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Lactic Acid Bacteria viability and physicochemical properties of curdled milk available in the retail markets of Goiânia, Goiás, Brazil

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Curdled milk (CM) is a fermented milk product obtained by coagulating and reducing the pH of milk through lactic fermentation, mediated by mesophilic lactic acid bacteria (LAB) cultures. LAB are essential in fermentation, producing lactic acid and compounds that confer specific sensory attributes. The regular consumption of fermented dairy products promotes several functional benefits to health, such as balancing the intestinal microbiota. To achieve these effects, LAB cultures must be viable, active, and present in appropriate quantities in the final product throughout its shelf life. The study aimed to evaluate the physicochemical characteristics and LAB count in CM available in the retail market of Goiânia, Goiás, Brazil, to assess compliance with the requirements set by the Technical Regulation of Identity and Quality (RTIQ) for Fermented Milk. For this purpose, CM from seven brands, with state (SI) or federal inspection (FI) registration, with at least two different batches, was analyzed, totaling 19 samples. Ambient and refrigerated display temperatures were measured with an infrared thermometer at the time of purchase, and the products were transported in isothermal containers and analyzed immediately upon arrival at the laboratory. LAB enumeration was performed employing the Petrifilm® plating method, incubated at 37°C/ 48 hours. The pH was measured with a digital pH meter, and titratable acidity was determined using phenolphthalein indicator and 0.1N sodium hydroxide solution, according to official methods. All analyses were performed in duplicate. For five of the seven evaluated brands (71.4%), three different batches of curdled milk were obtained, while for two brands (28.6%), only two batches were found in commercial establishments visited. One brand was registered under SI service (14.3%), while all other samples were from brands produced in establishments under FI (85.7%). The average room temperature of the establishments was 22.8°C, with a minimum of 21.1°C and a maximum of 26.6°C, while the temperature of the refrigerated displays ranged from -2.5°C to 6.4°C, with an average of 2.7°C. According to RTIQ, the temperature storage of CM must not exceed 10°C, and in this regard, all establishments adequately met the temperature criterion. Regarding LAB enumeration, results ranged from $1.69x10^4$ CFU/g to $3.79x10^8$ CFU/g, distributed as follows: seven samples with counts of 10^8 CFU/g; six with counts of 10^7 CFU/g; three with 10^6; two with 10^5 CFU/g; and finally, one sample with a count of 10^4 CFU/g. Of the 19 samples analyzed, 15.7% (n=3) did not meet the minimum LAB count required by legislation, of $1x10^6$ CFU/g, with two of these (10.5%) belonging to different batches of the same brand under SI. Regarding physicochemical analyses, the average pH value was 4.3, and the titratable acidity was 0.98 g of lactic acid/100 g, with all samples meeting the legislative standard, which defines titratable acidity varying

between 0.6 to 2.0 g of lactic acid/100 g. The results of this study demonstrated that most CM samples available in the retail market of Goiânia, met the microbiological and physicochemical requirements established by the RTIQ, except for 15.7% of the samples that did not reach the minimum required LAB count. These findings indicate the need for continuous monitoring of the viability and quantity of LAB in commercial products to ensure the functional benefits and quality of fermented milk, essential for consumer health.

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