating the efficiency of the actions established by the standards in force or even new directions to achieve a higher quality[5].

Milk quality control includes microbiological and physicochemical laboratory analysis. The main assessments for this type of food are: coliforms at 45 ºC/mL, *Salmonella* sp./25 mL, sensory characteristics (color, odor, and aspect), titratable acidity, relative density at 15 ºC, fat content, total solids content, solids-not-fat content, lactose content, protein content, and, in the case of pasteurized milk, cryoscopic index[7,21,27].

The objective of the present study was to assess the quality of pasteurized and UHT milk marketed in the FD, Brazil, in 2015, 2016, and the first semester of 2017 by examining the results of microbiological and physicochemical analyses carried out at Lacen-FD.

METHODS

The present study evaluated 276 milk reports issued by Lacen-FD in 2015, 2016, and the first semester of 2017. These 276 milk samples – 48 of pasteurized milk and 228 of UHT milk - were collected by VISA-FD food auditors in 20 administrative regions (AR) of the FD.

At the time of collection, the supervisory authority picked a sample randomly among the several milk brands commercialized by the establishment. The samples were packaged individually in new plastic bags, which were properly sealed and labeled and forwarded to be transported to the laboratory. A sample seizure term was filled out for each sample. This document gathers information on the product, such as manufacturer, expiration date, and name, as well as data on the product holder.

Ultra-high temperature milk samples were collected in triplicate and made tamper-evident to keep the conservation characteristics and the authenticity of the products. One of the samples was given to the holder or the person accountable for the foods in the establishment to be used as a counterproof and the two other samples were sent to Lacen-FD. Analysis was carried out up to 30 days from the date of receipt of the sample. Because of its perishable nature, pasteurized milk had to be collected as a single sample, kept refrigerated until the time of transportation to the laboratory, and its analysis began within 24 hours. At the time of collection, the auditor informed the establishment where the sample was obtained about the analysis time so an expert could observe it[1].

After collection, the milk samples were delivered to Lacen-FD, which received, checked, and registered them in the HARPYA 2.12455 system. The material was then sent to the microbiology laboratory, where microbiological analyses were performed, and to the milk laboratory, where physicochemical analyses were carried out. The labels of the products were analyzed for conformity with the standards established by law.

Microbiological and physicochemical parameters were examined in accordance with the principles of MAPA Normative Instruction no. 62 dated December 29, 2011[28], MAPA Normative Instruction no. 68 dated December 12, 2006[22], ANVISA Board of Directors Resolution (BDR) no. 12 dated January 2, 2001[23], instructions available in a publication by the Adolfo Luz Institute[28], and Regulation of Industrial and Sanitary Inspection of Animal Products (RIISPOA, as per its acronym in Portuguese) Decree no. 9,013 dated March 29, 2017[7]. Ultra-high temperature milk was submitted to the following assays: incubation test at 35 ºC – 37 ºC, labeling analysis, aspect analysis, color analysis, odor analysis, determination of acidity in lactic acid, search for starch, stability to 68% v/v ethanol without incubation, search for chlorides, acidity after a seven-day incubation at 35 ºC – 37 ºC, stability to 68% v/v ethanol after a seven-day incubation at 35 ºC – 37 ºC, flavor determination, determination of total fat, determination of defatted dry extract, and determination of total protein[22]. Pasteurized milk was analyzed regarding coliform at 45 ºC count, search for *Salmonella* spp., *labeling analysis*, *aspect analysis*, color analysis, odor evaluation, flavor determination, determination of acidity in lactic acid, determination of total protein, search for starch, search for chlorides, determination of solids-not-fat, determination of peroxidase, determination of total fat, cryoscopic index, and clot on boiling test. The latter was carried out until March 2017, when changes in the legislation excluded it from the set of procedures for milk evaluation purposes[7].

After performing all the tests and assays, Lacen-FD issued a report to inform whether the sample was satisfactory or not and sent it to VISA-FD, which was responsible for taking the applicable measures.

At VISA-FD, the reports referring to 2015, 2016, and the first semester of 2017 issued for pasteurized and UHT milk were reviewed and evaluated regarding the type of product, microbiological, physicochemical, and labeling analysis results, reasons for non-approval, collection place, and manufacturing location.

Microsoft Excel program was used to tabulate data. Analysis of collected data was complemented by the participatory observation of Geali and Lacen-FD employees.

RESULTS AND DISCUSSION

A total of 276 reports referring to the period from 2015 to the first semester of 2017 were evaluated, among which 48 addressed pasteurized milk and 228 concerned UHT milk.

The number of reports of pasteurized milk is lower given that its analysis is more complex. Because the product is perishable, it is collected as a single sample, demands refrigerated transportation, and its analysis must begin within 24 hours after collection, with the possibility of monitoring by an expert. All these factors limit the number of analyses that may be carried out.

Only one (0.4%) out of 228 samples of UHT milk was considered unsatisfactory by the report. Regarding pasteurized milk, 18 out of 48 reports indicated at least one parameter that did not

comply with the legislation in force, which represents 37.5% of the samples. The results are alarming because they show that pasteurized milk has low reliability regarding its quality.

The reports revealed that the examined samples were collected in 20 out of 31 AR of the FD and that the holders of these samples were mostly bakeries and grocery shops. Samples could not be collected in all the AR because of limited human resources and materials. The number of auditors at VISA-FD is insufficient and the last public tender for this carrier occurred in 1993. There are currently 22 inspection centers for 31 AR. Another aspect that must be stressed is the concentration of 48.6% of the collections in only five AR: Asa Norte (16.7%), Núcleo Bandeirante (9.4%), Riacho Fundo (8.7%), Guará (6.9%), and Asa Sul (6.9%) (Figure 1).

Manufacturing of the milk commercialized in the FD is concentrated mostly in the Brazilian states of Goiás and Minas Gerais (Figure 2), which can be explained by the proximity of these places to the FD. Manufacturing must take place near the commercialization centers, especially for pasteurized milk, because of the short expiration date of this type of product.

Decree no. 9,013/2017[7] by MAPA, known as RIISPOA, establishes in article 258 that pasteurized milk must arrive at commercialization sites at a maximum temperature of 7 ºC. In the commercial establishments examined in the present study, collection temperatures of pasteurized milk samples ranged from 1 ºC to 10 ºC. Report analysis showed that the temperature of pasteurized milk samples is not measured at the moment they are delivered to Lacen-FD. This process is currently under implementation by the laboratory. Having this indicator will be important to evaluate if the sample transportation manages to keep the collection temperature. The samples are stored in thermal boxes with ice, transported, and delivered to the laboratory immediately after collection.

Ultra-high temperature milk undergoes a commercial sterilization process and can be stored and made available to commercialization at room temperature, at which the examined samples were collected at commercial establishments.

A proper thermal treatment decreases and even eliminates the risks of milk contamination. Different thermal treatments may be used according to the time and temperature conditions applied, such as thermization, pasteurization, and sterilization, including the UHT procedure[29]. The latter results in a safer product regarding microbial contamination, with a lower loss of quality in comparison with conventional processes of pasteurization and sterilization. When correctly applied, pasteurization eliminates vegetative microorganisms in milk, including pathogenic agents. However, this process does not destroy heat-resistant *Clostridium botulinum and Bacillus cereus spores and may even induce their germination, with the subsequent microorganisms' growth and release of toxins during the preservation of pasteurized milk. For this reason, proper refrigeration of the product is imperative to decrease the microbial multiplication rate and thus keep its quality after processing*[15,29].

Milk must be kept cooled during all the steps of its production process and commercialization: farms, industries, trade points, and places where it is kept until it is consumed, including transportation, in an attempt to keep the so-called "cold chain". Milk

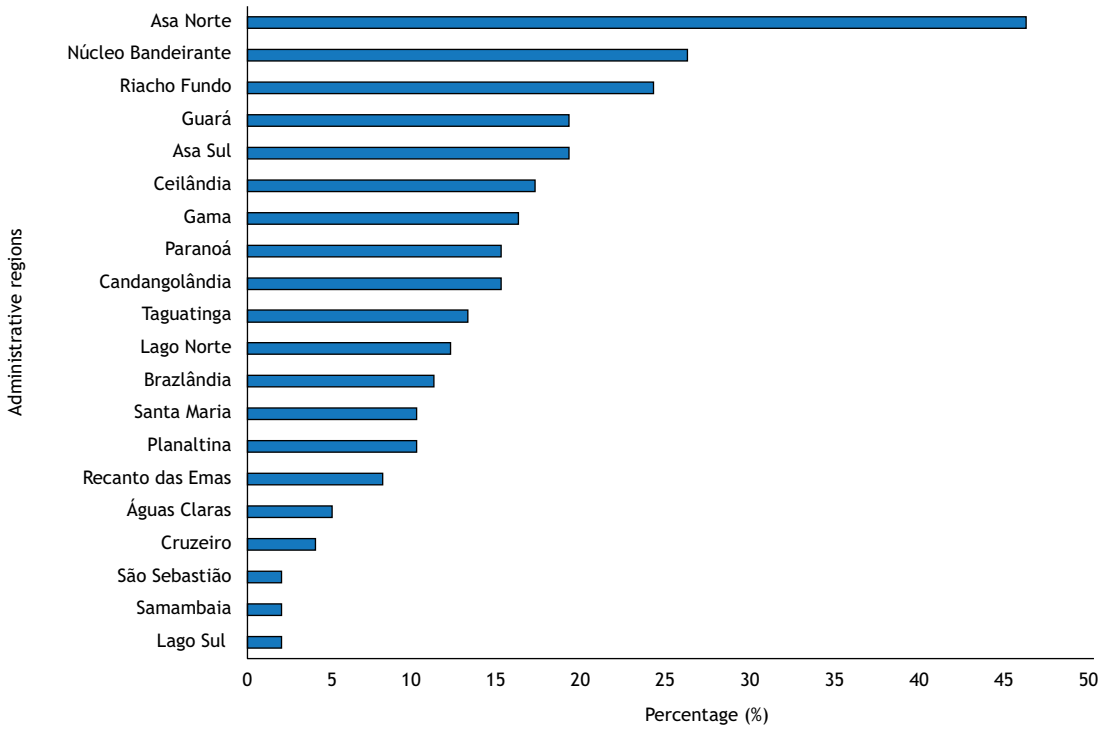

Figure 1. *Administrative regions where milk samples were collected for analysis and their respective distribution percentages.*

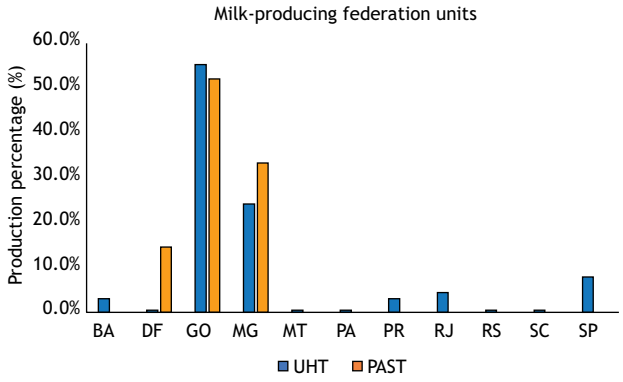

Figure 2. Federation units of origin of pasteurized and UHT milk commercialized in the FD and their respective production percentages.

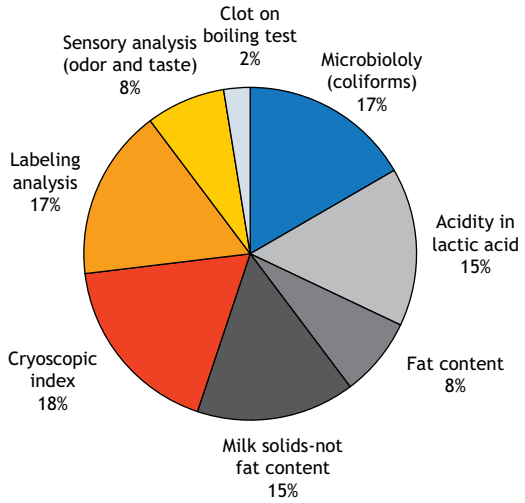

Figure 3. Noncompliant parameters of pasteurized milk according to the legislation and their respective distribution percentages.

refrigeration is important to assure that the product keeps its microbiological quality, as well as its sensory characteristics, over its shelf life[15,30].

According to MAPA Normative Instruction no. 62/2011 and Decree no. 9,013/2017[7], transportation of pasteurized milk must occur in cool stores, which have to assure a maximum milk temperature of 4 ºC, and the product has to reach trade points at a maximum temperature of 7 ºC[27]. However, this temperature interval allowed for commercialization has been contested in literature. Petrus et al.[30] evaluated the microbiological stability of milk at different temperatures and concluded that the ideal temperature to preserve the microbiological quality of pasteurized milk until the expiration date is 4 ºC. The authors warned that an increase of 2 ºC in the storage temperature may result in a decrease of 50% in the stability of pasteurized milk over its shelf life.

In the evaluation of microbiological quality of milk samples, those which showed a microbial load higher than that established by ANVISA BDR no. 12/2001 were considered unsatisfactory[23]. The incubation test at 35 ºC – 37 ºC was performed for seven days. No sample presented packaging or product alterations after the incubation week and 100% were considered satisfactory.

Pasteurized milk is submitted to two microbiological assays, the coliform at 45 ºC count, which may give a maximum value of 4 MPN/mL according to BDR no. 12/2001[23], and the *Salmonella spp. search assay, which must show the absence of the microorganism in a 25-mL aliquot of the product. Among the 48 samples of pasteurized milk analyzed, five* (10.4%) were not approved because they presented a coliform at 45 ºC count *higher than the reference value of 4 MPN/mL. The presence of coliforms is an important indicator of hygiene and sanitary conditions of a product during manufacturing and may be related to inadequate milking procedures, poorly cleaned equipment, handling procedures noncompliant with Good Manufacturing Practices (GMP), and problems in milk storage*[17]. Keeping milk at temperatures higher than 4 ºC allows the multiplication of psychrotrophic microorganisms that may influence milk quality because of the production of thermostable lipolytic and proteolytic enzymes[31].

Psychrotrophic bacteria found in milk after pasteurization are probably thermotolerant, common in this type of product, which could interfere with the quality if the refrigeration time and the period of validity were longer than that established by law or if the product were used in the manufacturing of other items or derivatives with long preservation or maturation periods[12]. It is important to stress that these results point to possible failures in the monitoring of systems for quality assurance adopted by the dairy industry, such as GMP and Hazard Analysis and Critical Control Points, which must be evaluated on a regular basis[29,32,33].

Salmonella spp. were not found in the examined samples. It is essential that bacteria from this genus is absent in milk microbiological analysis, because these microorganisms have been described as one of the main pathogens responsible for the incidence of foodborne diseases worldwide[34].

In addition to the milk microbiological quality evaluation, the present study also assessed the physicochemical quality of the product, which is fundamental to identifying fraud attempts, especially those of economic nature, characterized by the addition of foreign substances to the milk composition either to increase the yield or to conceal irregularities. Among the 228 UHT milk reports analyzed, only one sample (0.4%) was unsatisfactory, because its protein content was lower than the reference value of 2.9 g de protein per 100 g of milk established by MAPA Normative Instruction no. 62/2011[27] and RIISPOA Decree no. 9.013/2017[7]. Pasteurized milk samples, in turn, had several parameters which did not meet the physicochemical and microbiological standards determined by MAPA Normative Instruction no. 68/2006[22]. Among the 48 reports evaluated, 18 (37.5%) showed parameters noncompliant with the legislation (Figure 3).

The cryoscopic index indicates the freezing point of milk. Its reference value is -0.530 ºH to -0.550 ºH, which equals -0.512 ºC to -0.531 ºC[28]. Values closer to zero may indicate fraud by water

addition. Values more negative than -0.550 ºH may indicate the presence of density restorative substances or lactic acid[35].

It is important to emphasize that determination of the cryoscopic index was the analysis type with the highest number of samples (seven or 14.6%) noncompliant with the legislation. A study carried out by Caldeira et al.[16] revealed that 37% of the type C pasteurized milk commercialized in Janaúba, state of Minas Gerais, Brazil, presented alterations detected using the cryoscopic index. The authors stressed that the water added to milk may pose a high risk of contamination depending on its quality, determined mostly by the conditions in which it was obtained, in addition to diluting milk natural components and consequently the levels of protein, lactose, and the nutritional value of the food as a whole, thus harming consumers[13,14,16].

Other factors such as cattle breed, season, diet and water consumption of the animals, time of day the milking is performed, weather, origin udder quarter, mastitis, and acidity may influence the cryoscopic index[35].

It is also necessary to take into consideration that tests to measure the cryoscopic index, which were carried out using a Laktan 230 milk analyzer, ceased being performed in early 2017 because this method is not the official one provided for the legislation[22]. Normative instruction no. 68/2006[22] by MAPA establishes that the official equipment for the freezing point depression is the electronic cryoscope.

Analysis of acidity in lactic acid for pasteurized milk samples revealed that 12.5% of the items did not comply with Normative Instruction no. 62/2011[28] and RIISPOA Decree no. 9.013/2017[7]. The test for determining the level of acidity in lactic acid indicates the conservation status of milk. High acidity results from lactose acidification, caused by microorganisms multiplying in milk. Consequently, acidity tends to increase as time passes by and milk grows old[28,36]. This result corroborates the findings of the microbiological tests because, according to Rosa and Queiroz[20], aerobic mesophilic microorganisms and bacteria from the coliform group are responsible for undesirable alterations in the composition of milk as a consequence of lactose fermentation and the formation of lactic, acetic, propionic, and formic acids, thus originating milk acquired acidity and increasing its total acidity.

Samples were also analyzed regarding solids-not-fat (SNF) contents. Six showed values lower than the minimum of 8.4%[7,22]. This decrease in the SNF level may be related to skimming and addition of water[13].

Concerning the fat content, it was found that 6.2% of the pasteurized milk samples were unsatisfactory. The unapproved samples were whole pasteurized milk that did not reach the minimum fat level of 3 g per 100 g of milk established by MAPA Normative Instruction no. 62/2011 and RIISPOA Decree no. 9.013/2017[7]. A variation of ± 20% of the value indicated in the product label is allowed, according to ANVISA BDR no. 360 dated September 23, 2003[37]. The decrease in the percentage of milk fat may have resulted from skimming, a process that consists of removing milk fat, which can be used in the manufacturing of other products such as butter and heavy cream. However, article 242 of Decree no. 9.013/2017[7] prohibits partial or total skimming of milk in rural properties.

One of the samples (2.1%) of pasteurized milk had a positive result in the clot on boiling test, presenting thermal instability. This test evaluates the quality of milk thermal resistance and stability before being pasteurized. According to MAPA Normative Instruction no. 68/2006[22], the clot on boiling test assesses milk acidity. When it is high, heating causes milk proteins to precipitate, that is, milk curdles after boiling and becomes unfit for consumption. It was a routine test in the set of pasteurized milk analyses carried out by Lacen-FD until the enactment of Decree no. 9.013/2017[7], which revoked it.

Fresh milk has a pleasant and slightly sweet taste, essentially due to the significant quantity of lactose. The other milk components, including proteins, which are tasteless, participate in the flavor composition at some level, directly or indirectly. Changes in the taste of milk can occur for many reasons, usually related to animal handling and milk processing, but even after pasteurization and packaging undesirable tastes may be absorbed. The fat content also influences milk taste. In general, the higher the fat content of the milk, the better it will taste.

The main elements that impact on milk odor originate from foods, the environment, and utensils that come into contact with milk and microorganisms. Unpleasant milk odors can be eliminated during pasteurization, in the aerator. This equipment causes slightly heated milk to eddy so volatile substances that impart unpleasant odors to milk evaporate[38].

Three samples (6.2%) of pasteurized milk had characteristics that did not comply with the legislation regarding odor and taste. The assay, although carried out by two analysts trained in the items listed by the legislation[7,22,27], did not follow statistical criteria. Still, some samples were not approved, suggesting that the legislation in force should be reviewed to include more specific criteria regarding sensory parameters of pasteurized milk. Non-characteristic organoleptic properties may arise from several factors, among which adulteration of milk composition by addition or withdrawal of a component.

Additionally to microbiological and physicochemical characteristics, labeling was verified regarding its compliance with the specific legislation. All the UHT milk samples met the criteria established by the legislation in force, but five samples (10.4%) of pasteurized milk did not comply with at least one of the standards[7,21,27,37,39,40,41,42,43,44,45,46,47,48]. The main problems found in those products were noncompliance with article 13 of Decree no. 8,552 dated November 3, 2015[39], meaning that they did not display the following warning:

> "WARNING: This product must not be used to feed children under 1 (one) year of age, unless upon explicit prescription from a doctor or nutritionist. Breastfeeding prevents

infections and allergies and is recommended up to 2 (two) years of age or over."

and not providing the explicit information "Gluten free" on the label[47]. In addition, some samples presented nutrition information which differed from what was found in physicochemical assays that evaluated milk nutritional composition.

Board of Directors Resolution no.91 dated February 8, 2017[49], which establishes how lactose-related information must be presented in labels regardless of food type, is being adjusted and will come into force 12 months after its publication. According to the new standard, any foods containing more than 0.1% of lactose will have to display the expression "Contains lactose" in their label. Some labels examined in the present study did not comply with this standard, but their adjustment period established by the mentioned BDR had not expired yet.

CONCLUSIONS

Although the number of analyzed samples of pasteurized milk was lower than that of UHT milk, the former showed more issues regarding their microbiological and physicochemical quality. The present study pointed out problems such as the presence of coliforms, skimming, and signs that indicate the possibility of fraud by addition of water, suggesting that the nonconformities found originate in the processing and transportation steps. However, the people accountable for the products often are not held liable for damage, because the scope of action of VISA-FD is limited to the FD and most manufacturing facilities and dairies are located at the states of Goiás and Minas Gerais. In these places, intervention actions are carried out by MAPA, and often a lack of proper communication between institutions results in uncoordinated and ineffective actions. Consequently, it is imperative to increase the coordination between sectors responsible for sanitary regulation and public health policies to provide the delivery of surveillance services with technical and legal elements.

Given this scenario, the authors consider that monitoring milk quality is an important public health action related to food safety and plays a role in guiding actions of the Health Surveillance Department, which are adopted in a process of direct consumer care, thus contributing to health promotion and prevention of diseases and complications.

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Conflict of Interest

Authors have no potential conflict of interest to declare, related to this study's political or financial peers and institutions.