

# Evaluation Of Albanian Raw Milk Quality Situation By Using Somatic Cell Counts

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**Abstract**—As Albania applies for EU accession, it is required to implement EU food hygiene legislation in the milk sector. The deadline for the transition period to achieve raw milk quality standard of EU it was established by the Albanian Authorities on January 1, 2014. Parameters to evaluate milk quality and safety are Total Bacteria Count (TBC per ml), zoonotic agents, Somatic Cells Count (SCC per ml) and residues in the milk (directive 853/2004).

This study was carried out by the Albanian Dairy and Meat Association, from November 2011 to February 2012, and one of the parameters we have asses its Somatic Cells Count (SCC) per ml at different levels of production and collections centers. The milk samples were collected in the three regions Fier, Korce and Shkoder. In total 1,831 raw milk samples, 903 (49.3%) on farms, 631 (34.5%) at the entrance of milk processors and 297 (16.2%) of milk collection points in villages, have been collected and tested on the Somatic Cells Count (SCC/ml) The samples analysis in the laboratory were done according to internationally recognized methodologies and Albanian legislation, ISO 13366-1: IDF 148-1, using microscope method and Bioluminescence/LumCharm.

The average of SCC/ml, to the farm level (903 samples) resulted 570.000, to the milk collecting centre (297 samples) 750.000, to the manufactory (631 samples) 810.000 On average, the level of Somatic Cells Count (SCC/ml) is much higher than national threshold which is for SCC/ml < 500,000. Many dairy farms have serious problems with udder health. The raw milk quality (SCC) is in Albania far away from national targets and specifically from EU standard.

**Keywords**— Albania; milk quality testing; status assessment; SCC

## I. INTRODUCTION

According to the official statistic of the Albanian Ministry of Agriculture Food and Consumer Protection (MAFCP) for the year 2010 the total domestic milk production in Albania is currently about 1 Mio tons from which cow milk production is about 86% whereas 14% come from small ruminants. Milk production holdings as well as milk processing units are in

average very small in Albania. In the majority of production holdings and processing units traditional technologies are applied. Farm gate price for milk is usually not based on parameters for quality.

Regular testing of the quality of raw milk is a very important instrument for the development of the Albanian dairy sector and to protect the consumer in buying a safe domestic milk product.

As Albania applies for EU accession, it is required to implement EU food hygiene legislation in the milk sector. The deadline for the transition period to achieve raw milk quality standard of EU it was established by the Albanian Authorities on January 1, 2014.

Generally no studies have been conducted in Albania on the determination of SCC in raw cow's milk, in the different production, collection point samples.

Parameters to evaluate milk quality and safety are Total Bacteria Count (TBC per ml), zoonotic agents, Somatic Cells Count (SCC per ml) and residues in the milk (directive 853/2004). According to this directive food business operators must initiate procedures to ensure that raw cows' milk meets the criteria for Somatic cell count (per ml)  $\leq$  400,000 which is rolling geometric average over a three-month period, with at least one sample per month, unless the competent authority specifies another methodology to take account of seasonal variations in production levels.

TABLE I. DEVELOPMENT STEPS AND TARGETS IN ALBANIA TO ACHIEVE EU MILK QUALITY STANDARD

Steps	Development steps		
	Year	Criteria	Legislative target of SCC
Step I	1 January 2008 – 31 December 2010	Somatic Cells Count/ml	< 700,000
Step II	1 January 2011 – 31 December 2012	Somatic Cells Count/ml	< 500,000
Step III	1 January 2014 EU norm which is factual	Somatic Cells Count/ml	< 400,000

The milk somatic cell count (SCC) is an important indicator of the udder health status of lactating mammals. Somatic cells excreted with milk include different types of white blood cells and some epithelial cells. The cellular composition and the concentration of cells change dramatically during periods of inflammation. An increase in SCC is regarded as the primary indicator of inflammation of the mammary gland, Hogeveen H et al., 2005. Enumeration of the somatic cell count (SCC) of milk, according to Dohoo et al., 1991, has long been used as a tool for measuring milk quality. SCC is therefore relevant in EU food legislation Regulation (EC) No 853/2004 and in payment of ex-farm raw milk, where it serves as a quality parameter. When measured with individual animals, it also has a major impact on farm management and breeding programs.

In most developed countries, mastitis is the most common infectious disease of dairy cows and results in considerable economic loss for both dairy farmers and milk processors, (Fetrow et al, 2000; Geary et al, 2012 and Halasa et al, 2007). The economic impact of mastitis is greater than most other infectious diseases because the point of infection is the mammary gland; thus intramammary infection (IMI) results in reduced productive capacity of the gland and decreased processing value of milk (Barbano et al 2006). Inflammation subsequent to IMI can result in subclinical and/or clinical symptoms and control programmes must include methods to detect and monitor outcomes of both presentations of the disease (Ruegg et al, 2011).

The objective of this study was to assess the quality of raw milk, based on SCC/mL, in farm level, at the collection and manufactory point, in aim to compare with national and EU standard.

## II. MATERIAL AND METHODS

The milk samples were collected in the three regions Fier, Korçe and Shkoder which are important regions for milk production in the country (Fier 213,305 ton, Korçe 95,312 ton, Shkoder 100,292 ton) (MAFCP 2010).

In total 1,831 raw milk samples have been collected and tested on the Somatic Cells Count (SCC/ml). Milk analysis it is performed during November 2011-February 2012. Due to the season of sampling and harsh weather conditions in January – February 2012, only samples of cow-milk could be taken. 903 raw milk samples (49.3%) had been collected on farms, 631 (34.5%) at the entrance of milk processors and 297 (16.2%) of milk collection points in villages or more professional milk collection centers.

The milk samples were taken by qualified persons in a most representative way by using the method of sampling in accordance with EU directives 853/2004; 854/2004 and 882/2004, the Food Law and related implementing regulations .

Transport of milk samples to the ADAMA lab was done in accordance with procedures, in appropriate temperature to safeguard the samples.

The analysis of the milk samples in the laboratory were done according to internationally recognized methodologies as well as in accordance with the Albanian legislation.

Determination of the somatic cells Method: ISO 13366-1: IDF 148-1, 2008, ISO 13366-2|IDF 148-2:2006 using microscope method and Bioluminescence/-6+LumCharm.

Results of the milk tests were recorded. Testing results from cow milk farms are grouped for the evaluation according to the source and farm size (1-5 cows, 6-10, 11-50, 51 and more cows per farm), milk collection centers and entrance of dairy processors.

## III. RESULTS AND DISCUSSION

The following table 2 and figures 1-3 are summarising the results of raw milk testing done by laboratory. On average the level of Somatic Cells Count (SCC/ml) is much higher than national threshold which is for SCC/ml < 500. Many dairy farms have serious problems with udder health (SCC). According to Dohoo, somatic cell count from healthy glands should be lower than 200,000 cells/ml and SCC between 200,000 and 300,000 cells/ml is indicative of infection or initial stages of infection and that udder health is decreasing (Dohoo and Leslie, 1991) or the cow is infected with a form of mastitis (Smith, 1996).

TABLE II. AVERAGE SCC AT DIFFERENT PRODUCTION, COLLECTION POINT SAMPLES

Level	Table Column Head	
	No. of raw milk samples	SCC/ml
All farms	903	570 000
Milk collecting centre	297	750 000
Manufactory	631	810 000

### A. Results from samples collected on farms

Figure 1 illustrates the frequency of SCC analytical results from 903 samples collected directly on farms according to categories from < 200,000 to more than 1,500,000 SCC/ml and < 500,000. Milk SCC is a key component for milk quality, an indicator of udder health and of the prevalence of clinical and subclinical mastitis in dairy herds. Refer to the figure 1, large number of farm holdings show SCC level higher than 400,000 /ml. The majority of farms have serious udder health problems.

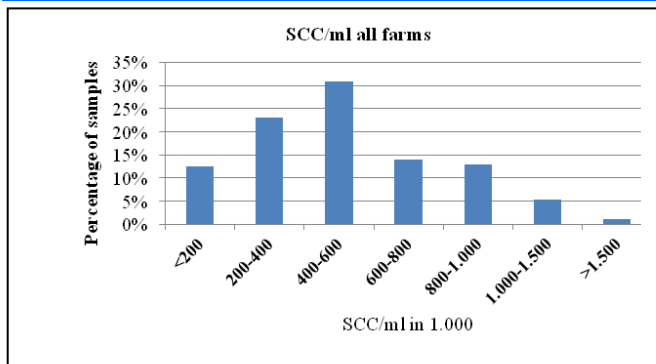


Fig. 1. Percentage of sample results according to categories of SCC on farm level

In this study we have categorized the Albanian farms in four groups, from smaller 1-5 cows to bigger with more than 50 cows. As it is indicated by Figure 2, in small farms with 1-5 cows, the percentage samples with more than 400.000 SCC/ml is lower than in bigger size farms. Elevated number of SCC is an expected case in farms with higher animal population due to required labor for management. Similarly, reduced SCC in farms with relatively less animal population it can be expected, due to more focuses facility and workers. It is indicates also that particular dairy farms with bigger herd size have significant problems with udder health.

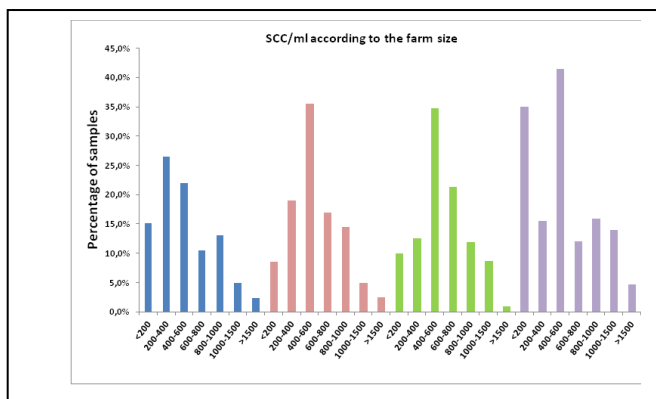


Fig. 2. Percentage of samples according to SCC categories and farm size (903 samples), in blue are farms with 1-5 cows, in red farms with 6-10 cows, green farms with 10- 50 cows and purple farms containing more than 50 cows.

The following figure 3 shows that because Somatic Cells are of course not increasing during further transport to MCC the results at MCC are similar like in figures 1 and 2 on individual farms.

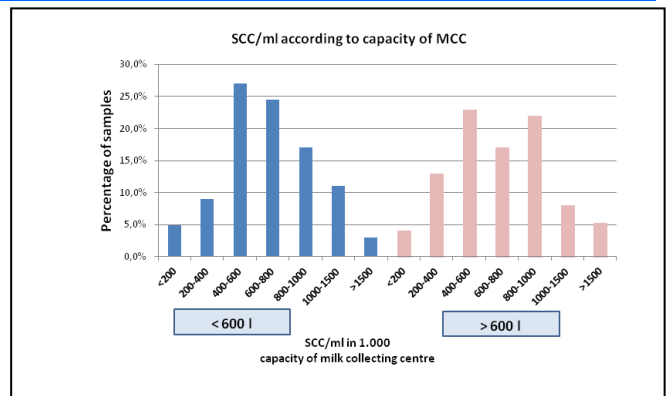


Fig. 3. Percentage of samples according to SCC categories and capacity of MCC (297 samples)

#### IV. CONCLUSION

The results of milk analyses are opening the eyes for the reality of raw milk quality of cow-milk in Albania. The results are very similar to the results available from some new EU member states such as Hungary or Slovenia about 30 – 40 years ago when the farm structure, milking technology, milk storage, milk cooling and other conditions were quiet similar like it is in Albania today.

The raw milk quality is currently in Albania far away from national targets and specifically from EU standard. The results are reflecting the conditions which can be observed in many dairy farms, at collection points and centers or during the transport of raw milk before entering the milk processor.

It is obvious that the majority of dairy farms in Albania are not in the position to achieve the national targets in a short period. The further development process requires several actions in the framework of a realistic transition period.

Farms with higher number of cows have obviously more problems on udder health (SCC). Important reason for the critical level of raw milk quality is amongst others that milk testing system for the bulk milk tank as well as a dairy herd improvement system is not in place. Without such tools and regular information about the microbiological status of the milk and farm advisory support as applied in many other countries, it cannot be expected that the dairy sector will improve very fast on milk quality during next years.

#### REFERENCES

- [1] Barbano, D.M., Ma, Y. and Santos, M.V., 2006. Influence of raw milk quality on fluid milk shelflife. *Journal of Dairy Science* 89: E15-E19.
- [2] Dohoo, I.R. and Leslie, K.E., 1991. Evaluation of changes in somatic cell counts as indicators of new intra-mammary infections. *Preventative Veterinary Medicine* 10: 225-237.
- [3] Fetrow, J., Steward, S., Eicker, S.S., Farnsworth, R. and Bey, R., 2000. Mastitis: an economic consideration. *Proceedings of the 39th Annual Conference of the National Mastitis Council*, Atlanta, GA, USA, pages 3-47.
- [4] Geary, U., Lopez-Villalobos, N., Begley, N., McCoy, F., O'Brien, B., O'Grady, L. and Shalloo, L., 2012. Estimating the effect of mastitis on the

profitability of Irish dairy farms. *Journal of Dairy Science* 95: 3662-3673.

[5] Halasa, T., Huijps, K., Osteras, O. and Hogeveen, H., 2007. Economic effects of bovine mastitis and mastitis management: A review. *Vet Quarterly* 29: 18-31.

[6] Hogeveen, H., (2005) Mastitis in dairy production, current knowledge and future solutions. Wageningen Ac. Publication, Wageningen

[7] MAFCP Statistics Yearbook of Albania, 2010.

[8] ISO 13366-2|IDF 148-2:2006 Milk-enumeration of somatic cells, Part 2-guidance on the operation of fluoro-opto-electronic counters

[9] ISO 13366-1|IDF 148-1:2008 Milk-enumeration of somatic cells, Part 1-microscope method (reference method)

[10] Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for on the hygiene of foodstuffs. *Official Journal of the European Union*. 2004. 139/55. Annex II, section IX

[11] Ruegg, P.L., 2011. Managing mastitis and producing high quality milk. In: "Dairy Cattle Production Medicine" (eds. C. Risco and P. Melendez), Wiley-Blackwell Publishing Ltd, Ames, Iowa, USA.

[12] Smith, K.L. 1996. Standards for somatic cells in milk; physiological and regulatory. *Mastitis Newsletter, Newsletter of the ID*, 144: 7.