



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of  
DEVELOPMENT RESEARCH

International Journal of Development Research  
Vol. 5, Issue, 01, pp. 2966-2969, January, 2015

### Full Length Research Article

## MICROBIOLOGY OF GOAT'S MILK IN BRAZIL SEMIARID

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#### ARTICLE INFO

##### Article History:

Received 05<sup>th</sup> October, 2014  
Received in revised form  
26<sup>th</sup> November, 2014  
Accepted 31<sup>st</sup> December, 2014  
Published online 26<sup>th</sup> January, 2015

##### Key words:

Goat Milk,  
Asepsis,  
Quality Consumption.

#### ABSTRACT

This work was developed in the semiarid region of São José da Tapera, in the state of Alagoas, Brazil, in order to assess the quality of goat milk in two communities: Settlement Mocambo and Settlement Selma Bandeira. Milk were analyzed in 74 goats that survive under extensive management in the Caatinga. All animals were Brown Alpine breed. Microbiological analyzes were performed at the Microbiology Laboratory of the Veterinary School of the Federal University of Alagoas. Among the pathogens found in goat's milk in natura, were characterized as the most frequents *Staphylococcus* sp and *Micrococcus* sp.

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#### INTRODUCTION

Goat's milk is a food with high nutritional value, which has been for centuries recommended for people suffering from digestive problems and whom can't tolerate cow's milk. Consequently, its importance has resulted in increased milk production and together with a concern for the quality of marketed milk, which requires control of the factors that can change its physical and chemical characteristics. The main one is mastitis. Mastitis usually caused by the presence of microorganisms, very frequent in dairy cattle production. Results from inflammation of the mammary gland, due to the presence of microorganisms altering milk composition which promotes increases in somatic cells in the milk from infected animals (Langoni *et al.*, 2006). General foods are sources of nutrients for microorganisms; therefore, the development of colonies of microorganisms in various foods becomes constant. Milk as one of most important food, likewise, may be a substrate for the development of different groups of microorganisms, including pathogens that cause very injury to the public health (Riedel, 2005).

Also according to Riedel (2005), obtaining the hygienic milk is of paramount importance, even when it is intended to pasteurization, as highly contaminated milk loses some of its nutritional value, because the microorganisms already used these components, leaving only the products of their metabolism. To Germano (2001), on the farm, milking is one of the critical points of greatest relevance to the animals, is a serious threat to the overall quality of milk, because it fails hygiene, ill-suited equipment, and even the staff, cause injuries in the mammary gland, may have led to invasion by pathogens causing infectious diseases, which led to economic losses to the farmer and the dairy industry in general.

The mastitis can be caused by various microorganisms, particularly *Streptococcus* sp and *Staphylococcus* sp and for determining the occurrence, becomes necessary, to conduct tests on blood agar culture media (Riedel, 2005). Although the UHT (Ultra High Temperature) treatment eliminate the vegetative forms of microorganisms present in milk, sporulated forms highly resistant to heat (highly heat resistant spores - HHRS) may remain and come to the product due to the precarious conditions of obtaining the raw material (Schocken-Iturrino *et al.*, 1996). This study aimed to identify the most frequent microorganisms in the infection of the mammary glands of Alagoas semiarid goats, with views to the

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attention of the main microorganisms causing subclinical mastitis, as a basis for control methodologies and reduction in economic losses to milk producers of milk.

## MATERIALS AND METHODS

### Experiment development location

Microbiologically was rated the quality of goat milk belonging to farmers in two settlements in the state of Alagoas, Brazil. Settlement Mocambo which had reared goats in an area of 600 ha, the animals were subjected to management extensively in the Caatinga, in São José da Tapera, 260 km from the Alagoas capital, Maceió, with 400 animals flock and settlement Selma Bandeira, in the same city, consisting of 300 animals in semi extensive rearing in the Caatinga, All animals were Brown Alpine breed.

### Sample

At Mocambo settlement, 44 milk samples were taken from goats, varying in age and lactation period. In Settlement Selma Bandeira there were included 30 goats in a total of 30 milk samples. The animals were randomly selected in the herd, in both settlements. Milk samples were collected after cleaning of the ostium of the two ceilings of each goat, washed with water and mild detergent and after lean with paper towels. Mixed sample of the two ceilings were used for making a single sample per animal, then added with alcohol 70°GL in sterile vials, and tubes were stored in insulated boxes under cooling in ice. Microbiological analyzes were performed at the Microbiology Laboratory of the Veterinary School of the Federal University of Alagoas.

### Processing of samples

The milk was seeded in Petri dishes containing agar base with sheep blood to 10% and on Sabouraud agar, with platinum handle aid and exhaustion of the clinical material in the culture media. Then the seeded plates were incubated in bacteriological incubator at 37 ° C for 72 hours, the reading being performed every 24 hours. Thereafter, growth of bacterial colonies, were identified according to their macroscopic characteristics Gram staining and phenotypic profile by using biochemical assays (Konemam *et al.*, 2001).

## RESULTS AND DISCUSSION

Of the 44 samples analyzed in the Mocambo Settlement, 08 samples showed microbiological growth, and the most frequent microorganisms were *Staphylococcus sp* (9.09%), as shown in Table 1.1 and features of Colony Forming Units in Figures 1.1 and 1.2. In the Settlement Selma Bandeira, the result of microbiological analysis showed the *Micrococcus sp* in 20% of samples; followed by with 13% of *Staphylococcus sp* gender and equal percentage of 6% of the genders *Candida sp*, *Corynebacterium sp* and the association of *Staphylococcus sp* and *Micrococcus sp* as shown in Table 01. Albuquerque (2008), in a study in Senhor do Bonfim region, Bahia, isolated bacteria in goat milk (n = 17), lying between the contaminants *Staphylococcus sp* 47.05%, *Micrococcus sp* 36.30% and *Corynebacterium sp* 11.85%. Results with higher rates to those found in this work, but confirming the prevalence of

*Staphylococcus sp* as one of the main causes of subclinical mastitis in goats. Langoni *et al.* (2006) examined 124 samples of goat milk, from 62 lactating Saanen, Alpine and Pardo Toggenbourg goats with subclinical mastitis in Botucatu, São Paulo. In pure culture the authors found predominance of *Staphylococcus epidermidis* with 55%, 12.8% with *Staphylococcus aureus* and *Streptococcus agalactiae* with 10.1%, similar to what we have found, and *Candida albicans* with 6.4%, *Corynebacterium bovis* with 5.5%, *Pasteurella multocida*, 4.6% and in smaller percentages *Bacillus spp* 2.8%, *Escherichia coli*, 1.8% and finally with 1.0% *Acinetobacter calcoaceticus*.



Figure 1.1. Colony forming units of *Staphylococcus sp* in sheep blood agar, Mocambo Settlement

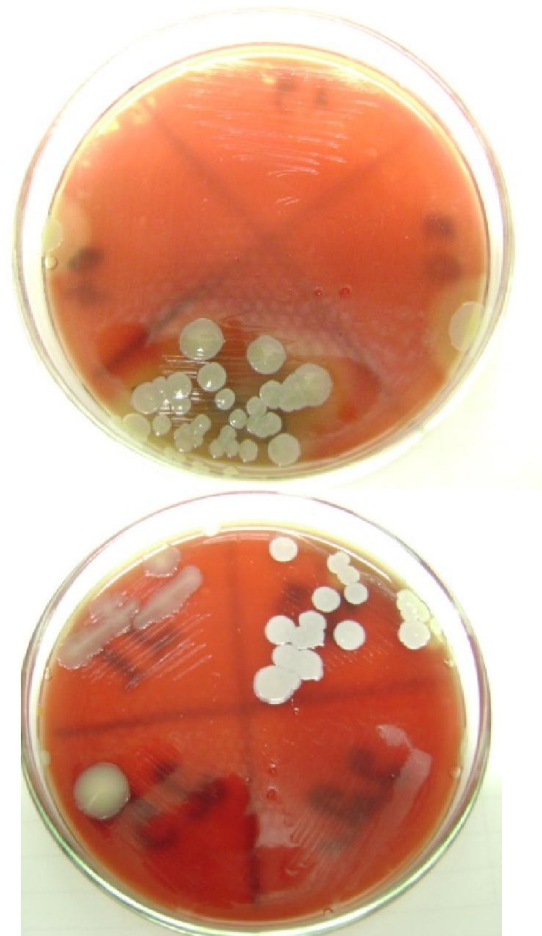


Figure 1.2. Forming units of *Staphylococcus sp* colonies. agar sheep blood Settlement Selma Brandeira

**Table 1. Frequency Apparent (FA) and Relative Frequency (RF) as a percentage of isolated goat milk microorganisms in nature in Mocambo Settlements (n = 44) and Selma Bandeira (n = 30), São José da Tapera, Alagoas, Brazil**

Microorganisms	Settlements			
	Mocambo		Selma Bandeira	
	F.A.	F.R.(%)	F.A.	F.R.(%)
<i>Staphylococcus</i> sp	4	9,09	4	13,33
<i>Streptococcus</i> sp.	1	2,27	-	-
<i>Pasteurellasp</i>	1	2,27	-	-
<i>Staphylococcus</i> sp + <i>Corynebacterium</i> sp	1	2,27	-	-
<i>Staphylococcus</i> sp. + <i>Streptococcus</i> sp	1	2,27	-	-
<i>Micrococcus</i> sp	-	-	6	20,00
<i>Candidasp</i>	-	-	2	6,66
<i>Corynebacterium</i> sp	-	-	2	6,66
<i>Staphylococcus</i> sp + <i>Micrococcus</i> sp	-	-	2	6,66
Negativo	36	81,83	14	46,69
TOTAL	44	100,00	30	100,00

Brito *et al.* (1998) in a study of 13 different herds obtained similar results with bovine milk, from collections in bulk tanks where more than 70% of milk contaminants were with *Staphylococcus aureus* and *Streptococcus agalactiae*. In microorganisms associations, Langoni *et al.* (2006) found in goat milk samples *Staphylococcus epidermidis* + *Streptococcus agalactiae* with + 40% of cases, *Staphylococcus epidermidis* + *Bacillus* spp, *Staphylococcus epidermidis* and *Staphylococcus epidermidis*+*Corynebacterium*+*Corynebacteriumbovis* had all three of 13.3% relative frequency. In smaller percentages occurred *Staphylococcus aureus*+*Corynebacteriumbovis* +, *Corynebacteriumbovis* + *Streptococcus agalactiae* and *Staphylococcus aureus*, *Streptococcus agalactiae* and *Acinetobactercalcoaceticus* all three with 6.7%. Wilson (1977), already showed in their study in two dairy companies of São Paulo Basin, there is growth of bacteria in the path between the production and the plant. The milk was strongly contaminated with *Staphylococcus aureus*, contaminated with enterotoxigenic strains, thermostable toxins, which can cause damage to the consumer; failures in the industry further aggravate the problem.

Raw milk and also UHT (Ultra High Temperature) milk, present possibilities for contamination; Even with pasteurization there are possibilities of these microorganisms remain present, as stated by Vittori *et al.* (2008), evaluating the microbiological quality of goat milk after UHT treatments in the South and Southeast regions of Brazil. The authors noted the presence of mesophilic bacteria in 21 of 100 samples studied, and it was mentioned that the term "sterilized milk" used by the industry has confused consumers who believes is the milk "sterile", leading to increased consumption by a longer shelf life and practicality. *Bacillus* sp and *Staphylococcus* sp was isolated in 32% and 36% respectively of the samples which demonstrates that the heat treatment known as UHT treatment milk usually called "long life" in which at the end of heating the temperature is from 130 to 150 °C for 2 to 4 seconds, followed by cooling at temperatures below 32 °C and packed in aseptic packages may still persists pathogens. Schalm and Noorlander (1957), found in pure culture 55% (60) with *Staphylococcus epidermidis*, and 12.8% (14) *Staphylococcus aureus*, adding to the two species obtained 67.8% with *Staphylococcus*, higher value to this work found that 50% (4) of pure culture samples with the same microorganism in the Settlement Mocambo. Langoni (2006) similarly found in their samples of microorganisms

*Staphylococcus epidermidis* organisms associations *Corynebacteriumbovis* + 13.3%, equivalent results in this respect microorganisms associations. The same found different number and higher isolated microorganism association between *Staphylococcus epidermidis* + *Streptococcus agalactiae* 40% (06), which exceeds the amount of this association in this study, among *Staphylococcus sp* + *Streptococcus* sp, which would amount to 12, 5% (1). Poiatti *et al.* (2005), from April to October 2000 underwent microbiological tests on 255 samples of goat milk in various stages of processing, such as in natura (4 °C), pasteurized (63.5 °C for 30 min) and frozen ready to eat (-15 °C / 6 h in distribution conditions). The milk was from three dairy farms in the state of Sao Paulo, Brazil and the analysis were performed at FCAV-UNESP, São Paulo, Brazil.

The results from Poiatti *et al.* (2005) showed that of the 255 samples analyzed, 85.8% (73) of fresh milk, 37.6% (32) of pasteurized milk and 21.2% (18) of frozen milk showed the presence of *Staphylococcus* sp and further, following biochemical tests, 27.1% of fresh milk samples showed positive coagulase *Staphylococcus* 13% of pasteurized frozen and 4.3%, and 63.7% corresponds to coagulase negative. Langoni *et al.* (2006), in their study did not record the presence of *Micrococcus*, the external side of the ceiling bacteria, outer skin of the roof, not pathogenic. Murici *et al.* (2002) *Micrococcus* observed at 2.5% as a result below this job where the universe of samples 30 20% (6) exhibited their presence. Murici *et al.* (2002), Langoni *et al.* (2006), Ribeiro (1998), this study corroborate placing *Staphylococcus* organism as the most important in the prevalence of mastitis in dairy goats. Settlement in Selma Bandeira the incidence of *Micrococcus* was very high 37.5% (6) on the positive results and *Staphylococcus* 25% (4), secondly, shows that this pathogenic microorganism has a lot more importance on the other, which should be devoted more time to study their survival characteristics in the semiarid Alagoas, Brazil.

## Conclusions

In both communities, where quality of goat milk were studied pathogens were found contaminating the milk. Settlement Mocambo 18.18% and 53.33% Settlement Selma Bandeira milk were contaminated after direct sampling in the ceilings of animals. The tainted milk could turn out to cause harm to public health when in use for human consumption, with

effective contamination arising from the raw material, even if pasteurized, being necessary sanitary control of animals.

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