



Original Research Article

Study of authentic cheeses manufactured from local goat milk in Tunisian arid land

Amor Gaddour^{1*}, Sghaier Najari¹, Samira Aroum² and Mouldi Abdennebi¹

¹Institute of Arid Regions, Medenine, Tunisia- 4119

²University of Gabes livestock and wildlife laboratory, Tunisia

*Corresponding author e-mail: gaddour.omar@yahoo.fr

ABSTRACT

Keywords

Milk;
Goat;
Cheese;
physico-
chemical.

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, our 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.

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 (FAO, 2001).

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 (Ouni *et al.*, 2007). Among the Tunisian national goat herd, more than 60% of livestock was actually raised in arid zone where pastoral breeding contributes to regional economy (Ouni *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 (Jesus *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 work, we manufacture three 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 three types of cheese were determined.

Results and Discussion

The table 1 shows changes in pH, MS, Na, K, Ca and Mg of three 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*. 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 work, it was found that these pH values are lower than that found for the goat cheese and soft cheese by Cassinello *et al.*, (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.

Table.1 Gross composition of cheese.

Parameters	Cheese goat	Cheese goat with <i>Rosmarinus officinalis</i>	Cheese cow
pH	6.33	6.4	5.38
M S (g/kg)	339.1	348	367
Na (mg/100g)	82.42	138.4	118.21
K (mg/100g)	33.17	80.24	21.18
Ca (mg/100g)	119.11	167.42	126.02
Mg (mg/100g)	9.8	19.01	7.48

The different results found (Table 1) show 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/100g for calcium, 11.7 mg/100 g to 355 mg/100 g Magnesium and sodium for data Technical Institute Products dairy Goats in France (2007), we 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, we can see that the cheese flavoring rosemary induced by increasing the mineral content and thus improve the nutritional quality of the cheese. Simple technology has been implemented for cheese making and the creation of a new product that is goat cheese flavored *Rosmarinus officinalis*. The physico-chemical analysis of cheese showed that the composition is not significantly altered by the addition of "romarin". Finally, this work was a first approach to the valuation of goat milk in cheese making.

References

Cassinello J., and Pereira S., 1999. La qualité

du lait et du fromage dans cinq exploitation caprines de la Serra do Caldeirao, Direccao Regional of Agricultura do Algarve Portugal,157-161.

Najari S., 2005. Caractérisation zootechnique et génétique d'une population caprine. Cas de la population caprine locale des régions arides tunisiennes. Thèse de doctorat d'Etat. Institut National Agronomique, Tunisie, 214 p.

Jesus M Sanchez-Blanco, Trinitario Ferrandezl, and M Angeles 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.p675-682.

Ouni M., Najari S. and Gaddour A. 2007. DNA polymorphisms of caseines genes in local goat's population in southern of Tunisia. Inter. J. Dairy sci. 2 (4) 356-363.

Ong, L.; Henriksson, A. and Shah, N.P. 2006. Development of probiotic cheddar cheese containing *Lactobacillus acidophilus*, *Lb. casei*, *Lb. paracasei* and *Bifidobacterium* spp. and the influence of these bacteria on proteolytic patterns and production of organic acid. Inter. Dairy J. 16:446-456.

Saarela, M.; Lahteenmaki, L.; Crittenden, R.; Salminen, S. and Mattila-Sandholm, T. 2002. Gut bacteria and health food: the European perspective. Inter. J. Food Microbiol. 78:99-117.