The Influence of Extensive System on Goat Milk

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Abstract
The extensive system influences the hygienic quality of milk and it is mainly represented by the absence of mastitis. The basic parameter to detect this illness is the somatic cell count SCC, which are defensive cells located in the goat's udder. In order to assess the goat milk, this study was made upon the somatic cells from the selected goats and their relation with the milk production and the extensive system farms from which the samples were taken. The results were in conformity with the European standards. Regarding the factors of influence, the amount of milk production in combination with the system type of farm must be taken into consideration.

Keywords: extensive systeme, goat milk, Somatic Cell Count (SCC)

1. Introduction

Worldwide, mastitis is still one of the most important diseases in milk [1].
Because it is a disease caused by multiple factors (multiple pathogens), it is difficult to control mastitis [2]. Mastitis not only affects the health of milk-producing animals, with direct consequences for farm profitability, but also affects animal welfare [3]. The quality of milk is related to the absence of mastitis, the somatic cell count (SCC) being the prime element to identify the presence of this pathology [4].
SCC represents the level of somatic cells in one milliliter of milk which increases when an udder is infected [5]. Moreover, SCC is an important indicator of the health status of the lactating mammary gland [6]. In order for the milk to be considered as hygienic, the number of SCC must be under 4 x 10^5 cells/ml milk [7]. The extensive system represents the animal production system with access to pasture [8]. In this case, the contamination of goats with different pathogens is higher due to their exposure to an environment that cannot be controlled or supervised from the hygienically point of view. That is why the extensive production system influences the increase of the mastitis rate at goats [9]. Mastitis in dairy goats is the most important disease of the mammary gland, with zoo economics implications due to losses in milk production and early reform of sick animals. Also, through infected milk the public health is at risk [10, 11].

2. Materials and methods

The chosen farm for the physical – chemical analysis of milk was from Sibiu area with an extensive production system. The samples for the necessary determinations were taken from the two breeds found within the farm: the Carpatina breed which is the predominating one and the Alba de Banat. The farm commercializes the milk from its own store, the milking being performed twice a day using manual milking.
The goats were chosen randomly, using subjects only from the Carpatina breed which were in their 1st to 3st lactation, in a total number of 15 goats, free of clinical mastitis.
Once a month and always from the same goats, individual samples of the evening milking were taken. The produced milk (in

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liters) was registered and the taken samples were kept at a temperature of 4^0C in sterile containers of 10 ml. On the next day the number of somatic cells in milk was determined by means of Petri film method [11]. The total number of samples was 90 (15 goats x 2 udders x 3 months). The sampling had an individual data sheet which included the goat's identification number, the sampling date, the lactation number, the sampling quantity and also the identified number of somatic cells [5].

Detecting the number of somatic cells (SCC) by the Petrifilm method. The number of somatic cells from the homogeneous milk samples was determined by chemical and electronic methods.

Principle: The first step is spreading a quantity of tested milk on a slide, until a film is obtained. The next steps are: drying and staining the film of milk and then the counting of stained cells using a microscope and multiplying the result calculated on a defined area by the percentage of work which allows the determination of the number of cells per milliliter [12, 13].

Results Calculation

With a microscope, the cell nucleons are counted in the film (at least 400). The length of the numbered strips should be of 5 mm. The width of the strip corresponds to the diameter of the microscopic field. At an outlet of testing of 0.01 ml the work coefficient W1is calculated, using the following equation:

W1 = (20 x 100) /d x b

Where:d = diameter in mm of the microscopic field; b = number of fully counted strips;

The number of counted somatic cells is multiplied with the work coefficient (W1) on an ml of milk [12, 14].

Table 1. Content of SCC found in the goat milk samples from 1st-3rd stage of lactation

No of ½ udder	SCC			
	1st stage	2nd stage	3rd stage	Average
1	75.688	128.305	163.042	122.345
2	79.520	132.952	162.156	124.876
3	79.486	143.007	156.551	126.348
4	80.541	141.285	156.180	126.002
5	72.228	138.624	357.195	189.349
6	155.698	328.994	350.676	278.456
7	139.569	302.719	320.006	254.098
8	286.004	352.927	397.770	345.567
9	228.935	332.425	342.600	301.320
10	331.861	395.941	402.898	376.900
11	230.549	329.558	353.399	304.502
12	354.256	383.622	389.933	375.937
13	181.364	251.035	271.101	234.500
14	389.802	397.930	405.458	397.730
15	163.831	238.150	269.314	223.765
16	76.229	103.093	108.033	95.785
17	82.182	138.941	216.112	145.745
18	291.624	368.412	376.998	345.678
19	141.825	231.954	343.254	239.011
20	125.961	201.952	306.155	211.356
21	294.881	367.842	384.276	349.000
22	374.821	386.065	406.216	389.034
23	15.069	20.952	50.819	28.947
24	72.822	127.414	146.900	115.712
25	289.209	358.217	387.904	345.110
26	129.903	256.870	317.855	234.876
27	77.560	108.503	147.543	111.202
28	86.592	185.954	256.426	176.324
29	88.560	192.203	224.605	168.456
30	375.804	368.008	392.891	378.901
Average	179.079	247.128	285.476	

3. Results and discussion

The mean number of somatic cells/ml of milk (SCC/ml) oscillated between 15.000 and 410.000 (Table 1), these results indicate that the goat milk produced in these farms is of good sanitary quality that would comply with the standards established by the EU which enforces goat milk production in liquid state and to contain less than 4 x 10^5 cells/ml. [7] Nonetheless, only in three cases there was found SCC over the maximum limit in the 3rd stage of lactation.

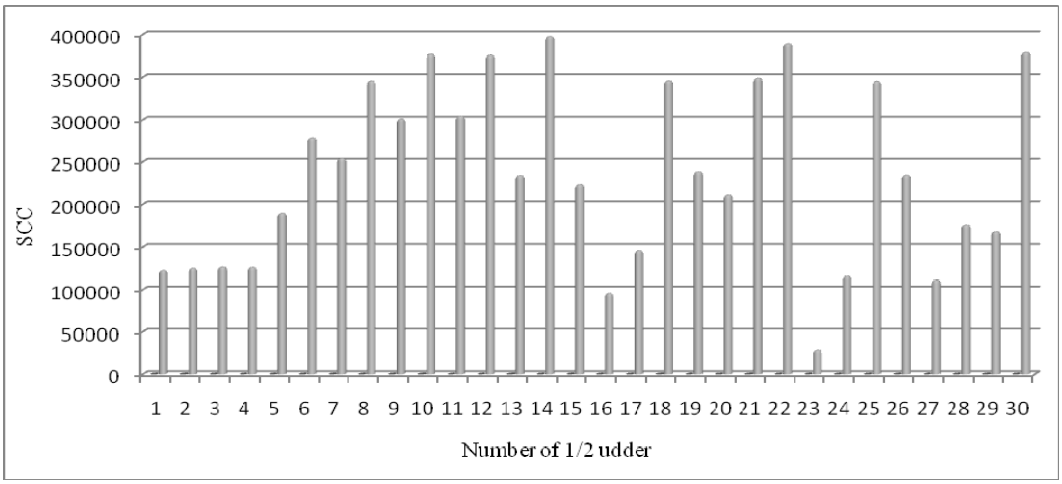

Figure 1. Variation of the average of SCC in the three stages of lactation

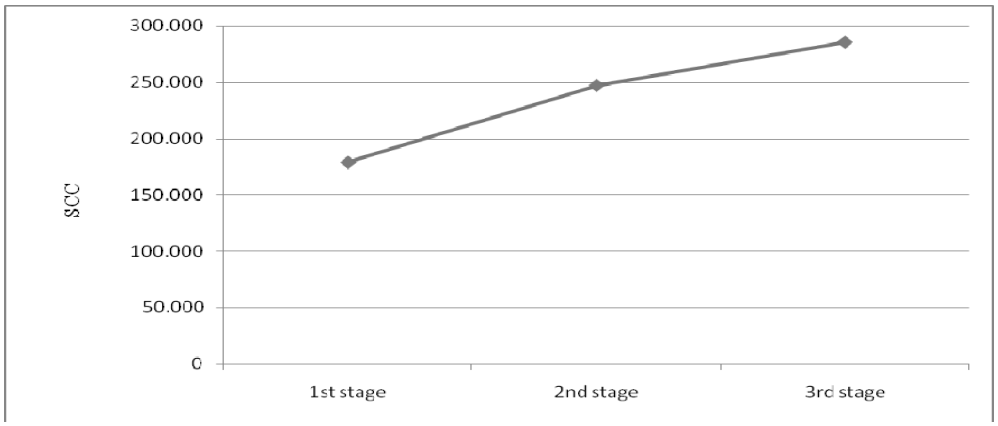

Figure 2. SCC in each of the three stages of lactation

The SCC is progressively increasing in all the 3 stages of lactation because of the access to the pasture, where during grazing the goats get wounded and this favors the occurrence of infections [15, 16].

Based on the variance analysis, the amount of produced milk is related to the stage of lactation which in combination with the extensive production system may have an influence upon SCC (Table 2, Figure 3).

Table 2. Variation between the number of lactation and milk quantity produced within the extensive production system

Lactation number	Goat number	Average Value	Standard Deviation
1	5	1,08	±0.10
2	6	1,43	±0.50
3	4	1,55	±0.26

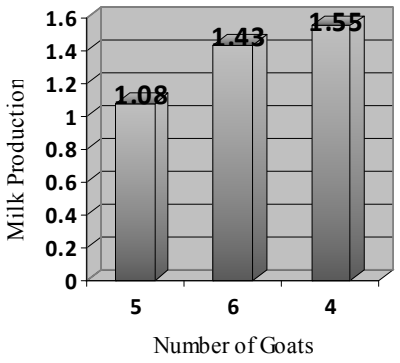

Figure 3. Variation of the milk quantity in the three lactation stages

4. Conclusions

Due to the type of the production system of goats like the extensive one, there are some factors that negatively influence the goats' health state such as: the poor hygiene of the pasture, the contamination with pathogens and the wounds resulted from grazing, the hygiene of the milker and of the milking equipments. Having considered that mastitis is the most costly disease in dairy farms causing loss in milk production and milk quality alteration from biochemical, physical, bacteriological point of view, it is highly recommended that in order to decrease the incidence of mastitis the pastures must be sanitized as much as possible, the milking process must be correctly done and a more complex clinical control of the goats should be achieved.

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References

1. Boscos, C.A., Stefankis, C. Alexopoulos, O. Samartzi, Prevalance of subclinical mastitis and influence of breed, parity stage of lactation and mammary bacteriological status on coulter counter counts and California mastitis test in milk of Saanen and autochtonous goats, Small Ruminant Research 1996, 21, 139-147

2. Darton- Hill, I., J. Coveney and G.R. Davey, Goat milk: Nutritional and public health aspects: A review, Food Technol. Aust., 1987, 39, 568-572

3. White, E.C., L.S. Hinckley, Prevalence of mastitis pathogens in goat milk, Small Ruminant Research 1999, 33, 117-121

4. Dulin, A.M., M.J.Paape, W.P.Wergin, Differentiation and enumeration of somatic cells in goat milk. Journal of Food Proteins 1982, 45, 435

5. Poultrel, B., C. Lerondelle, Cell count of goat milk: CMT, CCC and Fossomatic, for prediction of infction. Journal of Dairy Science, 1983, 66, 2575-2579

6. Hromei Neculai, Cercetări asupra etiopatogeniei, simptomatologiei şi terapiei mastitelor la vaci - teza de doctorat, 2006

7. Regulamentul European nr. 853/2004 şi 854/2004

8. Aich, El. A., S.Landau, M.Napoleone, A.Bourouze, Goat production systems in the Mediterranean: A comparative study. In : Goat Production Systems in the Mediterranean. EAAP Publication No 71, 1995, 226-228

9. Oprean Letiţia, Bahcivanci, Ş., Ramona Iancu, Investigations concerning the morphological and pathological analysis of the goats udder as part as the extensive and half-intensiv production system, 2010, Annals of the Romanian Society for Cell Biology, vol. XV, Issues 1, Cluj-Napoca

10. Şonea, C., Colceri, D., Băcilă, V., Research on sublinical mastitis effect on milk quality, Lucrări ştiinţifice Zootehnie şi Biotehnologii, 2009, vol. 42 (2) Timişoara

11. Dunn, P., Infective agents associated with mastitis. In: The Goat Keeper's Veterinary Book (3rd edition). Farming Press Books, United Kingdom, 1994, 127

12. Tiţa Mihaela-Adriana, Manual de analiză şi controlul calităţii în industria laptelui,Ed. Universităţii Lucian Blaga, Sibiu, 2002

13. Bernacka Henryka, Cytological Quality of Goat Milk on the Basis of the Somatic Cell Count, Journal Central European Agriculture, 2007, Volume 7, No.4, 773-778

14. Bondoc, I., Tehnologia şi controlul calităţii laptelui şi produselor lactate (vol.I) Editura „Ion Ionescu de la Brad" Iaşi, 2007

15. Bhosale, S.S., P.A. Kahate, K. Kamble, V.M. Thakare and S.G. Gubbawar, Effect of lactation on physicochemical properties of local goat milk. Vet. World, 2009, 2, 17-19.

16. Wilson, D.J., K.N. Stewart, P.M. Sears, Effects of stage of lactation, production, parity and season on somatic cell counts in uninfected dairy goats. Small Ruminant Research 1995, 16, 165-169