

Characterization Goat Milk Cheeses by Physicochemical Analyses

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Abstract: Up until now, the composition of goat's milk has not been well known. However, every day it is more and more evident that this milk is quite different from cows and other mammal's milk. This difference depends on a major concentration in some of milk elements. Caseins, in goat's milk are found in a minor concentration (their inner components have besides, different relative proportions). All these goat's milk qualities result in a different physicochemical composition which explains some of its characteristics and its very particular technological behaviour. They prevent also the associating goat's milk to cow's milk as it has been done until recently. The objective of this study is to determine the physicochemical composition quality of goat milk for its turn in flavored cheese. Indeed, goat's milk is a food interesting nutritional and dietary values.

Key words: Milk, goat, cheese, physicochemical, composition quality

INTRODUCTION

In recent years, consumers have become more interested in the general quality of foods. Most consumers are concerned not only about safety and nutritional value but also about health benefits (Saarela *et al.*, 2002). The food and agriculture organization defines food-related probiotics as living organisms that upon ingestion in certain numbers, exert health benefits to the consumer's health beyond inherent basic nutrition.

The local goat population represents an animal group raised since centuries in the Tunisian arid zone. The natural and human selection process oriented during long period this population to acquire a gene pool adapted towards range lands harsh environments and resources scarcities (Mabrouk *et al.*, 2007). Among the Tunisian national goat herd >60% of livestock was actually raised in arid zone where pastoral breeding contributes to regional economy (Mabrouk *et al.*, 2007). In fact, local goat remains as a rare genetic group able to valorise pastoral resources when other domestic species strive to survive (Najari, 2005).

The local goat pastoral herds have reduced production due mainly to the resources scarcities and the climatic negative impacts (Najari, 2005). Notwithstanding this relatively small overall impact, caprine productions play an essential part in certain difficult and marginal environments where they often represent one of the rare sources of high quality proteins (Sanchez-Blanco *et al.*, 2004). The main local breeds' production, under extensive mode is the kid's meat and milk is usually considered with secondary importance, especially in the herd cash flow (Najari, 2005).

Considering the survival and viability of probiotic cultures, fermented dairy products such as cheeses, yogurts and fermented milks are promising food delivery systems for these cultures. Cheese has been suggested as a better carrier of probiotic bacteria than other fermented milk products due to its pH, higher content of fat and solid consistency which offer greater protection to these microorganisms in the gastrointestinal tract (Ong *et al.*, 2006).

Currently, there is a lack of studies emphasizing the incorporation of probiotic cultures into goat cheese and the influence of probiotics on the quality parameters of the cheese during storage. Regarding these aspects, this study was performed with the main purpose of assessing the technological, physicochemical and sensory characteristics of goat cheese.

MATERIALS AND METHODS

Goat and cow milk were obtained from Arid Land Institute Medenine in Tunisia. Milk was collected from number of lactating animals. Then, samples stored in a refrigerator for subsequent processing. All chemicals and media used in this study were of reagent grade. In this research, researchers manufactures 3 types of cheese: fresh goat cheese, fresh goat cheese flavored with rosemary and fresh cow cheese (witness). The cheese manufacturing fresh pasta following manufacturing steps following: preparation of milk, pasteurization of milk, aromatization, seeding, milk coagulation, molding, drainage, stripping, salting and soak.

Gross composition: pH, MS, Na, K, Ca and Mg of 3 types of cheese were determined.

Table 1: Gross composition of cheese

Chemical contents	Cheese goat with		
	Cheese goat	<i>Rosmarinus officinalis</i>	Cheese cow
pH	6.33	6.40	5.38
MS (g kg ⁻¹)	339.10	348.00	367.00
Na (mg/100 g)	82.42	138.40	118.21
K (mg/100 g)	33.17	80.24	21.18
Ca (mg/100 g)	119.11	167.42	126.02
Mg (mg/100 g)	9.80	19.01	7.48

RESULTS AND DISCUSSION

Table 1 shows changes in pH, MS, Na, K, Ca and Mg of 3 types of cheese (cheese goat, cheese of goat with *Rosmarinus officinalis* and cheese of cow).

The important pH, Na, K, Ca and Mg is for cheese goat with aroma. The pH of goat cheese flavor is no less important than the pH of the cheese flavored with *Rosmarinus*. The pH indicator cheese (cow) is lower than other types of cheese, this may explain a greater development of the lactic flora or the degradation of lactose into lactic acid. Referring to other earlier research, it was found that these pH values are lower than that found for the goat cheese and soft cheese by Cassinello and Pereira (1999) with a value which is equal to 6.74. The results found (Table 1) showed significant levels of solids, this proves the richness of the cheese solids. Furthermore, these results show that the goat cheese flavoring *Rosmarinus officinalis* by increasing the content of dry matter with a rate of 9 g. The different results found. Table 1 shows that the content of phosphorus, potassium, magnesium and calcium is especially high so the cheese rich in minerals. As in the case of milk, the Ca content is higher in the cow's milk cheese in the cheese by goat against the Mg and K is higher in the goat cheese. By comparing the values found for the goat cheese with the following results: 94.1 mg/100 g for calcium, 11.7-355 mg/100 g magnesium and sodium for data Technical Institute Products dairy Goats in France in 2007, researchers find that n is not a big difference regarding the content of Ca and Mg against a much smaller value for sodium. From these results, researchers can see that the cheese flavoring rosemary induced by increasing the mineral content and thus improve the nutritional quality of the cheese.

CONCLUSION

Simple technology has been implemented for cheese making and the creation of a new product that is goat cheese flavored *Rosmarinus officinalis*. The physicochemical analysis of cheese showed that the composition is not significantly altered by the addition of rosmarin. Finally, this research was a first approach to the valuation of goat milk in cheese making.

REFERENCES

- Cassinello, J. and S. Pereira, 1999. La qualite du lait et du fromage dans cinq exploitation caprines de la Serra do Caldeirao. Direccao Regional of Agricultura do Algarve Portugal, pp: 157-161.
- Mabrouk, O., G. Amor, A. Mouldi and N. Sghaier, 2007. DNA polymorphisms of casein genes in local goat's population in the Southern Tunisia. *Int. J. Dairy. Sci.*, 2: 356-363.
- Najari, S., 2005. Caracterisation zootechnique et genetique d'une population caprine. Cas de la population caprine locale des regions arides tunisiennes. Ph.D. Thesis, Tunisian National Agronomy Institute.
- Ong, L., A. Henriksson and N.P. Shah, 2006. Development of probiotic Cheddar cheese containing *Lactobacillus acidophilus*, *L. casei*, *L. paracasei* and *Bifidobacterium* sp. and the influence of these bacteria on proteolytic patterns and production of organic acid. *Int. Dairy J.*, 16: 446-456.
- Saarela, M., L. Lahteenmaki, R. Crittenden, S. Salminen and T. Mattila-Sandholm, 2002. Gut bacteria and health foods-the European perspective. *Int. J. Food Microbiol.*, 78: 99-117.
- Sanchez-Blanco, J.M., T. Ferrandezl and M.A. Morales, 2004. Variations in water status, gas exchange and growth in *Rosmarinus officinalis* plants infected with *Glomus deserticola* under drought conditions. *J. Plant Physiol.*, 161: 675-682.