ANALYSIS OF FATTY ACID OF THE "MARAJOARA" CHEESE, ELABORATED WITH WATER BUFFALO AND CATTLE MILK

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ABSTRACT

It was analyzed four types of cheeses, two from water buffalo milk and two from cattle milk. For each animal species, it was studied two methods of cheese making, one handmade and the other using appropriate technology. The handmade cheeses were obtained from local farms and the others from the Laboratory of Technology of Embrapa Eastern Amazon, using milk from females of the Embrapa Experimental Stations - Belem and "Terra Alta", Para State, Brazil. The animals were maintained under hygienic and healthy conditions. The analyses of methyl esters was carried out using alkaline hydrolyzes and the CG/EM system (coupled Gaseous Mass Spectrometer Chromatograph). The fatty acids found were methyl caprate, methyl laurate, methyl meristate, methyl pentadecanoate, methyl palmitate, methyl stearate and methyl oleate.

Key words: Amazon, Marajo island, dairy product, milk technology.

INTRODUCTION

The "marajoara" cheese is one of the dairy products more commonly produced in the Marajo island, Para State, Brazil, having great acceptance and being commercialized in the local market. It is handmade, in inadequate conditions, using mainly water buffalo (*Bubalus bubalis*) milk and, in smaller scale, milk from crossbred cattle (*Bos indicus* vs. *Bos taurus*). There is very little research concerning the physical and chemical characteristics of dairy products from cattle and water buffalo in the Brazilian Amazon (7, 8, 9, 10, 11, 14). Thus, this work aims to determine the amount of fatty acid of the "marajoara" cheese, elaborated with cattle and water buffalo milk.

MATERIAL AND METHODS

Four types of cheese were analyzed, two elaborated with water buffalo milk and two with cattle milk. A cheese of each animal species was handmade, in a local farm, and the others made using appropriate technology, in the Laboratory of Technology of Embrapa Eastern Amazon, in Belém, Pará, Brazil, where the analyses were accomplished. The cheeses 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 cheeses were conserved in cryovac packing, for four weeks. Extraction of methyl esters was carried out using alkaline hydrolyzes and the CG/EM system (coupled Gaseous Mass Spectrometer Chromatograph).

RESULTS AND DISCUSSIONS

In Table 1 it is presented the percentile composition of the fatty acid for cheese made from water buffalo milk with and without the use of technology. For the water buffalo milk with technology, the main methyl esters identified were the methyl palmitate (39.8%), methyl meristate (19.9%) and the methyl oleate (16.1%), amongst other esters found in smaller concentration.

For the water buffalo milk without technology, the methyl esters with higher values were the methyl palmitate (38.6%), the methyl oleate (21%) and the methyl meristate (14.9%), amongst other esters identified in smaller concentrations.

Table 1 - Percentile composition of methyl esters of "marajoara" cheese from water buffalo using (WT) and not using (NT) appropriate technology.

N	FA	Ester	RT (Mean)	WT (%)	NT (%)
1	$C_{10:0}$	Methyl caprate	10.72	2.7	2.8
2	$C_{12:0}$	Methyl laurate	16.83	6.5	3.3
3	$C_{14:0}$	Methyl meristate	24.87	19.9	14.9
4	-	NI	26.19	0.9	0.6
5	$C_{15:0}$	Methyl pentadecanoate	27.07	1.6	1.1
6	-	NI	27.77	1.3	1.7
7	$C_{15:0}$	Methyl pentadecanoate	29.00	2.4	3.1
8	$C_{16:0}$	Methyl palmitate	33.21	39.8	38.6
9	$C_{16:0}$	Methyl palmitate	33.98	2.2	2.1
10	$C_{18:0}$	Methyl stearate	41.22	6.7	10.9
11	$C_{18:1}$	Methyl oleate	41.71	16.1	21.0

N = Peak number; FA = Fatty acid; TR = Retention time; NI = Methyl ester not identified

In Table 2 it is presented the percentile composition of the methyl esters for milk of cattle with technology and without technology. In the cheese of cattle with technology, the methyl esters with higher values was the methyl palmitate (33,55%), the methyl meristate (19,5%) and the methyl oleate (14,9%). In the cheese from milk of cattle without technology, the methyl esters that presented higher values were the methyl palmitate (35,1%), methyl oleate (20,9%) and methyl meristate (17,5%).

Table 2 - Percentile composition of methyl esters in cattle cheese using (WT) and not using (NT) appropriate technology.

N	FA	Ester	RT (Mean)	WT (%)	NT (%)
1	$C_{10:0}$	Methyl caprate	10.72	7.0	4.9
2	$C_{12:0}$	Methyl laurate	16.83	7.5	5.4
3	$C_{14:0}$	Methyl meristate	24.87	19.5	17.5
4	-	NI	26.19	1.7	1.6
5	$C_{15:0}$	Methyl pentadecanoate	27.07	2.0	0.8
6	-	NI	27.77	0.7	1.1
7	$C_{15:0}$	Methyl pentadecanoate	29.00	1.8	2.0
8	$C_{16:0}$	Methyl palmitate	33.21	33.5	35.1
9	$C_{16:0}$	Methyl palmitate	33.98	1.7	1.6
10	$C_{18:0}$	Methyl stearate	41.22	7.3	7.7
11	$C_{18:1}$	Methyl oleate	41.71	14.9	20.9

N = Peak number; FA = Fatty acid; TR = Retention time; NI = Methyl ester not identified.

The methyl esters of the cheeses found in this work - methyl caprate, methyl laurate, methyl meristate, methyl pentadecanoate, methyl palmitate, methyl stearate and methyl oleate - are the same found in the literature (3), analyzing the cheese from the northern region, in which composition it was found caprilic, capric, lauric, miristic, palmitic, stearic, oleic, linoleic and linolenic. In the other work (1) was found methyl cetones in cheeses Camembert, using gaseous chromatography phase.

The presence of acid free fatty acids, amino acids, amines and alcohol characterize the group of complex biochemical reactions responsible for the formation of the " typical flavor " of each cheese, as it was recognized at the beginning of the century (13). The fat is the main substratum for varied biochemical reactions that take for the formation of aromas and flavors in the cheese (5).

So much in the "marajoara" cheese as in other the cheese of the northern region it was not found butyric nor caproic acid, the same happening with research works (15). However, other authors (2, 4, 6) verified presence of these acids in provolone, swiss, parmesan, gouda, camembert and

"Minas" cheese. Other author (3) considers that those fatty acid can have suffered transformations in the cheese made in the northern region, during boiling (85-90°C), fact that could have happened in this work.

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