

## SAFETY OF RAW MILK IN THE POLLOG REGION

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### Abstract

The purpose of this paper is to assess how far has reached the total number of microorganisms and somatic cells in raw milk of cow, in the region of Polog and how much it is in accordance with the new Law on food safety. Respectively this paper will also be a contribution to the relevant institutions to assess the dynamics of a decision to reduce the total number of microorganisms and somatic cells at certain level for a period of time. The paper was conducted during 2010 in several collection points throughout the region Polog, in order to see the seasonal effect on the aforementioned parameters.

Tests conducted show that the total number of microorganisms and somatic cells differ greatly throughout different seasons annually, which is closely related to non-compliance of hygienic conditions in the farm, storage and transportation of raw materials, parameters which generally are not in accordance with the Law on food safety and regulation of microbiological.

**Key words:** Safety, raw milk, somatic cells, Polog region, Law on food safety.

### 1. Introduction

The milk from the moment of its way out from the mammary gland is not sterile. The greater pollution of milk occurred from the surrounding environment and the teat (Bijo and Andoni [1]).

Through the teat canal, the microorganisms can climb on the galaktofore routes, but during this way a selective selection of microbial strains is made (Tiecco [2]). Even the milking which is thought to be made in perfect sterility conditions has a modest microbial load.

The causes of contamination of milk after milking can be many and they are categorized into:

1. Reasons related to animal;
2. Reasons related to the environment;
3. Reasons related to the milking system.

The milk after milking undergoes some changes in the microbiological aspect, more specifically in the early hours after milking happens microbial number decrease due to the presence of some cases with bactericidal action in it (Danków *et al.* [3]). This stage or bactericidal abilities can stay for a longer time if the milk is kept under low temperatures. One of the elements which determine the milk hygiene quality is the somatic cell count which is also the main mammary gland health condition measurement. In the cause of udder infection, their count increases even to a dozen or so million per 1 mL of milk (Bernacka [4]).

The normal milk contains cells (somatic cells) with different origins: some remain from the blood, while others from the breast glands (alveolar epithelium), major milk ducts and breast sucking (Schutz [5]).

### 2. Materials and Methods

The samples are taken in different parts of the region of Polog through 2010. Taking into account the geographical characteristics of these parts, sampling is divided in two parts:

1. Dry Mountain (Suva Gora) villages;
2. Shara mountain villages.

From each village four samples are taken during different seasons of the year. The samples obtained were analyzed in the Veterinary Institute- Skopje. In all the samples were analyzed the total number of bacteria and somatic cells. The total number of bacteria was analyzed by IDF 161:1995, while the number of somatic cells by ISO 13366-2:2006.

### 3. Results and Discussion

**Table 1. Results for the months February to June in Suva Gora (Dry Mountain) villages\***

No.	Sample	February		March		April		May		June/ Cooling	
		TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.
1	Ten/1	2624000	555000	4611000	1396000	4124000	305000	6459000	1288000	3326000	406000
2	Ten/2	542000	95000	682000	556000	434000	476000	626000	12000	537000	276000
3	Ten/3	778000	448000	2302000	688000	1994000	384000	2538000	411000	1499000	274000
4	Ten/4	1318000	427000	4428000	205000	3120000	376000	3418000	75000	1914000	455000
5	Vol/1	509000	211000	410000	255000	1260000	268000	886000	86000	414000	42000
6	Vol/2	1029000	705000	879000	416000	2685000	139000	1574000	420000	1548000	268000
7	Vol/3	1134000	294000	3978000	494000	3393000	637000	3171000	578000	3025000	514000
8	Vol/4	2040000	669000	4449000	540000	6587000	424000	6826000	1917000	4334000	350000
9	Cel/1	779000	401000	613000	326000	852000	532000	1133000	369000	1722000	491000
10	Cel/2	2101000	526000	2294000	346000	275600	682000	3025000	286000	2274000	204000
11	Cel/3	1618000	755000	1291000	648000	1382000	351000	2205000	234000	2196000	385000
12	Cel/4	3555000	491000	3756000	586000	4289000	329000	6820000	281000	4438000	246000

\*TNB (Total Number of Bacteria), S.C. (Somatic Cells).

**Table 2. Results for the months July to November in Suva Gora (Dry Mountain) villages\***

No.	Sample	February		March		April		May		June	
		TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.
1	Ten/1	4723000	503000	4207000	321000	2894000	503000	2901000	226000	1452000	173000
2	Ten/2	648000	266000	745000	312000	402000	248000	420000	485000	342000	844000
3	Ten/3	1859000	199000	1834000	373000	1043000	130000	1132000	267000	906000	315000
4	Ten/4	2641000	610000	3314000	286000	1564000	523000	1451000	332000	1492000	363000
5	Vol/1	444000	308000	459000	245000	107000	594000	253000	218000	307000	125000
6	Vol/2	1920000	194000	3590000	325000	2468000	594000	2699000	282000	1928000	719000
7	Vol/3	4296000	637000	3738000	270000	4954000	292000	4289000	151000	3154000	127000
8	Vol/4	2659000	282000	3344000	441000	1905000	274000	1649000	277000	1319000	327000
9	Cel/1	2723000	279000	3707000	257000	2388000	210000	3151000	335000	2717000	331000
10	Cel/2	1056000	396000	2497000	384000	1951000	247000	1958000	290000	1379000	234000
11	Cel/3	3138000	273000	4121000	136000	1089000	580000	1205000	496000	1079000	234000
12	Cel/4	4768000	464000	5045000	378000	2759000	363000	2763000	244000	2154000	246000

\*TNB (Total Number of Bacteria), S.C. (Somatic Cells).

**Table 3. Results for the months February to June in Shara mountain villages\***

No.	Sample	February		March		April		May		June	
		TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.
1	Bog/1	190000	414000	308000	559000	338000	282000	537000	241000	404000	172000
2	Bog/2	2961000	115000	1435000	398000	1948000	277000	1822000	196000	1370000	140000
3	Bog/3	719000	284000	566000	231000	948000	177000	1265000	180000	832000	149000
4	Bog/4	1277000	840000	1150000	276000	1607000	814000	616000	115000	411000	121000
5	Gra/1	1219000	494000	983000	433000	856000	279000	1361000	239000	2069000	318000
6	Gra/2	382000	745000	335000	924000	432000	651000	753000	457000	184000	189000
7	Gra/3	1338000	840000	2223000	790000	2382000	571000	2599000	283000	1594000	342000
8	Gra/4	952000	553000	1174000	1042000	1883000	1865000	1819000	142000	1531000	243000
9	Neg/1	5028000	688000	4411000	853000	3308000	459000	824000	190000	2157000	523,000
10	Neg/2	977000	332000	745000	287000	1839000	524000	880000	113000	267000	214,000
11	Neg/3	3211000	100000	4832000	864000	3308000	459000	756000	152000	1042000	145000
12	Neg/4	876000	517000	857000	412000	950000	586000	359000	148000	898000	943000

\*TNB (Total Number of Bacteria), S.C. (Somatic Cells).

**Table 4. Results for the months July to November in Shara mountain villages\***

No.	Sample	February		March		April		May		June/ Cooling	
		TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.	TBN/ml	S.C.
1	Bog/1	543000	238000	888000	161000	585000	318000	363000	331000	290000	391000
2	Bog/2	1027000	188000	1570000	226000	931000	134000	1095000	158000	923000	161000
3	Bog/3	1187000	231000	1602000	201000	2003000	249000	2317000	184000	2285000	182000
4	Bog/4	586000	349000	745000	108000	581000	342000	388000	156000	243000	269000
5	Gra/1	2132000	144000	2681000	370000	2165000	337000	2118000	331000	1859000	105000
6	Gra/2	867000	709000	1058000	307000	778000	256000	450000	423000	247000	330000
7	Gra/3	2132000	144000	2943000	628000	2490000	310000	2229000	754000	1854000	148000
8	Gra/4	2152000	163000	2033000	245000	2165000	337000	1588000	294000	1027000	498000
9	Neg/1	2071000	590000	2303,000	564000	1869000	239000	1586000	631000	1192000	757000
10	Neg/2	350000	157000	757000	308000	788000	149000	827000	145000	662000	117000
11	Neg/3	1480000	473000	1833000	806000	1469000	688000	1410000	362000	1078000	685000
12	Neg/4	1292000	105000	1726,000	708000	1288000	532000	1348000	850000	1053000	121000

\*TNB (Total Number of Bacteria), S.C. (Somatic Cells).

Referring to tables 1,2,3,4 it can be seen a gradual increase in the number of total bacteria by the end of the month in May, while in the coming months, despite of the temperature increase, the total number of bacteria increase is very small. This comes as a result of not receiving milk from processors who are not cooling the milk and who are not improving hygienic conditions.

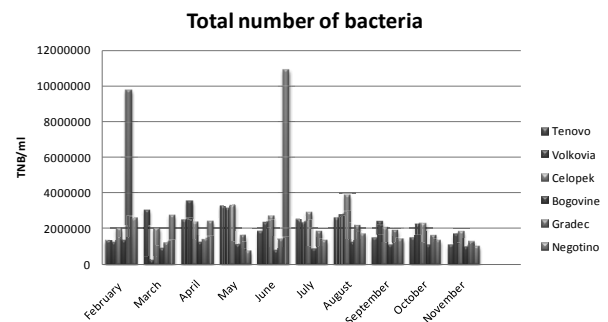
Referring to the results for the number of somatic cells in Table 1, 2, 3, 4 we can notice an increase of the number of somatic cells from February to April and in the coming months here is a gradual decline in the number of somatic cells. The high number of somatic cells during the months February, March and April is due to environmental conditions on the farm, while the period May - September it can be noticed somatic cells reduction, which is result of breeding the animals outside farm regime.

In Figures 1 and 2 are shown simple arithmetic average for the total number of bacteria and the number of somatic cells from February until November.

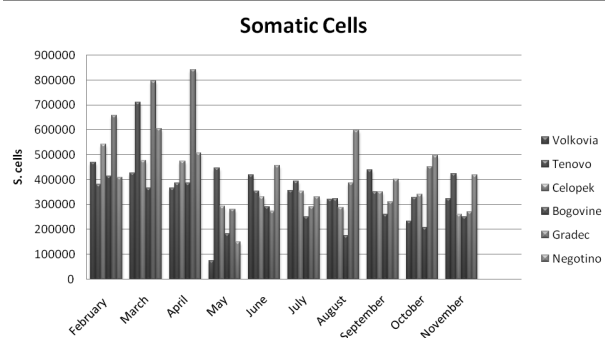
The formula for the simple arithmetic average.

$$\bar{x} = \frac{\sum xi}{x}$$

$\bar{x}$  = Arithmetic average;  $\sum xi$ = amount of data;  
n = number of data



**Figure 1. Total number of bacteria (TNB)**



**Figure 2. Number of somatic cells**

#### 4. Conclusions

Law regulation on specific requirements for safety and hygiene, manner and procedure for performing official control of milk and milk products (Official Gazette of the Republic of Macedonia No. 151/2007) Annex 3, requirements for raw milk and milk products in the period 2008-2012 is presented in Table 5.

**Table 5. Legal requirements for raw milk since 2008 - 2012**

Year	Number of bacteria	Number of somatic cells
01.01.2008	800,000	600,000
01.01.2009	600,000	500,000
01.01.2010	400,000	400,000
01.01.2011	200,000	400,000
01.01.2012	200,000	400,000

According obtained results we can conclude that:

- - The total number of bacteria in raw milk in the Polog region does not meet the requirements from according the regulation on specific requirements for safety and hygiene, manner and procedure for performing official control of milk and milk products (Official Gazette of the Republic of Macedonia No. 151/2007). There are differences between the regions, where the villages gravitating the Shara mountain have lower numbers than those of the Dry mountain.
- - Regarding somatic cells number, it can be said that they are generally within the regulations requirements, except for village Tenovo, where during February, March and April we found very high somatic cells number.
- - We recommend milk to be cooled throughout the whole year. Also we recommend: application of hygienic measures and milk payment on the basis of total number of bacteria and somatic cells number, which will contribute in their reduction.

## 5. References

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