

Monitoring the quality and hygiene of processed milk from Bistrița-Năsăud county

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Abstract

The research aimed at monitoring the hygiene and quality of raw milk from Bistrița-Năsăud over three years since 2007, when Romania joined the ranks of EU countries.

In the milk hygiene control laboratories are allowed, for the assessment of milk hygiene quality, some specific parameters like: somatic cell count (SCC), total plate count (TPC) and freezing point.

Keywords: TPC/ ml milk at 30°C, SCC/ ml milk, mammitis, milk quality and hygiene

1. Introduction

The negative effects of mastitis on production, composition and hygiene of milk have a unanimous recognition that is why the new EC regulations focus on somatic cell count, so that member countries take measures to reduce them and thus remain competitive on the Community's market.

Determination of milk somatic cell count provides information on the health of the mammary gland for one animal or the entire group, milk somatic cell number have a wide recognition in the EC regulations as an indicator for assessing the quality of milk.

Total plate count (TPC) determination provides information on animal's shelter hygiene, milking equipment, personnel, milking operation and storage conditions of milk after milking.

2. Materials and methods

Monitoring the quality and hygiene of cow's milk was done on two types of samples:

- samples taken from collection points;
- samples collected from animal farms.

Determinations were carried out to establish the TPC at 30°C/ml and SCC/ml over a period of three years after Romania joined EU.

The eligibility criteria for raw cow's milk immediately after collection, according to the Order No. 853/2004 are [1-5]:

- TPC at 30°C/ml \leq 100.000 cfu;
- SCC/ml \leq 400.000.

TPC was done in accordance with this reference documents and annexes:

- SR ISO 7218/2007: Rules for microbiology examination;
- SR ISO 6887-1/97: Food and feed microbiology. Sample preparation, initial suspensions and decimal dilutions for microbiological examination;
- SR ISO 4833/2003: General orders for establishing the number of organisms. Colony counting method at 30°C.

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Milk somatic cell count determination includes two parts: **part I*: microscopic method for counting somatic cells in milk that contains chemical preservatives, according to the reference documents:

- SR EN ISO 13366-3/2001 – somatic cell counting from milk. Part 3. Fluoro-opto-electronic method;
- SR ISO 13366-1/1999 – somatic cell counting from milk. Part 1. Microscopic method (Reference method);
- STAS 6343/1981 – milk and milk products. Sample preparation.

**part II*: fluoro-opto-electronic method is executed as specified in SR EN ISO 13366-3/2001 and instructions from Bentley Instruments User Manual.

The used technology is the Flow Cytometry. The SOMACOUNT 150 requires the use of a chemical substance, ethidium bromide (bluecount tablets) in order to preserve the DNA for the leukocyte count. The transportation liquid leads fluorescently marked cells through a flow cell.

3. Results and Discussion

The results are presented in the following tables.

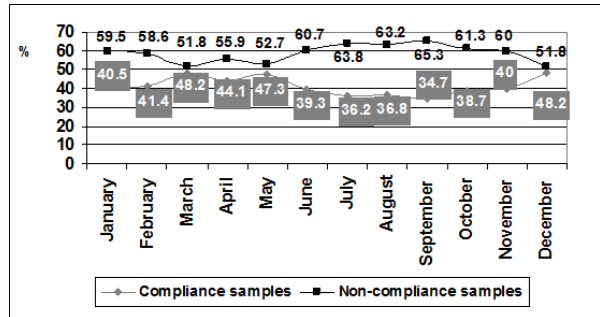


Figure 1. Variation of the TPC/ml milk during the year 2007 in the collection centers

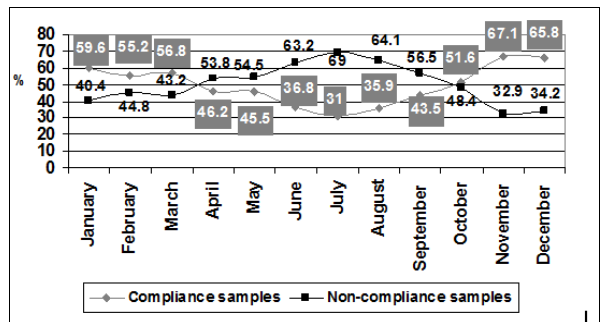


Figure 2. Variation of TPC/ml milk during the year 2008 in the collection centers

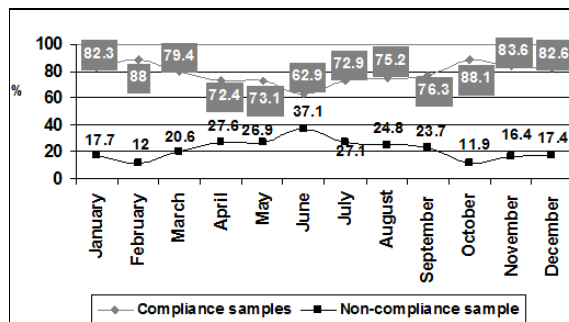


Figure 3. Variation of TPC/ml milk during the year 2009 in the collection centers

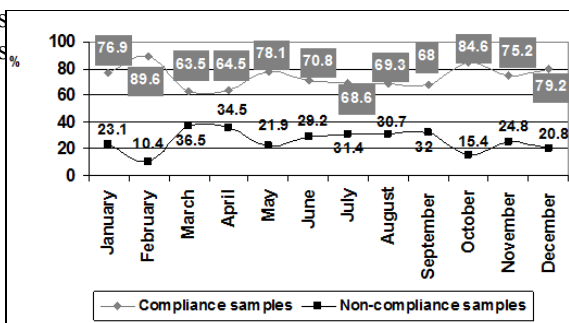


Figure 4. Variation of TPC/ml milk during the year 2007 from farm animals

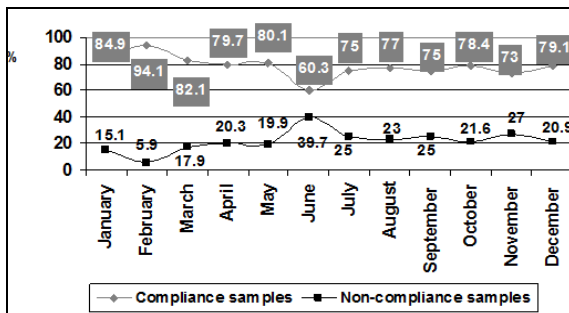


Figure 5. Variation of TPC/ml milk during the year 2008 from farm animals

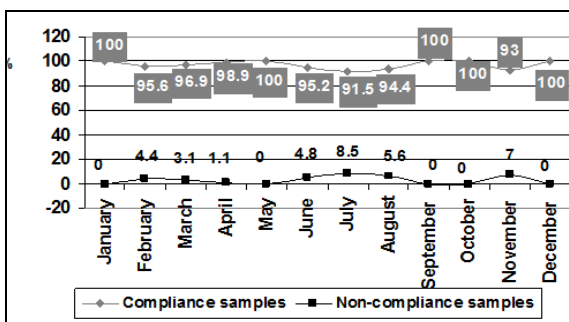


Figure 6. Variation of TPC/ml milk during the year 2009 from farm animals

Table 1 and 2 and Figures 1 – 6 shows the following: positive development of the results during the analysis; wide variations between seasons: autumn – winter and spring – summer.

Once Romania has joined the EU in 2007 at the collection centers and farm animals were imposed some conditions which would lead to raw milk with the smallest germ load, and these are:

- supplying the farm animals with milking devices;
- the existence of the cooling tanks;
- milk transportation machines must be provided with cooling systems;
- strict compliance with the hygiene rules starting from milking until the milk enters the processing;
- collection of milk in the morning and evening;
- reduction of the time from collection of milk to processing.

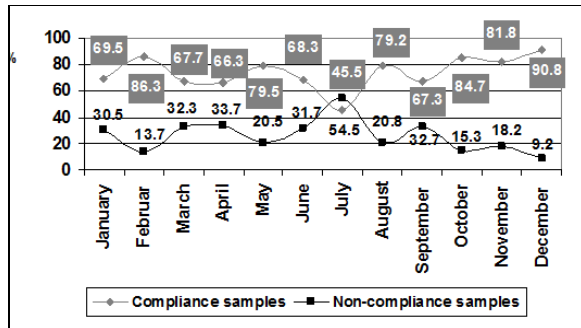


Figure 7. Variations of SCC/ml milk during the year 2007 from farm animals

Animal farmers and processing units, by following these conditions have managed through a period of 3 years to obtain increasingly better results regarding the quality of raw milk. Tables 3 and 4 present the results from the somatic cell count from farm animals and collection points.

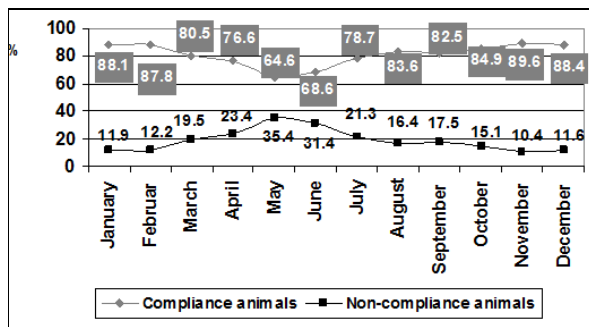


Figure 8. Variation of SCC/ml milk during the year 2008 from farm animals

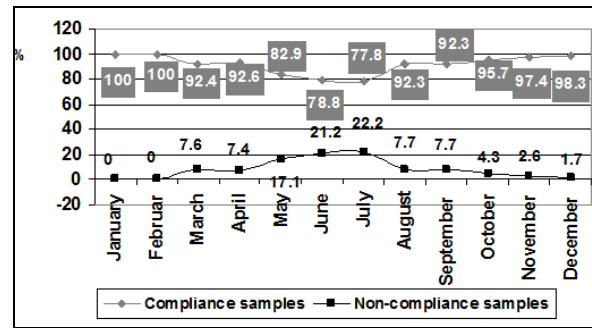


Figure 9. Variation of SCC/ml milk during the year 2009 from farm animals

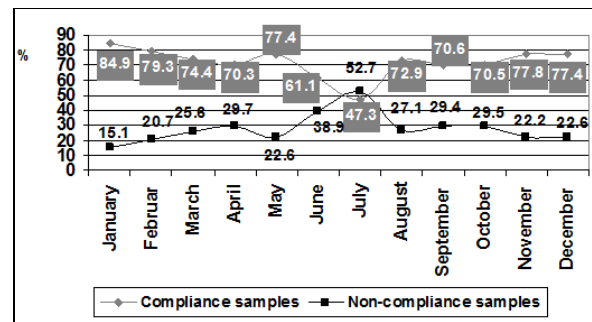


Figure 10. Variation of SCC/ml milk during the year 2007 from collection centers

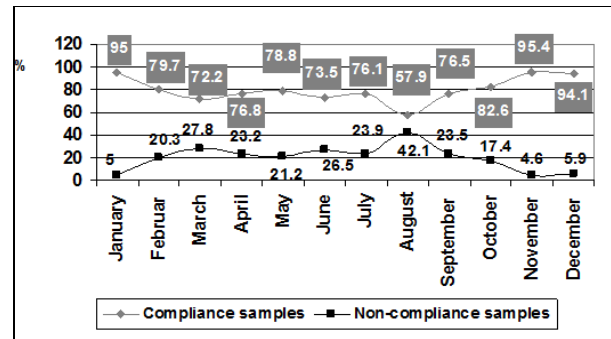


Figure 11. Variations of SCC/ml milk during the year 2008 from collection centers

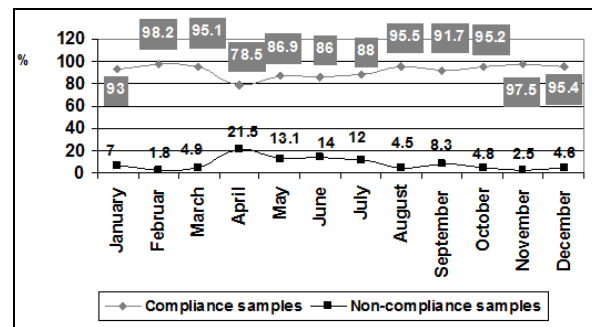


Figure 12. Variation of SCC/ml milk during the year 2009 from collection centers

Table 1. Analysis results for TPC/ml raw milk from collection centers

Sample	Limits of variation, TPC/ml milk		2007		2008		2009	
			Sample No.	Percentage, %	Sample No.	Percentage, %	Sample No.	Percentage, %
c	< 100.000	3248	42.1	4928	48.8	4054	77.8	
n	> 100.000	4463	57.9	5173	51.2	1159	22.2	
Total samples		7711		10101		5213		

c – compliance milk; n – non-compliance milk

Table 2. Analysis results of TPC/ ml raw milk collected from farm animals

Sample	Limits of variation, TPC/ml milk		2007		2008		2009	
			Sample No.	Percentage, %	Sample No.	Percentage, %	Sample No.	Percentage, %
c	< 100.000	1393	72.8	1212	77.7	1029	96.8	
n	> 100.000	518	27.2	348	22.3	34	3.2	
Total samples		1911		1560		1063		

c – compliance milk; n – non-compliance milk

Table 3. Analysis results of somatic cell count from farm animals

Samples	Limits of variation, SCC/ml milk		2007		2008		2009	
			Sample No.	Percentage, %	Sample No.	Percentage, %	Sample No.	Percentage, %
c	< 400.000	881	71.9	755	80.5	578	92	
n	> 400.000	344	28.1	183	19.5	50	8	
Total samples		1225		938		628		

Table 4. Analysis results of somatic cells count from collection centers

Samples	Limits of variations, SCC/ml milk		2007		2008		2009	
			Sample No.	Percentage, %	Sample No.	Percentage, %	Sample No.	Percentage, %
c	< 400.000	3928	71.7	4053	78.5	2453	91.5	
n	> 400.000	1553	28.3	1113	21.5	229	8.5	
Total samples		5481		5166		2682		

c – compliance milk; n – non-compliance milk.

As shown in Tables 3 and 4 and Figures 7 – 12 the non-compliance results have decreased substantially in 2009 compared to 2007. This happened because they took a series of specific measures:

- monitoring the health of the mammary gland through early detection of mastitis. This was achieved by rapid tests like “Mastitest” that indicated a possible mastitis.
- analysis of milk from suspected animals, in the laboratory with the help of Somacount which indicated the diagnosis of a mastitis.
- treatment of animals.
- Large new incidents of mastitis, as shown in the tables above, were found starting with March – April when there are large calving and in the period Mai – August do to the high temperatures.

4. Conclusion

Monitoring of milk as raw material it is an objective need, due to its importance in the human diet.

- Romanian’s entry in E.U. involves, along with the legislative organization, the implementation of new methods of analysis.
- The processing unit from Bistrița-Năsăud, have entered a monitoring system, and so at the moment they meet the E.C. requirements.
- Due to economic losses caused by mastitis, there is a surveillance program at the farms using “Mastitest” and in the laboratory using somatic cell counting device. This program has decreased the number of mastitis.
- By permanent monitoring the hygiene from milking to processing, were obtained good results regarding milk hygiene.

- European Community has issued a series of regulations that impose some restrictions regarding the quality of milk as raw material.
- In order to obtain quality milk in terms of hygiene, but also mammary gland health, there have been established international methods (ISO) for the determination of TPC and SCC.
- So, to reduce the time spent on analysis, there have been purchased devices with high performances, faster and more precise that help the producer to detect earlier possible mammary gland diseases.
- Taking these measures, as seen by monitoring the quality of milk for three years, its quality is becoming better in terms of TPC and SCC.
- To enter the EU market, the efforts of the producers and processors must increase, so that products can be competitive.

References

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