

MICROBIOLOGICAL ANALYSIS OF THE MARAJOARA CHEESE ELABORATED IN THE NORTH OF BRAZIL

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ABSTRACT

Four types of cheese were analyzed, two from water buffalo and two from cattle milk. For each animal species, it was studied two methods of cheese making, one handmade and the other with proper technology. The handmade cheeses were from local farms, and the other ones from the Laboratory of Technology of Embrapa Eastern Amazon, using milk from females of the Experimental the Stations of Belém and "Terra Alta", Para State, Brazil. The animals were maintained under hygienic and healthy conditions. The microbiological and sensorial evaluations were initiated in the subsequent day to cheese production and at seven day intervals, during approximately one month. The data was analyzed by the NTIA statistic program. It was not detected the presence of *S. aureus* and Salmonellas, while microbiological contamination was found through the presence of total and fecal micro-organisms, mould and yeast.

Key words: Amazon, cheese, microbiological contamination, sensorial test.

INTRODUCTION

The cheese marajoara is produced commonly in the Marajo island, Pará State, Brazil. It is a handmade product that uses water buffalo milk and, in smaller scale, cattle milk. There is little research with respect to cheese made out from water buffalo milk in the Amazon region. Some works were carried out by (6, 4, 2, 3, 8). However, almost nothing is known about the microbiological pattern of the marajoara cheese. The inadequate hygiene in milk production and in the dairy industry, as well as the precarious conditions of processing, storage and commercialization facilitate the microbiological dissemination. Thus, this work aims to determine the microbiological conditions of the marajoara cheese, elaborated with cattle and water buffalo milk.

MATERIAL AND METHODS

The microbiological analyses were accomplished in the Laboratory of Chemical Engineering of the Federal University of Pará State and in the Laboratory of Technology of Embrapa Eastern Amazon, in Belém, Para State, Brazil. Four cheeses were analyzed, two elaborated with water buffalo milk and two with cattle milk: C - cheese elaborated with cattle milk, without technology use; B - cheese elaborated with water buffalo milk, without technology use; CT - cheese elaborated with cattle milk, with technology use; BT - cheese elaborated with water buffalo milk, with technology use. It was studied the microbiological conditions through total counting of mushrooms and yeast, total and fecal micro-organisms, *Staphylococcus aureus* and Salmonellas, during the storage. The cheese pieces were conserved under refrigeration the about 12°C, considering that is the storing conditions more likely to be found in the area.. Later on, the cheese was conserved in cryovac packing, for four weeks. The microbiological determinations were made in agreement with the patterns demanded by the effective legislation (1), which are yeast, total and fecal micro-organisms, *Staphylococcus aureus* and Salmonellas, according to the methodology described by (7).

RESULTS AND DISCUSSIONS

In Tables 1 and 2 it is presented the results of the microbiological analyses of cheese from water buffalo milk, with and without technology.

Table 1 - Microbiological analyzes of cheese from water buffalo with technology.

Storage (week)	Total Micro-org. NMP/g	Fecal Micro-org. NMP/g	Yeast UFC/g	<i>S. aureus</i> UFC/g	Salmonellas (absence 25 g)
1	0	0	$1,3 \times 10^3$	absence	absence
2	0	0	$9,2 \times 10^3$	absence	absence
3	0	0	$>300 \times 10^3$	absence	absence
4	4	4	$>300 \times 10^3$	absence	absence

Table 2 - Microbiological analyzes of cheese from water buffalo without technology.

Storage (week)	Total Micro-org. NMP/g	Fecal Micro-org. NMP/g	Yeast UFC/g	<i>S. aureus</i> UFC/g	Salmonellas (absence 25 g)
1	0	0	$0,79 \times 10^3$	absence	absence
2	23	0	$0,16 \times 10^3$	absence	absence
3	0	0	$>300 \times 10^3$	absence	absence
4	7	4	$>300 \times 10^3$	absence	absence

The microbiological analysis of cheese from water buffalo milk with technology (Controls 1) did not indicate contamination for Salmonellas and *Staphylococcus aureus*. The levels of total and fecal micro-organisms presented small growth at the end of the storing period. The levels of contamination for yeast are quite elevated in the experimental period. In the cheese from water buffalo milk without technology (Controls 2), also, it was not observed the presence of Salmonellas and *Staphylococcus aureus*. There was not growth of total micro-organisms in the beginning of the storage. In the course of the storing of the cheese there was growth and, at the end, a decrease. The fecal micro-organisms only began develop at the end of the period. With relation to yeast a considerable growth was observed during the storage period. In Tables 3 and 4 it is presented the results of the microbiological analyses of cheese from cattle milk, with and without technology.

Table 3 - Microbiological analyzes of cheese from cattle milk with technology.

Storage (week)	Total Micro-org. NMP/g	Fecal Micro-org. NMP/g	Yeast UFC/g	<i>S. aureus</i> UFC/g	Salmonellas (absence in 25 g)
1	0	0	$0,34 \times 10^3$	absence	absence
2	0	0	$0,24 \times 10^3$	absence	absence
3	0	0	$>300 \times 10^3$	absence	absence
4	0	0	$>300 \times 10^3$	absence	absence

Table 4 - Microbiological analyzes of cheese from cattle milk without technology.

Storage (week)	Total Micro-org. NMP/g	Fecal Micro-org. NMP/g	Yeast UFC/g	<i>S. aureus</i> UFC/g	Salmonellas (absence in 25 g)
1	>1.100	0	18 x 10 ³	absence	absence
2	>1.100	23	1,3 x 10 ³	absence	absence
3	>1.100	930	1,3 x 10 ³	absence	absence
4	230	230	300 x 10 ³	absence	absence

The samples were not polluted by *Salmonellas*, *Staphylococcus aureus*, total and fecal micro-organisms, until the end of the experimental period. With relation to yeast it was verified a great growth at the end of the period. In samples of cheese from milk without technology (Controls 4) the contamination was not verified by *Salmonellas* and *Staphylococcus aureus*. The counting of total micro-organisms was high since the beginning of the storage, staying in this level until the third week, when the levels decreased. The behavior of the fecal micro-organisms was quite irregular. In the beginning they present high growth, decreasing at the end of the storing. The yeast decreased its growth, starting from the second week, happening a great development at the last week. In this work, the total micro-organisms were absent in 75% of the samples of the cheeses from water buffalo milk with and without technology, not being found in cheese from milk with technology. However, those micro-organisms were present in 100% of the samples of cheese from milk without technology. The yeast was present in 50% of the cheese from water buffalo milk with and without technology, being present in 100% derived us from milk with and without technology. The microbiological analyses of the marajoara cheese from water buffalo milk with and without technology, as the total and fecal micro-organisms, attended the specifications, until the end of the experimental period. In those cheeses, there was no development of *Staphylococcus aureus* and *Salmonellas*. With relationship to the yeast there was a considerable growth in the course of the weeks of storage, presenting quite altered levels and out of specification. Similar results were found by (5), in three types of cheese from water buffalo milk. In the present work, the fact of the high micro-organisms levels and yeast found in the cheese from milk without technology, it should be associated to the lack of hygiene control in the production process, resulting in dairy products of low quality and smaller duration of shelf life. The lack of specific legislation for microbiological tolerances of the marajoara cheese or for similar cheeses turn the research difficult. In the Para State, the diversity in the processing of dairy products from cattle milk, as the marajoara cheese, requires the application of available technologies, being necessary the establishment of standard specifications or the quality control of. The microbiological data found indicates that the duration of shelf life of the marajoara cheese is of approximately two weeks.

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