

QUALITY OF LOCAL GOAT MILK DEPENDING ON THE SEASON

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INTRODUCTION

In the current targeting of nutrition a increasing extent to agricultural and food products with high nutritional and biological value need for food, especially animal grows increasingly more.

The assortment of dairy products in the world and especially in Moldova is diverse. Every year there are about eight thousand new food products, of which one third are dairy products. The basic problem of specialists and producers of food is to create the possibility of competition by high indicators of quality and safety of human health, to satisfy consumer demands and competitive price [1, 2, 3].

Milk is the main purpose for which goats are bred in Moldova. In this context the quality and milk production should be strengthened as a primary criterion for goat farms. [4,5].

Goat's milk is considered superior to cow's milk due to the effects of nutrients, toning and rickets, anemic and anti-infectives. It has specific taste and smell, pleasant, in case of maintenance and milking hygiene and proper feeding [4,5].

Goat milk is widely used for home consumption worldwide and used to produce different cheeses and yoghurt. There is much historical information about consuming goat milk. Herding of goats is thought to have evolved about 10.000 years ago in the mountains of Iran, making goats one of the oldest domesticated animals [6]. Goat milk, and the cheese made from it was venerated in ancient Egypt. [6] The top producers of goat milk in 2008 were India (4 million metric tons), Bangladesh (2.16 million metric tons) and the Sudan (1.47 metric tons.) [7]. The Mediterranean region produces 18% of the world's supply of goat milk [8]. According to information given by FAO [9], the goat is believed to be the first true livestock domesticated and world goat milk production reached 15.2 million tons most of it being used by households or families. Europe produces only 2.5% of the world goat milk, but it is the only continent where goat milk production has significant economic importance and organization [10].

The variation in the compositions of milk and the total yield of milk within a species depends on different factors. Some of these factors are

physiological factors, genetical factors and climatic (or precisely micro-climatic) factors. Some physiological factors are stage of lactation, age, udder health and type of diet. Daily variation and season changes can be taken as the climatic factors [8, 9]. Lactation periods as well as climatic conditions are generally termed as seasonal changes which have a great influence on the milk constituents.

Thanks to its nutritive, taste and dietetic values, goat's milk is recommended to children (above 8 months of age), allergy sufferers, elderly people and convalescents. Goat's milk is therefore considered the 21st century food, i.e. health-promoting or functional food [11].

The goal of the present study is to determine the general composition of local goat's milk and to find out the effect of seasonal variation on its constituents.

1. MATERIALS AND METHODS

1.1. Materials

Row goat milk, without added preservatives. Analyses were carried out in triplicate. Goat milk has been received from farms in the South, Center and North of Moldova, during lactation of 2016.

Sample 1 – goat milk received from farms in the North of Moldova.

Sample 2 –goat milk received from farms in the Center of Moldova.

Sample 3 –goat milk received from farms in the South of Moldova.

1.2. Methods

Sensory quality assessment based on the scoring ladder. Organoleptic assessment of each by comparison with ladders scoring 0 ...5 points and getting the group average score of tasters, (ISO 6658:2005)

$$P_{mp} = P_{mnp} \times f_p \quad (1)$$

where: P_{mnp} – unweighted average score;

f_p – weighting factor (shown as part of a total sensory characteristic sensory quality of the product).

$$P_{sp} = \sum P_{mp} \quad (2)$$

The process of chemical analysis of milk samples was based on standard methods. For the chemical analysis of milk Total dry matter (Mac 50/WH). Fat, butirometric method was used (GOST 5867). Protein in the milk samples was estimated using fresh neutralized formaldehyde. The pH value was measured by using digital pH meter (SevenGO SG2 ELK). Acidity was measured by titration method (GOST 3627) in terms of Thorner's degree. Density (GOST 3625), purity degree (GOST 8218).

2. RESULTS AND DISCUSSIONS

Milk and milk products are an important group of food products as they contain many different nutrients that are essential for normal growth and functioning of the body [11].

Goat's milk contains vitamins, minerals, trace elements, electrolytes, enzymes, proteins, and fatty acids that are easily assimilated by the body. Goat's milk has a similarity to human milk that is unmatched in cow milk and also has several medicinal values. In 1981, Le-Jaouen reported that goat's milk has similar vitamins contents of human milk except lower content of folic acid, Vit. C and Inositol [12]. With respect to its mineral composition, in general the levels measured of the principal elements, and the nutritional use made of them, show it to be of higher quality than cow milk (Moreno, 1995; Boza and Sanz Sampelayo, 1997; Haenlein, 2001; Campos et al., 2003) [13].

Taking into consideration the research conducted on the goat milk in different countries, a study of local goat milk properties would be welcome. Scientific studies have been conducted to samples of milk collected in the South, Central, North Moldova.

2.1. Organoleptic indices

Today, goat milk is of particular interest due to its specific composition, which has led to it being considered a high-quality raw material for manufacturing food for infants and the elderly, as well as for certain sectors of the population with particular needs (Haenlein, 1992, 1996, 2004; Boza and Sanz Sampelayo, 1997; Park, 2006) [13].

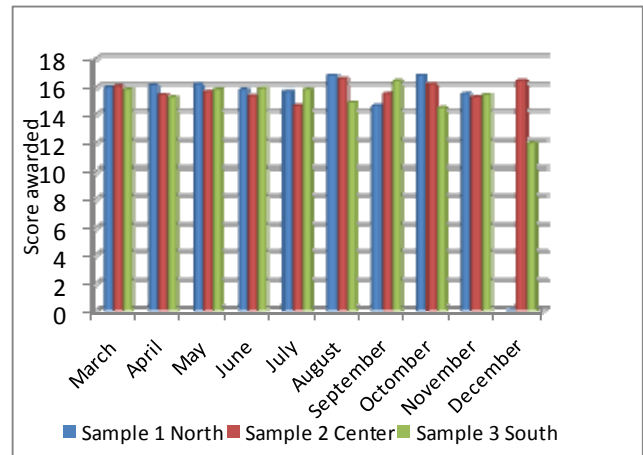


Figure 1. The score awarded sensory quality of goat milk depending on the season

Sensory Quality rating was carried out based on the scoring scale of 5 to 20 points. After evaluating the sensory quality level of food in 20 point system, all milk samples obtained during investigations qualifiers between 15-18 points, corresponding quality characteristics "GOOD" (figure 1.). Sensory quality of milk is characterized by goats forage quality and hygienic conditions of their maintenance, these indicators depend on the season. Respectively, proceeding from results obtained maximum values of milk collected in the center of Moldova and the lowest values it obtained the milk collected in the south.

2.2. Physico-chemical indices

Table 1, 2, 3 and 4 shows the chemical composition of the local goat milk.

Table 1. Goat milk physico-chemical indices received in spring months 2016.

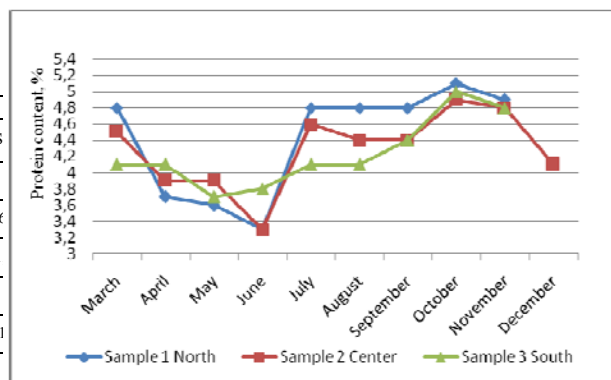
Physico-chemical indices	March			April			May		
	North	Center	South	North	Center	South	North	Center	South
Temperature, °C	21	20	21	21	20	22	21	21	21
pH	6,9	6,97	7,03	7,2	7,2	7,1	6,9	6,9	7,1
Density, g/cm ³	1,025	1,024	1,028	1,021	1,018	1,026	1,026	1,022	1,028
Titrate acidity, °T	19	19	19	19	19	18	19	19	19
Dry matter, %	12,3	12,6	13,2	12,0	12,0	12,8	11,4	12,0	10,8
Cleaning degree	I	I	I	I	II	I	I	I	I

The total solids content of milk is increasing starting June and have the highest values in the last period of lactation [14].

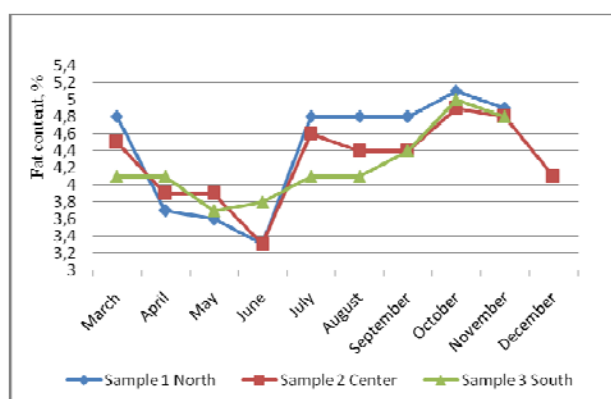
The titrate acidity and pH are usually milk quality indicators, but it can be affected by lactating, which dictates the chemical composition of milk.

Table 2. Goat milk physico-chemical indices received in summer months 2016

Physico-chemical indices	June			July			August		
	North	Center	South	North	Center	South	North	Center	South
Temperature, °C	19	21	20	20	19	19	20	19	19
pH	6,81	6,55	6,62	6,60	6,48	6,57	6,53	6,41	6,41
Density, g/cm ³	1,028	1,026	1,027	1,028	1,025	1,030	1,029	1,029	1,029
Titration acidity, °T	19	20	18	18	20	19	19	18	18
Dry matter, %	13,4	14,2	7,1	10,1	8,4	9,5	12,4	9,2	9,2
Cleaning degree	I	I	I	I	I	I	I	I	I

**Figure 2.** The values of protein content in goat milk depending on season and geographical area.**Table 3.** Goat milk physico-chemical indices received in the autumn months 2016

Physico-chemical indices	September			October		
	North	Center	South	North	Center	South
Temperature, °C	19	19	18	18	19	18
pH	6,53	6,73	6,91	6,63	6,72	6,84
Density, g/cm ³	1,030	1,031	1,030	1,030	1,029	1,030
Titration acidity, °T	18	20	19	20	19,5	18
Dry matter, %	16,11	11,14	13,75	16,29	14,31	15,23
Cleaning degree	I	I	I	I	I	I



* in December, the fat milk collected in the South did not separate because of high viscosity and change the composition of milk, normal effect in the last months of lactation.

Figure 3. The values of fat content in goat milk depending on season and geographical area.**Table 4.** Goat milk physico-chemical indices received in the autumn – winter months 2016

Physico-chemical indices	November			December		
	North	Center	South	North*	Center	South
Temperature, °C	19	18	19	-	18	18
pH	6,72	6,68	6,62	-	6,63	6,92
Density, g/cm ³	1,028	1,029	1,029	-	1,030	1,032
Titration acidity, °T	16	17	20	-	19	21
Dry matter, %	20,42	15,43	18,82	-	15,83	18,83
Cleaning degree	I	I	I	-	I	I

* December goat milk in the north was not collected because of the interruption lactation period (bad weather).

The special characteristics concerning the composition of goat milk, in terms of its principal nutrients, mean that the nutritional utilization of the latter is markedly higher than is the case with cow milk. Thus, the protein of goat milk is more digestible (Park, 1994; Boza and Sanz Sampelayo, 1997; Haenlein, 2001, 2004; Lopez-Aliaga et al. (2003), and at the same time it is more tolerable (i.e. less allergenic) (Bevilacqua et al., 2001; Lara-Villoslada et al., 2004; Sanz Ceballos, 2007). It was observed that the protein content of goat milk significantly affected due to season and the average protein decrease from march to April, but till summers month protein content is stable. Starting July there was an gradually increase in protein content increased (figure 2). The findings of present investigation are in agreement with Haenlein (2002).

Similarly, the fat of goat milk is more digestible (Alferrez et al., 2001; Haenlein, 2001), and it may be considered an excellent source of energy for use in various metabolic processes (Boza and Sanz Sampelayo, 1997; Sanz Ceballos, 2007) and even for combating metabolic diseases (Babayan, 1981; Garcí'a Unciti, 1996; Vela'zquez et al., 1996) [13]. According to table results, fat content was highest in march but in the following months decrease, and the lowest fat content was obtain in June, after what it began increase (figure 3). Effect of season and lactation showed significant differences on fat content of milk. The findings of present investigation are in agreement with Charnobai et al. (1999) and S.S.Bhosale et al. (2009) reported that the lactation period influenced the fat content of goat milk.

CONCLUSIONS

Milk is the main purpose for which goats are bred in Moldova. In this context the quality and milk production should be strengthened as a primary criterion for goat farms

Organoleptic indices determined for the local goat milk presented characteristics specific for full goat milk without deviations except milk collected in the South in April that were detected contaminants from feed.

Within the same species and breeds season has great influence in the milk composition. Collected milk in the first lactation period is rich in protein and fat, as these components decrease and since July there is a slow increase.

Raw milk characterization constitutes a preliminary and an important step to take account in order to obtain an optimal technological valorization. Among other factors, breed, feed and season or stage of lactation are the most important factors that influenced cheese making and other dairy products valorization.

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