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Goat coalho cheese with alcoholic beverages: a first report about technological aspects and their implications on physicochemical properties and *starter* culture

Queijo de coalho caprino com bebidas alcoólicas: um primeiro relato sobre aspectos tecnológicos e suas implicações nas propriedades físico-químicas e na cultura *starter*

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ABSTRACT
The aim of this research was to determine the viability of the production of goat Coalho cheese seasoned with alcoholic beverages. Five treatments of goat Coalho cheese were prepared: without alcohol (control); with aged cachaça (T1); with cocoa honey liqueur (T2); with mead (T3); and with pure malt beer (T4). Samples were evaluated for chemical composition, pH, color, texture and total lactic acid bacteria (LAB) count during maturation (days 0 and 5) and storage (days 0, 10, 20, 30, 40, 50 and 60). Seasoned cheeses showed physicochemical characteristics according to the identity and quality of Coalho cheese, showing that alcoholic seasoning does not change the characterization of the final product. However, due to the shorter pressing time when compared to the literature and the timing of the seasoning, cheeses with alcoholic beverages negatively influenced the physicochemical (fat and moisture) and instrumental (pH, color and texture) characteristics. In addition, seasoned cheeses only showed LAB counts from the fifth day of maturation, demonstrating an initial inhibition of starter culture. Still, alcoholic seasoning has proven to be a viable technology. However, new pressing and seasoning times should be studied.

Keywords: Alcholic seasoning, Caprine cheese, Goat milk.

RESUMO
O objetivo desta pesquisa foi determinar a viabilidade da produção de queijo de coalho caprino condimentado com bebidas alcoólicas. Foram elaborados cinco tratamentos de queijos de Coalho caprino: sem bebida alcoólica (controle); com cachaça envelhecida (T1); com licor de mel de cacau (T2); com hidromel (T3); e com cerveja puro malte (T4). As amostras foram avaliadas quanto à composição química, pH, cor, textura e contagem de bactérias ácido láticas totais (BAL) durante o período de maturação (dias 0 e 5) e armazenamento (dias 0, 10, 20, 30, 40, 50 e 60). Os queijos condimentados apresentaram características físico-químicas de acordo com a identidade e qualidade para o queijo de Coalho, mostrando que a condimentação alcoólica não altera a caracterização do produto final. No entanto, devido ao menor tempo de prensagem quando comparado à literatura e o momento da etapa de condimentação, os queijos com bebidas alcoólicas influenciaram negativamente as características físico-químicas (gordura e umidade) e instrumentais (pH, cor e textura). Além disso, os queijos condimentados só apresentaram as contagens de BAL a partir do quinto dia de maturação, demonstrando uma inibição incial da cultura starter. Ainda assim, a condimentação alcoólica provou ser uma tecnologia viável. Contudo, novos tempos de prensagem e de condimentação devem ser estudados.

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Palavras-chave: Condimentação alcoólica, Leite de cabra, Queijo de cabra.

1 INTRODUCTION

Goat milk has high nutritional and therapeutic characteristics when compared to bovine milk, such as better digestibility and hypoallergenicity (PARK et al., 2007). However, for not habitual consumers, goat milk and derivatives, as coalho cheese, has less acceptance than cow coalho cheese (QUEIROGA et al., 2013) due to high concentration of caprylic, caproic and capric acids (PARK et al., 2007). Coalho cheese is a popular Brazilian ripened cheese that is obtained by enzymatic coagulation and maturation up to 10 days (BRAZIL, 2001). In the Brazilian Northeast, Coalho cheese production has a recognized tradition with great popularity and represents a relevant economy activity for this region (BARROS et al., 2019; SILVA et al., 2020). The Coalho cheese production is mostly made by small and medium producers from bovine and goat milk (GARCIA et al., 2008), which can be produced added an alcoholic beverage (SILVA et al., 2017).

In this context, this research was aimed to determine the feasibility of the goat Coalho cheese production with different alcoholic beverages (aged Cachaça, cocoa honey liquor, mead and pure malt beer) by physicochemical (chemical composition, pH, color and texture) and bacteriological characteristics during maturation (days 0 and 5) and storage (days 0, 10, 20, 30, 40, 50 and 60) period.

2 MATERIAL AND METHODS

2.1 GOAT COALHO CHEESE PROCESSING

Goat coalho cheeses were elaborated in Kadosh Dairy (Vila de Abrantes, Camaçari, Bahia, 12°48'03.0"S 38°17'41.0"W). For the preparation, 100 liters of goat's milk were used (Breeds Saanen and Toggenburg). The alcoholic beverages used were the aged cachaça (Cachaça de Abaíra®, Abaíra, Bahia), Cocoa Honey Liquor (Sabores da Cabruca®, Camacan, Bahia), Mead (Sofia®, Salvador, Bahia) and Pure Malt Beer (Black Princess®, Petropólis, Rio de Janeiro). Goat's milk was pasteurized (65°C/30 min) and then cooled to 35°C. After the heat treatment, the Coalho cheese was prepared according to SILVA et al. (2017). The pressing was carried out for 50 min and the condimentation was performed after the elaboration, by immersion cheese in alcoholic beverages for 12 hours. Goat Coalho cheese without seasoning (control) and seasoned with cachaça (T1), liquor (T2), mead (T3) and beer (T4) were elaborated. After that, the cheeses were maturated for 10 days at 12ºC.

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2.2 PHYSICOCHEMICAL ANALYSIS

The fat analysis was carried out by the butirometric method for cheeses and the moisture by the gravimetric method (AOAC, 2012) in triplicate, for the characterization of the final product (Day 0). The pH determination was performed by the electroanalytical method (Kasvi pH meter, K39-1014B, Brazil) in analytical triplicate (AOAC, 2012). The color (L*, a* and b*) and texture (hardness, elasticity and chewiness) analysis were performed using the Konica Minolta colorimeter (Chroma Meter CR5 model, United States) and the TA.XT Express Enhanced texturometer (Stable Micro Systems, Extralab Brazil), respectively. The samples were cut into 5 cm x 5 cm cubes and the pre-determined parameters were: cylindrical probe, 5 g force, pre-test velocity 1.0 mm / s, 2.0 mm / test and post-test 10 mm / distance of 10 mm and time of 5 s. These analyzes (pH, color and texture) were performed on days 0 and 5 of maturation and days 0, 10, 20, 30, 40, 50 and 60 of storage.

2.3 BACTERIOLOGICAL ANALYZES

The Lactic Acid Bacteria (LAB) count of the cheeses was performed using MRS Agar (Sigma-Aldrich cod. 69964-500G, Brazil) in triplicate, incubated in aerobiosis at 35°C/ 48 hours (APHA, 2015).

2.4 STATISTICAL ANALYSIS

The physicochemical and bacteriological results were performed by analysis of variance (ANOVA one-way), using a commercially available statistical package, the SPSS program (v. 17, Chicago IL, USA). Statistical significance was set at the 0.05 level of confidence ($p < 0.05$) using the Tukey test.

3 RESULTS AND DISCUSSION

3.1 PHYSICOCHEMICAL ANALYSIS OF GOAT COALHO CHEESES

Coalho cheeses presented moisture and fat values within the Brazilian legislation (BRAZIL, 2001) and the recommended result for Coalho cheese, medium to high moisture classification (Table 1). This shows that alcoholic seasoning does not influence the physicochemical characterization of goat Coalho cheese, keeping it within the technological standards of identity and quality.

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Table 1. Physicochemical parameters obtained for seasoned goat Coalho cheeses corresponding to day 0 of storage.

Treatment	Fat (%)	Moisture (%)	TDE (%)	FMDE (%)
Control	22.00 ± 1.00$^{A, B}$	43.63 ± 1.44$^{A, B}$	56.37 ± 1.44$^{A, B}$	39.04 ± 0.98^{A}
T01	19.67 ± 0.29^{A}	47.83 ± 3.37^{B}	52.17 ± 3.37^{B}	37.81 ± 2.53$^{A, B}$
T02	20.17 ± 1.26$^{A, B}$	40.74 ± 1.96^{A}	59.26 ± 1.96^{A}	34.06 ± 1.13^{B}
T03	21.50 ± 0.50$^{A, B}$	46.18 ± 1.11$^{A, B, C}$	53.82 ± 1.11$^{A, B, C}$	39.96 ± 0.83^{A}
T04	23.67 ± 1.15^{B}	50.95 ± 0.36^{C}	49.05 ± 0.36^{C}	48.32 ± 0.36^{C}

*Letters indicate significant differences ($p < 0.05$) between samples.
TDE = Total Dry Extract; FMDE = Fatty matter in dry extract; T01 = cheese with cachaça; T02 = cheese with cocoa honey liquor; T03 = cheese with mead; T04 = cheese with beer.

The Coalho cheeses were seasoned after preparation, keeping syneresis still in maturation after seasoning. This variable in the processing could influence the moisture of the cheeses because they would tend to retain more liquids. However, the type of alcoholic beverage may have influenced the difference in moisture between treatments, and T04, which corresponded to the cheese seasoned with pure malt beer, showed a significant difference between the other seasonings. This observation may be due to the higher alcohol content reduced of this beverage in front of the others. As moisture increased, cheeses became more predisposed to deterioration to favor the microorganism's growth. A possibility to decrease these influences would be in the preparation of seasoned cheese to perform the pressing for an average time of 4 h to 16 h (MORAES et al., 2018; QUEIROGA et al., 2013).

The all samples pH showed a significant difference during the maturation and storage period, which was increased by cheeses seasoning (Figure 1). This result can be related to lower LAB viability.The alcohol inhibited the LAB initial growth reducing lactose fermentation and lactic acid production. Nevertheless, these results are in accordance with MORAES et al. (2018), which evaluated the potential probiotic of goat cheese produced with autochthonous adjunct culture of *Lactobacillus mucosae*.

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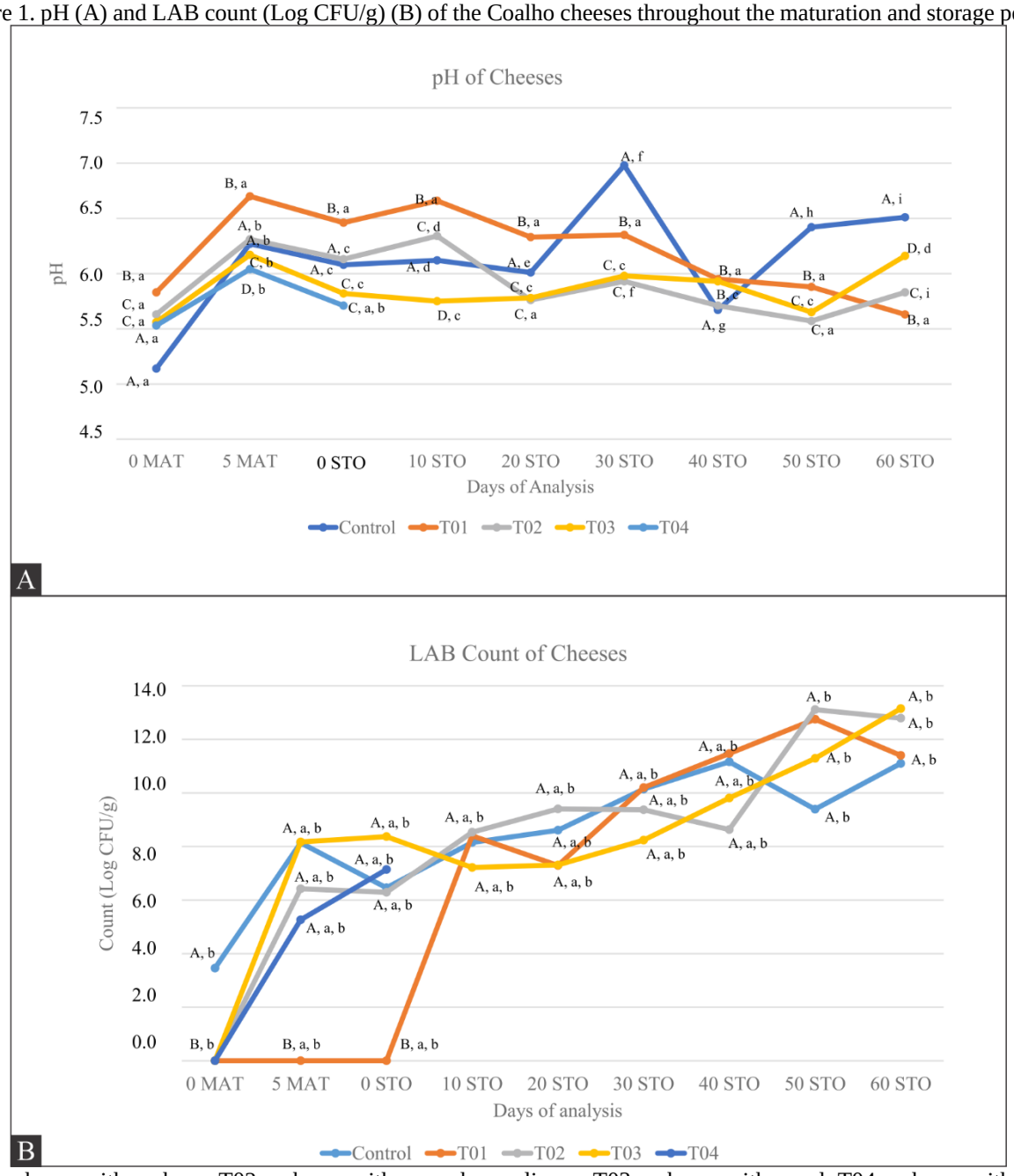
Figure 1. pH (A) and LAB count (Log CFU/g) (B) of the Coalho cheeses throughout the maturation and storage period.



T01 = cheese with cachaça; T02 = cheese with cocoa honey liquor; T03 = cheese with mead; T04 = cheese with beer; MAT = Maturation; STO = Storage. *Different capital letters indicate significant differences ($p < 0.05$) between samples. *Different lowercase letters indicate significant differences ($p < 0.05$) in the same sample between the analyzed days.

In relation to color, although cheeses presented smaller values for L^* (Table 2) than those already reported in the literature (QUEIROGA et al., 2013), the treatments still presented high luminosity, with predominance of the yellow component of b^* and less influence of the green component a^*. Thus, it can be inferred that the component b^* was the parameter that contributed the most to the color of the cheeses. The lowest values of L^* may be due to the higher values of b^*, which when positive reflects the yellow color. Its increase may be related to the occurrence of

proteolysis and the darkening reaction of polyphenolic compounds in the raw material composition of alcoholic beverages, which may decrease lightness (AZEREDO, 2012). This fact can be explained by seasoning with beverages containing polyphenolic compounds, mainly cocoa honey liquor (T02), as the antioxidant potential of cocoa is already widely highlighted in the literature due to its content in polyphenolic compounds (EFRAIM et al., 2011). Thus, during the storage period proteolysis and the darkening reaction can occur, resulting in lower values of L* and greater of b*, as observed in Table 2.

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Table 2. Instrumental color and texture results of goat Coalho cheeses throughout the maturation and storage period.

		Maturation and storage period								
Param	**Treatment**	**0 MAT**	**5 MAT**	**0 STO**	**10 STO**	**20 STO**	**30 STO**	**40 STO**	**50 STO**	**60 STO**
*L**	Control	85.55 ± 0.62^{A,a}	83.66 ± 2.13$^{A, a}$	83.90 ± 0.92$^{A, a}$	78.56 ± 5.88$^{A, a, b}$	79.84 ± 3.82$^{A, a, b}$	79.78 ± 3.41$^{A, a, b}$	77.95 ± 2.70$^{A, b}$	76.18 ± 2.91$^{A, b}$	74.87 ± 1.21$^{A, b}$
	T01	83.23 ± 3.25$^{A, a}$	86.32 ± 0.85$^{A, a}$	83.83 ± 0.73$^{A, a}$	76.06 ± 5.94$^{A, a, b}$	76.97 ± 9.59$^{A, a, b}$	76.88 ± 9.75$^{A, a, b}$	67.56 ± 5.00$^{B, b}$	74.46 ± 5.43$^{A, a, b}$	75.57 ± 3.58$^{A, a, b}$
	T02	84.87 ± 1.45$^{A, a}$	85.00 ± 0.38$^{A, a}$	84.19 ± 0.87$^{A, a, b}$	76.60 ± 6.65$^{A, a, b}$	79.71 ± 6.50$^{A, a, b}$	75.06 ± 9.28$^{A, a, b}$	78.84 ± 5.96$^{A, a, b}$	71.30 ± 6.80$^{A, b}$	71.75 ± 3.89$^{A, b}$
	T03	80.69 ± 6.25$^{A, a}$	84.90 ± 0.61$^{A, a}$	84.10 ± 1.65$^{A, a}$	80.89 ± 4.36$^{A, a}$	83.67 ± 0.52$^{A, a}$	79.09 ± 3.73$^{A, a}$	77.86 ± 2.50$^{A, a}$	76.78 ± 2.45$^{A, a}$	77.31 ± 2.34$^{A, a}$
	T04	85.95 ± 0.55$^{A, a}$	86.00 ± 0.94$^{A, a}$	83.22 ± 2.62$^{A, a}$	NE	NE	NE	NE	NE	NE
*a**	Control	-3.58 ± 0.18$^{A, a}$	-2.38 ± 1.10$^{A, a, b}$	-3.31 ± 0.36$^{A, a}$	-1.86 ± 1.58$^{A, a, b}$	-2.64 ± 0.76$^{A, a, b}$	-1.58 ± 0.80$^{A, b}$	-1.28 ± 0.58$^{A, b}$	-1.17 ± 0.88$^{A, b}$	-0.72 ± 0.27$^{A, b}$
	T01	-1.61 ± 1.32$^{A, a, b}$	-2.94 ± 0.18$^{A, a, b}$	-3.10 ± 0.64$^{A, a}$	1.64 ± 2.60$^{A, a, b}$	-0.33 ± 3.05$^{A, a, b}$	-0.04 ± 3.17$^{A, a, b}$	2.51 ± 3.10$^{A, b}$	1.02 ± 2.55$^{A, B, a, b}$	0.12 ± 1.77$^{A, a, b}$
	T02	-2.98 ± 0.63$^{A, a, b}$	-3.23 ± 0.24$^{A, a}$	-3.01 ± 0.43$^{A, a}$	0.80 ± 4.80$^{A, a, b}$	-0.36 ± 2.73$^{A, a, b}$	2.90 ± 5.70$^{A, a, b}$	0.02 ± 2.66$^{A, a, b}$	6.03 ± 4.53$^{B, b}$	4.05 ± 2.59$^{B, a, b}$
	T03	-2.37 ± 1.35$^{A, a, b}$	-3.27 ± 0.67$^{A, a}$	-2.74 ± 0.42$^{A, a, b}$	-1.83 ± 1.35$^{A, a, b}$	-3.12 ± 0.46$^{A, a, b}$	-0.94 ± 1.04$^{A, b}$	-0.53 ± 0.28$^{A, b}$	-0.96 ± 1.27$^{A, b}$	-0.46 ± 0.,95$^{A, b}$
	T04	-3.20 ± 0.32$^{A, a}$	-3.25 ± 0.45$^{A, a}$	-2.82 ± 0.78$^{A, a}$	NE	NE	NE	NE	NE	NE
*b**	Control	12.76 ± 0.57$^{A, a}$	13.65 ± 1.97$^{A, a}$	12.92 ± 0.97$^{A, a}$	14.91 ± 2.01$^{A, a}$	16.98 ± 3.62$^{A, a, b}$	17.23 ± 1.82$^{A, a, b}$	16.88 ± 1.79$^{A, a, b}$	20.58 ± 3.47$^{A, b, c}$	22.72 ± 0.85$^{A, c}$
	T01	16.55 ± 4.09$^{A, a}$	11.46 ± 0.78$^{A, a}$	11.89 ± 0.90$^{A, a}$	20.38 ± 5.16$^{A, a}$	17.65 ± 6.28$^{A, a}$	21.19 ± 10.47$^{A, a}$	22.96 ± 8.20$^{A, a}$	21.00 ± 4.06$^{A, a}$	21.95 ± 3.78$^{A, a}$
	T02	13.78 ± 1.55$^{A, a, b}$	11.39 ± 0.54$^{A, a}$	11.79 ± 0.61$^{A, a}$	19.46 ± 6.58^{A,a,b,c}	18.68 ± 6.22^{A,a,b,c}	23.61 ± 8.82$^{A, b}$	17.97 ± 4.08^{A,a,b,c}	27.64 ± 5.69$^{A, b, c}$	28.14 ± 2.93$^{A, b, c}$
	T03	16.67 ± 4.89$^{A, a, b}$	12.96 ± 2.92$^{A, a}$	13.43 ± 1.69$^{A, a, b}$	16.37 ± 3.54$^{A, a, b}$	13.69 ± 0.28$^{A, a}$	19.44 ± 3.16$^{A, a, b}$	19.30 ± 1.33$^{A, a, b}$	22.42 ± 3.56$^{A, b}$	22.86 ± 2.68$^{A, b}$
	T04	14.06 ± 1.05$^{A, a}$	11.79 ± 0.59$^{A, b}$	13.26 ± 1.27$^{A, a, b}$	NE	NE	NE	NE	NE	NE
H (g)			1724.51 ±		519.85 ± 91.15^{A,}	407.56 ± 72.02^{A,}				
	Control	360.54 ± 49.84$^{A, a}$	1625.96^{A,b}	327.83 ± 33.39$^{A, a}$	^{a}	^{a}	438.07 ± 105.08$^{A, a}$	212.94 ± 42.09$^{A, a}$	314.29 ± 81.32$^{A, a}$	228.65 ± 57.88$^{A, a}$
	T01	810.79 ± 408.28^{B,} ^{a,c}	596.91 ± 64.34^{B,a,b,} ^{b}	527.75 ± 104.82^{B,}	761.63 ± 84.97$^{B, c}$	510.73 ± 63.07^{B,} ^{a,b}	666.77 ± 76.40^{B}	583.09 ± 124.21^{B}	649.67 ± 260.96^{B}	451.66 ± 69.04$^{B, a,}$ ^{b}
	T02	462.41 ± 123.13^{A,} ^{a}	439.38 ± 114.19$^{A, a}$	539.29 ± 53.39$^{B, a}$	505.25 ± 130.75$^{A, a}$	276.02 ± 39.72^{C,} ^{b}	412.47 ± 149.28$^{C, a,}$ ^{b}	409.41 ± 37.33$^{C, a,}$ $^{b, c}$	376.75 ± 72.54^{A,} $^{a, b, c}$	213.79 ± 38.24^{A,} $^{C, c}$
	T03	406.51 ± 73.58$^{A, a}$	352.08 ± 81.68$^{A, a}$	366.47 ± 20.82$^{A, a,}$ ^{c}	384.65 ± 51.96^{C,} $^{a, c}$	282.83 ± 38.10^{C,} $^{b, c}$	285.57 ± 50.85$^{A, b}$	238.96 ± 45.53$^{A, b}$	250.40 ± 49.85$^{A, b}$	147.25 ± 57.97$^{C, b}$
	T04	357.81 ± 60.12$^{A, a}$	304.37 ± 35.06$^{A, b}$	230.93 ± 19.29$^{C, c}$	NE	NE	NE	NE	NE	NE
S	Control	0.95 ± 0.04$^{A, a}$	1.35 ± 0.44$^{A, b}$	0.94 ± 0.04$^{A, a}$	0.97 ± 0.05$^{A, a}$	0.99 ± 0.02$^{A, a}$	0.98 ± 0.02$^{A, a}$	1.00 ± 0.01$^{A, C, a}$	1.04 ± 0.05$^{A, a}$	1.00 ± 0.00$^{A, a}$
	T01	0.96 ± 0.03$^{A, a, c}$	1.04 ± 0.20$^{A, B, a, c}$	0.95 ± 0.01$^{A, a, c}$	1.37 ± 0.45$^{B, b, c}$	0.99 ± 0.07$^{A, a}$	0.99 ± 0.03$^{A, a}$	0.93 ± 0.01$^{B, a}$	1.39 ± 0.50$^{B, a, c}$	1.03 ± 0.07$^{A, a, c}$
	T02	0.97 ± 0.02$^{A, a, b}$	0.99 ± 0.04$^{B, a, b}$	0.94 ± 0.02$^{A, a}$	1.00 ± 0.06$^{A, a, b}$	0.96 ± 0.02$^{A, a, b}$	1.12 ± 0.26$^{A, a}$	0.97 ± 0.05$^{A, a}$	1.05 ± 0.11$^{A, B, a, b}$	1.00 ± 0.04$^{A, a, b}$
	T03	0.95 ± 0.04$^{A, a}$	0.96 ± 0.04$^{B, a}$	1.03 ± 0.31$^{A, a}$	1.09 ± 0.33$^{A, B, a}$	1.02 ± 0.12$^{A, a}$	1.03 ± 0.05$^{A, a}$	1.02 ± 0.07$^{C, a}$	1.01 ± 0.06$^{A, a}$	1.07 ± 0.24$^{A, a}$
	T04	1.06 ± 0.36$^{A, a}$	0.99 ± 0.07$^{B, a}$	0.99 ± 0.01$^{A, a}$	NE	NE	NE	NE	NE	NE

*Different capital letters indicate significant differences (p <0.05) between samples. *Different lowercase letters indicate significant differences (p <0.05) in the same sample between the analyzed days. Param= Parameters; L*= Lightness; a* = Green / red componente; b* = Yellow / blue componente; H=Hardness; S=Springiness; Ch=Chewiness; T01 = cheese with cachaça; T02 = cheese with cocoa honey liquor; T03 = cheese with mead; T04 = cheese with beer; MAT = Maturation; STO = Storage; MAT= Maturation; NE= Not Evaluted

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Continuation Table 2. Instrumental color and texture results of goat Coalho cheeses throughout the maturation and storage period.

		Maturation and storage period								
Param	**Treatment**	**0 MAT**	**5 MAT**	**0 STO**	**10 STO**	**20 STO**	**30 STO**	**40 STO**	**50 STO**	**60 STO**
Ch	Control	178.82 ± 22.27$^{A, a}$	1336.57 ± 1687.87^{A,b}	144.80 ± 20,87$^{A, a}$	291.07 ± 61.86$^{A, a}$	216.79 ± 45.19$^{A, a}$	235.97 ± 84.75$^{A, B, a}$	124.00 ± 24.16$^{A, a}$	211.70 ± 84.54$^{A, a}$	126.52 ± 31.88$^{A, a}$
	T01	359.96 ± 144.99$^{B, a}$	295.64 ± 98.16$^{B, a}$	222.79 ± 34,36$^{B, a}$	556.05 ± 245.18$^{B, b}$	231.14 ± 20.69$^{A, a}$	308.98 ± 52.25$^{A, a}$	271.50 ± 60.36$^{B, a}$	425.91 ± 238.38$^{B, a}$	243.07 ± 41.21$^{B, a}$
	T02	227.07 ± 66.97$^{A, a}$	210.60 ± 53.32$^{B, a}$	247.22 ± 50,51$^{B, a}$	272.48 ± 50.36$^{A, a}$	158.43 ± 18.02$^{B, b}$	264.79 ± 95.76$^{A, B,a}$	229.01 ± 22.06$^{B, a}$	226.65 ± 64.40$^{A, a}$	132.59 ± 26.77$^{A, b}$
	T03	194.38 ± 33.51$^{A, a}$	160.83 ± 31.60$^{B, a}$	184.43 ± 60,22$^{A, B, a}$	219.54 ± 80.79$^{A, a}$	161.69 ± 24.06$^{B, a}$	170.37 ± 31.23$^{B, a}$	145.29 ± 25.26$^{A, a}$	157.45 ± 35.08$^{A, a}$	92.83 ± 35.27$^{A, b}$
	T04	194.55 ± 85.06$^{A, a}$	157.02 ± 20.21$^{B, a, b}$	122.75 ± 11,33$^{A, b}$	NE	NE	NE	NE	NE	NE

*Different capital letters indicate significant differences ($p < 0.05$) between samples. *Different lowercase letters indicate significant differences ($p < 0.05$) in the same sample between the analyzed days. Param= Parameters; L*= Lightness; a* = Green / red componente; b* = Yellow / blue componente; H=Hardness; S=Springiness; Ch=Chewiness; T01 = cheese with cachaça; T02 = cheese with cocoa honey liquor; T03 = cheese with mead; T04 = cheese with beer; MAT = Maturation; STO = Storage; MAT= Maturation; NE= Not Evaluted

Among the attributes analyzed by the texture profile, the hardness was the one that varied the most during the storage period, especially the samples T03 and T04 (Table 3). For these cheeses, it is assumed that the behavior observed may be due to the lipolysis that could be occurring, mainly because it has the highest percentage of FMDE, accentuated by the deterioration that the sample T04 suffered. The cheeses with higher fat contents tend to have the lowest values of hardness and chewiness (HEKKEN et al., 2013), as they present lower resistance to deformation. The sample T01 was the treatment that had higher strength because it presented higher hardness and chewiness.

3.2 BACTERIOLOGICAL ANALYZES OF GOAT COALHO CHEESES

The LAB counts obtained (Figure 1B) showed a significant difference between the seasonings used and the storage period. This behavior can be explained by the alcohol content of the beverages used for seasoning, especially in the initial viability of lactic acid bacteria. In addition, the seasoning moment may have been responsible for this initial behavior of the LABs, since it may not have reached sufficient concentration for observation in the initial period.

4 CONCLUSIONS

It can be concluded that it is possible to develop a seasoning technology for goat Coalho cheese with alcoholic beverages, however, it is necessary to check other processing moments of the cheeses for seasoning, as well as the pressing time to reduce moisture and predisposition to deterioration. Alcoholic beverages influenced significantly the physicochemical (fat and moisture) and instrumental characteristics (pH, color and texture), as well as the initial LAB counts, on day 0 of maturation, making them viable only on the fifth day of maturation. Modification in pressing time and seasoning technology is necessary to promote more intense syneresis and less possibility of deterioration such as after a few days of ripening. The pressing may occur for a minimum time of 4 hours and seasoning after at least 3 days of maturation.

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DECLARATION OF CONFLICTING INTERESTS

The authors declare that there was no conflict of interest during the research.

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