

## COMPARATIVE EVALUATION OF SOMATIC CELLS LEVELS OF GOAT MILK FROM ALPINE AND CARPATHIAN BREEDS

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### Abstract

*Milk is considered the most complete aliment, being abundant in high quality nutritive substances. The composition of goat milk, as well as its quality, differs between breeds and living area. Milk somatic cells are an indicator of hygienic quality as well as of the health of the mammary gland. The research aims the comparative analysis of milk quality depending on breed, as well as mammary gland health, goats being selected out of a group of 60 raised and fed in identical conditions in a private farm in Cluj County, considered clinically healthy being at the second lactation. For the determination there have been analyzed individual samples of raw milk harvested during July-September 2014 from Alpine (n=10) and Carpathian (n=10) breeds goats, using an automatic device for somatic cells count of Fossomax type. Following the corroboration of data for 6 Alpine goats the number of somatic cells was over the maximum admitted limit (400000/ml milk), respectively 4 were under the limit. For the Carpathian breed 8 of them were between limits and only 2 went over this limit. The conclusion of this study highlights the acquired resistance of indigene breeds compared to imported ones.*

**Keywords:** goat milk quality, somatic cells

### INTRODUCTION

Caprins are usually growing in hilly and mountainous areas, often around urban places, grouped in small or large households (40-60 heads) and even in micro and specialized farms (Taftă, 2002). As Taftă appreciated in 2002, 70% of the goats of our country, belonged Carpathian race, and the remaining 30% of domestic or imported breeds. Carpathian goat herds, less improved, are still rustic, with relatively low milk production, but remarkably resistant to harsh living conditions. French Alpine is an improved breed, having a well-developed body with a very good yield at the milk and yeanelings production. Goat milk is an essential element for numerous diets used in the prevention and treatment of human diseases, is a complete balanced food containing protein, fat, carbohydrates, vitamins and minerals (Hanzen, 1994, Michel, 2001, Park et al., 2007, Ksontini et al., 2011). Milk quality is considered essential for the welfare and safety of consumers (Yadav, et al., 2014). Cell contents is also a major component of goat milk, somatic cells represents one of the most relevant parameters used to assess hygienic-sanitary breast health and hygienic quality of milk as a product for public consumption (Sabău and Rotaru, 2006).

In the case of cows, the determination of the total number of cells in milk, is one of the most widely used tests in detecting mastitis (Hicks et al., 1994, Ognean L., 2001). According to current research these tests proved to be relevant also in the case of caprins, both strategies in the prevention and combating mastitis.

In case of lactating mammary gland, the evoution of inflammatory processes causes a significant increase in the number of somatic cells in milk and significant changes in the relationship between cell populations. Such cytological developments may occur even at lactating secretions with organoleptic and physico-chemical less important changes. (Rotaru and Ognean 1998).

The counting of somatic cells in milk is used both to evaluate the quality of milk and to predict any udder infections (Poutrel and Rainard., 1981). Because of this apocrine secretion, a feature of goat milk is the presence of cellular debris, which make difficult to identify and count somatic cells, because these anucleate formations contain no DNA. Such acellular particles are normally found in goat milk, which complicates the evaluation of leukocyte response in breast inflammation. On the other hand, the number of somatic cells in the goat milk can be relatively increased, even when the

percentage of white blood cells is low, given by the epithelial cells (Roguinsky et al., 1971; Schalm et al., 1971; Kapture, 1980).

### AIMS

The research in this paper are focused on comparative cytological analysis of milk from two breeds of goats (French Alpine and Carpathian) of hilly northwest Transylvania, seeking to assess the race influence degree on the cellular content of milk. However, these investigations were aimed at evaluating the effectiveness of this major cytological test in monitoring the health of goat milk and mammary gland. Milk quality as food and keeping it in optimal consumption parameters, major were and remain objectives in its early detection of changes in case of mastitis, or other general udder diseases that cause health and milk lactation disorders.

### MATERIALS AND METHODS

Cytological investigations were conducted during July - September 2014 on individual samples of raw milk obtained from two groups of clinically healthy goats, French Alpine breed (n = 10) and Carpathian breed (n = 10). The two groups studied were selected from a herd of 60 goats of a micro-farm from a hilly area north-west of Transylvania. The animals studied were grown in household system, in compliance with bio conditions, being at the second lactation. Their feeding was based exclusively on grazing in spring, summer and autumn seasons, respectively fed fibrous feed (hay, corn cobs, roots and succulent) in winter season. Milking was performed manually by a person respecting the milking hygiene. Evolution of mastitis in micro-farm has not been registered so far. There were provided optimal conditions for sampling in sterile containers, two samples per month, the milk being tested using an automated counting system of somatic cells in milk, a Fossomatic type. This device marks by fluorescence milk cells analysed after that an optical deceleration microscope identifies them entering them automatically with an electronic counting system.

### RESULTS AND DISCUSSIONS

After corroborating data, we came to the following results. Thus, for a total of 6 of the 10 goats that belong studied French Alpine breed, calved in the farm, goats imported from three years before, animals were declared to clinical examination, as healthy. For them, somatic cell count slightly exceeded the maximum allowed by (400,000 / ml milk) and 4 of them (being numbered 2, 4, 7 and 10, were placed in the standard rules of milk, are values between  $322.83 \pm 10.4 \times 10^3/\text{ml}$  and  $388.16 \pm 7.49 \times 10^3/\text{ml}$ . Thus the average number of somatic cells / ml in samples obtained from goat milk with number 1 was  $436.17 \pm 13.92 \times 10^3/\text{ml}$ . For goat number 3 was obtained a value of  $441.18 \pm 11.1 \times 10^3/\text{ml}$ . For goat with number 5, the value obtained was  $428.5 \pm 13.04 \times 10^3/\text{ml}$ . Goat number 6, obtained a value of  $425 \pm 10.23 \times 10^3/\text{ml}$  mentioning the fact that this value was closest to the maximum limit considered but for goat breed is a normal value. For goat and number 8 the value obtained was  $429.83 \pm 17.62 \times 10^3/\text{ml}$  and goat number 9 obtained  $436.83 \pm 16.54 \times 10^3/\text{ml}$ . For the six individual determinations made for each goat studied during the three months there were no significant differences, the results are close in number as shown in Table 1.

For native Carpathian breed were studied an identical number 10 the same age and lactating goats. So for eight of them, individual milk samples analysed were within the limit of European standards, with average values between  $365 \pm 16.52 \times 10^3/\text{ml}$  and  $396.33 \pm 10.68 \times 10^3/\text{ml}$ . For both native breed goats studied which slightly exceeded the allowed limit of somatic cells were the number 2, which has obtained a value of  $419.66 \pm 7.52 / \text{ml}$ , respectively the number 7 to the average value was  $423 \pm 7.97 \times 10^3/\text{ml}$ . The six individual determinations performed for ten native breed goats during the three-month period recorded no important differences, a noticing in Table 2.

Table 1. Monthly assessment of somatic cells for Alpine breed

Breed	Nr. of goats	Somatic cell number/ml ( $\times 10^3$ ml)						Average $\pm$ DS
		Milk samples						
		July		August		September		
	1	2	3	4	5	6		
French Alpine	1	420	452	425	440	452	428	<b>436.17<math>\pm</math>13.92</b>
	2	360	340	365	340	325	360	348.33 $\pm$ 15.7
	3	450	425	436	446	438	456	<b>441.18<math>\pm</math>11.1</b>
	4	330	315	320	312	320	340	322.83 $\pm$ 10.4
	5	420	454	420	430	425	422	<b>428.5<math>\pm</math>13.04</b>
	6	425	440	432	425	412	416	<b>425<math>\pm</math>10.23</b>
	7	398	389	396	384	382	380	388.16 $\pm$ 7.49
	8	422	426	428	465	420	418	<b>429.83<math>\pm</math>17.62</b>
	9	460	440	426	452	423	420	<b>436.83<math>\pm</math>16.54</b>
	10	380	382	368	366	364	360	370 $\pm$ 8.94

Table 2. Monthly assessment of somatic cells for Carpathian breed

Breed	Nr. of goats	Somatic cell number/ml ( $\times 10^3$ ml)						Average $\pm$ DS
		Milk samples						
		July		August		September		
	1	2	3	4	5	6		
Carpathian	1	400	398	365	368	365	389	380.83 $\pm$ 16.7
	2	422	430	410	412	424	420	<b>419.66<math>\pm</math>7.52</b>
	3	360	366	380	388	346	350	365 $\pm$ 16.52
	4	410	399	398	389	365	380	390.16 $\pm$ 15.9
	5	398	368	380	378	402	390	386 $\pm$ 12.96
	6	398	388	389	390	402	410	396.16 $\pm$ 8.77
	7	410	428	420	432	428	420	<b>423<math>\pm</math>7.97</b>
	8	400	380	360	358	400	405	383.83 $\pm$ 21.07
	9	390	380	398	400	412	398	396.33 $\pm$ 10.68
	10	380	398	378	364	385	368	378.83 $\pm$ 12.20

## CONCLUSIONS

The final conclusion of this study highlights and supports local Carpathian breed acquired resistance to environmental, climatic and food conditions than race French Alpine although there were no significant differences in terms of the number of somatic cells, that is not a feature between the two breeds studied. Because lately French Alpine was imported to our country by many farmers due to increased milk production, we claim that is a breed that adapts quickly to all conditions. Thus somatic cells derived from glandular epithelium scaling without an active role in milk composition only an indicator of quality and health of mammary gland. Among the factors identified in our study that may influence the somatic cell count in milk and appearing in specialized literature can remember the young age of the animals, hand milking and the

number of days in milk, knowing that the number of somatic cells increases along with the days in lactation. The observation that somatic cells in uninfected milk increased during lactation and the middle of the year, confirming the general theory that somatic cell count increases with advancing lactation (Poutrel and Lerondelle, 1983). Our study supports and recommends further research in this area for assessing and maintaining health of mammary gland and to increase the quality of milk as food for yearlings as well as food for consumption.

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