

## A STUDY REGARDING THE INFLUENCE OF THE CATTLE HEALTH UPON THE MILK QUALITY

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### **Abstract**

*The investigations presented in this paper had as purpose the establishment of the milk quality by the analysis of some parameters in accordance with the EU present legislation. The establishing of the number of somatic cells as well as the analysis of other chemical traits that define the milk quality notion represented some of the goals pursued in the realization of this paper. The working material was represented by milk samples from cattle of different ages and were prepared in such way for to express as real as possible the milk characteristics and to be enough for leading the analysis. From the data analysis we observed the age and seasonal variation of the physico-chemical parameters.*

**Key words:** somatic cells, milk quality, chemical traits, cattle age, physico-chemical parameters

### **INTRODUCTION**

The capacity of interpreting correctly the number of somatic cells depends on understanding the factors that can influence it. The most important among these are the health state of the mammary gland, the age, the stage of lactation and some technique traits [1].

The number of somatic cells of the healthy cattle varies according to the species, age, and physiological state of the mammary gland and even to the quarters of it and to the different milkings. [2].

Even though the somatic cells don't directly influence the consumers' health their presence in the milk has a direct influence upon the dietary consumption by the association with the somatic cells of high microbial load (most times coming from medicines) [3].

Most studies revealed the transfer in the milk contaminated with somatic cells of a microbial pathogen bacteria charge such as *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus agalactiae*, *Mycobacterium* extremely dangerous for humans. Even though the milk pasteurization reduces the milk's microbial charge the toxins produced by these microorganisms are not affected. Mostly the infected cattle milk enterotoxins

produced by *S. aureus* cause food poisoning to humans [4].

### **MATERIAL AND METHOD**

For the sampling of the milk we used uncolored glass containers of 500ml labeled properly and transported to the analysis lab in refrigeration conditions (0-40°C).

The determination of the number of somatic cells was done using the EKOSCOPE device. This device is specially built to automatize the microscopic method of counting the cattle milk somatic cells. At the same time with this determination we pursued the establishing of the raw milk quality by analyzing some chemical traits with the EKOMILK device, specially created for the rapid analysis of the main quality parameters of the milk- fat quantity, proteins, lactose.

The microscope direct method consists in the examination at a microscopic compound of the coloured film (after the measurement of the milk volume) laid on a glass device on a specific area. This fact allows a rapid estimation of the number of somatic cells from a milk sample. The microscope is first calibrated for to recognize the exact place in its area. Then a milk quantity of 0.01ml is put on the measured surface (1 cm<sup>2</sup>) of a glass device so that each microscopic examined

area represents a quantitative aliquot part of the sample. The milk dries and the film is fixed and coloured with a proper paint. The number of somatic cells is microscopically determined after the examination of 50-100 areas and depends on the microscope and the somatic cells / area.

The advantages of this device are the following: a large number of samples can be worked on, it has a great accuracy and repeatability in measuring the working sample, great repeatability for the film colouring procedure and is computer controlled.

Ekoscope has two working stations: EKOSCOPE – FPS1 – Film preparing station and EKOSCOPE – SCC1 – Film examining station. This ensures the identifying of the somatic cells values (according to the official method) and does with a high accuracy and precision all the scientific examinations on the display.

The EKOMILK device has some advantages in using for it allows a great number of measurements and for the analysis of all the parameters it is used only a small quantity of milk the chemical substances being unnecessary for the examinations. The detection limits for the measured parameters are the following: 0,5 – 9% fat, 6-12% light dry substance, 2 – 6% proteins.

## RESULTS AND DISCUSSIONS

The increase of the number of somatic cells was produced as a result of the inflammatory process in the mammary gland process during which usually the macrophages, the lymphocytes and the polymorphonuclear neutrophils appear (representing 90% of the somatic cells).

The milk coming from a healthy mammary gland contains in general 200.000/ml somatic cells. The increase of the number of somatic cells in milk above 300.000/ml is abnormal and indicated the evolution of an inflammatory process at the mammary gland level.

The data in table 2 showed the variation of the milk somatic cells during the warm season (the milk was collected from 5 collecting centers in the area of Suceava county).

Thus during the warm season from a total of 100 analyzed milk samples 69% of them had values of the somatic cells below 400 x1000/ml of milk, 20% had values between 400 – 600 x1000/ml and 11% had values between 600 – 800 x1000/ml. There were not any milk samples registered to contain somatic cells above the value of 800 x 1000/ml.

The data in table 3 showed that during the cold season 52% of the milk samples from the total number registered values of the somatic cells below 400 x1000/ml of milk, 25% of the samples had values between 400 – 600 x1000/ml, 15% had values between 600 – 800 x1000/ml while for 8% of the analyzed samples the values of the somatic cells overpassed 800 x 1000/ml.

The comparative analysis of the data in the tables 1 and 2 allows the establishing of the following conclusions: during the warm season the percent of the samples with somatic cells content below 400 x 1000/ml was higher than that for the samples analyzed in the cold season. For the rest of them during the cold season the registered values of the somatic cells were higher than those registered during the warm season.

If we report the obtained results to the communitarian regulations regarding the maximum limit for the number of somatic cells (400.000 /ml), we can assess that from the total of the analyzed samples approx. 31% of them are not in conformity during the warm season and 48% during the cold season.

Another goal of this paper was the determination of some chemical traits that contribute generally at the definition of the concept „quality milk” in the situation in which in the analyzed samples the number of somatic cells either almost overpassed the value of 400.000 ml, or was below this value. The results obtained are presented in table 3.

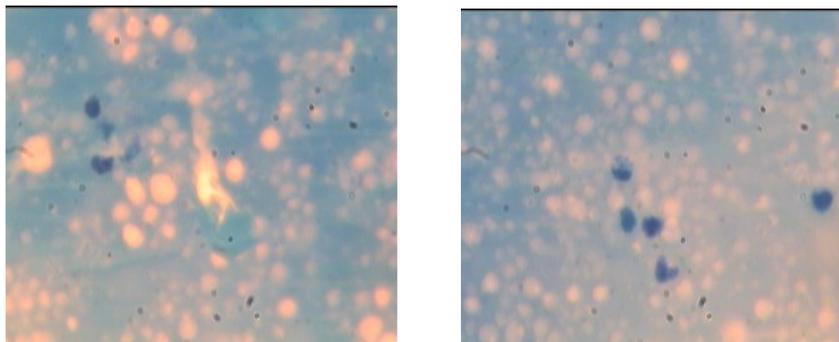


Fig.1. Neutrophils and macrophages, methylene blue colouring, x100

Table 1. The variation of the milk somatic cells in the warm season (june-august)

No. crt	Collecting centre	Number of samples	NCS x 1000/ml			
			< 400	400-600	600- 800	> 800
1.	Centre A	20	13	6	1	-
2.	Centre B	20	15	3	2	-
3.	Centre C	20	14	2	4	-
4.	Centre D	20	14	5	1	-
5.	Centre E	20	13	4	3	-
<b>TOTAL</b>		<b>100</b>	<b>69</b>	<b>20</b>	<b>11</b>	<b>0</b>
<b>%</b>		<b>100</b>	<b>69</b>	<b>20</b>	<b>11</b>	<b>0</b>

Table 2. The variation of the milk somatic cells in the cold season (october-december)

No. crt	Collecting centre	Number of samples	NCS x 1000/ml			
			< 400	400-600	600- 800	> 800
1.	Centre A	20	10	5	3	2
2.	Centre B	20	12	4	3	1
3.	Centre C	20	11	4	3	2
4.	Centre D	20	9	6	3	2
5.	Centre E	20	10	6	3	1
<b>TOTAL</b>		<b>100</b>	<b>52</b>	<b>25</b>	<b>15</b>	<b>8</b>
<b>%</b>		<b>100</b>	<b>52</b>	<b>25</b>	<b>15</b>	<b>8</b>

Table 3. The variation of the milk chemical traits in comparison with the NCS values from the analyzed samples

NCS value	% fat	% proteins	% lactose
< 400 x1000/ml	4.24 – 4.98	3.17 - 3.53	5.33 – 5.67
> 400 x 1000/ml	3.7 – 4.01	3.02 – 3.23	4.52 – 4.98
<b>Normal values</b>	<b>2,8 – 6</b>	<b>3 – 3.5</b>	<b>2,84– 7,66</b>

The data in table 3 showed that the milk with somatic cells below the limit of 400.000/ml fitted regarding the other indicators in the normal limits of quality according to the existing reglementations.

The average registered concentrations are: 4,61% for fat, 3,35% for proteins% and 5,5% for lactose.

For the milk samples that contain somatic cells above the normal limit we saw in

comparison with the previously examined series a decrease of quantity for the fat, the proteins and the lactose. This thing was due most probably to the fact that those samples could have been taken from cattle with clinical forms of mastitis a disease that causes due to the epithelium lesions a decrease of the synthesis products in milk.

## CONCLUSIONS

The quality of milk represents a distinctive and relevant goal necessary to be submitted to research for at least the following reasons:

- the milk is a secretion product with very close characteristics to a living tissue that produce sit in a physiological way. Milk's particularities are maintained and must maintain all over the valorification way of this food product.

- the milk is a food product with a major impact in sanogenesis fact that supposes compulsory health, control and surveillance parameters.

- the milk quality by its indicator- the number of somatic cells represents a guarantee of quality and health.

The importance of determining the somatic cells number in milk results from the fact that they show the health state of the mammary gland a thing that is considered to

be a great issue at the farms level. Even more the most recent problem raised is that of human health in relation with milk and diary products consumption. The last years researches regarding the cattle milk led to the conviction that in the milk there is always a cell population whose number and configuration is conditioned by certain physiological states of the animal and especially of the udder. This cell population reflects the animal and the udder health state and subsequently that of the milk as a secretion product. A small number of somatic cells / ml in collected milk from a farm is an indicator of a „clean milk” and a large number of somatic cells, over the admitted limit signifies an unhygienic, unsanitary milk.

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