

Total bacterial count in raw milk from the farms from Region “Ovče Pole”, Republic of North Macedonia

Sanja Kostadinović Veličkovska*, Zoran Arsevski, Fidanka Ilieva, Daniela Dimovska and
Aco Kuzelov

Faculty of Agriculture, University “Goce Delčev”, Krste Misirkov bb, 2000 Štip, Macedonia

e-mail: sanja.kostadinovik@ugd.edu.mk

Introduction

Raw milk must meet quality standards; it should be free of drug residues, free of added water and free of sediment, contaminants and other abnormalities. The categorization of farms according to the EU regulation for the quality of raw milk with milk cows is done according to the number of somatic cells and the total number of bacteria in the milk. In the first category are farms where the number of somatic cells in milk is less than or equal to 400,000 per milliliter of milk, and the total number of bacteria is up to 100,000. Bacterial contamination of milk can come from a variety of sources such as air, equipment used for milking and storing milk, food, soil, feces, bedding, animal health, and poor cooling (Karmen & Teger, 2008). External contamination of the udder can have a huge impact on the total number of bacteria. (Bramley and McKinnon, 1990). Improper disinfection of towels used to dry the udder can significantly increase the likelihood of contamination (Sana et al., 2003). Silage is also an important source of contamination with *Listeria* spp., including *L. monocytogenes* and other potential human pathogens such as *Yersinia enterocolitica* and *Aeromonas hydrophila* (Sana et al., 2003). Microbiological contamination of milking machines depends not only on the sanitary procedure but also on many other factors, such as milking procedures and the environment in the milking room (Feldman et al., 2006). Sick cows can secrete pathogenic bacteria through milk. Raw milk can therefore be dangerous to the consumer, and some diseases such as tuberculosis, brucellosis and anthrax can be transmitted directly to the consumer (O'Reilly et al., 2006; Pal et al., 2007). This research study presents an insight into the number of bacteria as indicators of the quality of raw milk from the Ovče Pole region. For the needs of this research, an analysis was made of 1320 samples for the presence of bacteria in raw milk. From the analyzes made by the milk producers that were the subject of analysis in this research, it can be concluded that they do not adhere to good agricultural practice, the level of milk contamination is high due to poor hygiene, improper handling of milk after milking and insufficient education of farmers for hygiene in primary production.

Materials and Methods

To determine the total number of bacteria in the period from January to June 2018, 1316 samples were taken, while to determine the number of somatic cells, 478 samples of raw milk from producers in the Ovče Pole region. Samples are taken and delivered in sterile plastic cups with a volume of 50 ml canned by Adizol (Sigma-Aldrich vol. 25 ml). After taking, they were transported at a temperature of 4°C in the laboratory for testing the quality of raw milk at the Faculty of Veterinary Medicine Skopje.

All samples are analyzed by accredited method in accordance with ISO 21187: 2004. The instrument used for the tests was the Bactoscan 8000S (Foss Electric Denmark). The BMO procedure was performed according to the Milk-Quantitative determination of bacteriological quality, IDF Standard 161A: 1995 This device works on the principle of staining bacteria with fluorescent dye. In the procedure after staining the bacteria, a thin film of the milk sample is placed on a rotating disk under the lens of a fluorescent microscope. This microscope counts colored bacteria as light pulses that are electronically converted and displayed as numerical data.

Month	Analysis 1	Analysis 2	Mean value 1	Mean value 2
January	80	72	348860,75 cfu/ml	326069,44 cfu/ml
February	87	81	392069,76 cfu/ml	332160,49 cfu/ml
March	102	102	464715,68 cfu/ml	454764,70 cfu/ml
April	124	124	581274,19 cfu/ml	538637,09 cfu/ml
May	137	137	623395,6 cfu/ml	605548,18 cfu/ml
June	137	137	538208,82 cfu/ml	552102,9 cfu/ml

Table 1 Number of bacteria average value per month

Results and discussion

In our researches of a total 1320 analyzes taken twice a month in the first (667 samples) and the second half of the month (653 samples), only 138 samples meet the National Standards, while according to the EU (Council Directive 92/46 EEC). Presented by months as the average value of bacteria that were detected in raw milk, it is obvious that the average value in January is the lowest with 326069.44 cfu / ml while in May it is the highest with 623395.6 cfu / ml.

The results of our research on the samples selected from the Ovče Pole region showed that only 10.45% meet the criteria according to the Rulebook on amending the rulebook on special requirements for safety and hygiene and the manner of the procedure for performing official controls on milk and dairy products (Official Gazette of the Republic of Macedonia, No. 197 of 28.10.2016) where the limit for the allowed number of bacteria is 400 000 cfu / ml, while none of the samples meet the criteria of the European legislation.

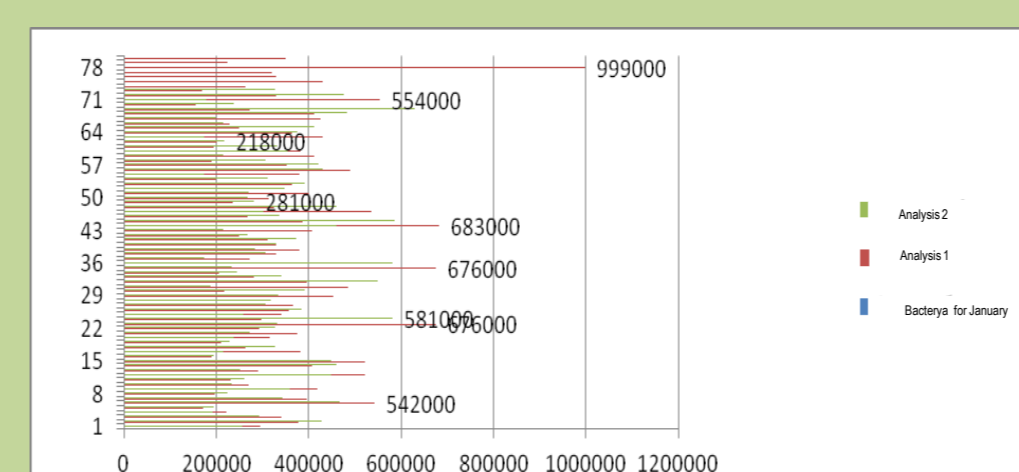


Figure 1. Total number of bacteria for January

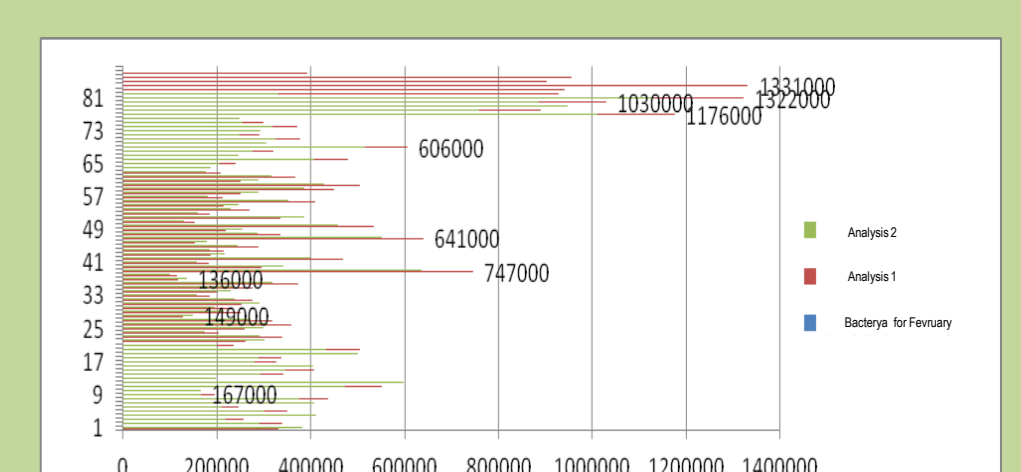


Figure 2. Total number of bacteria for February

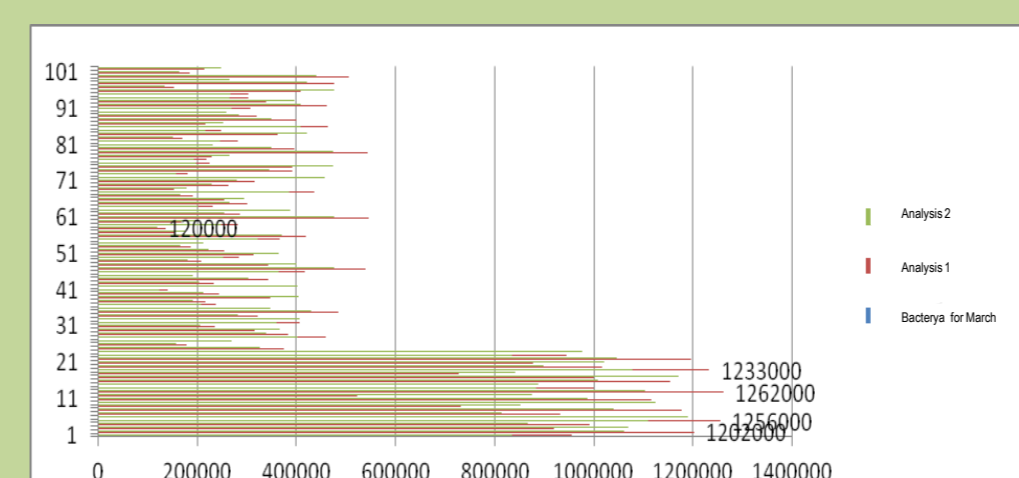


Figure 3. Total number of bacteria for March

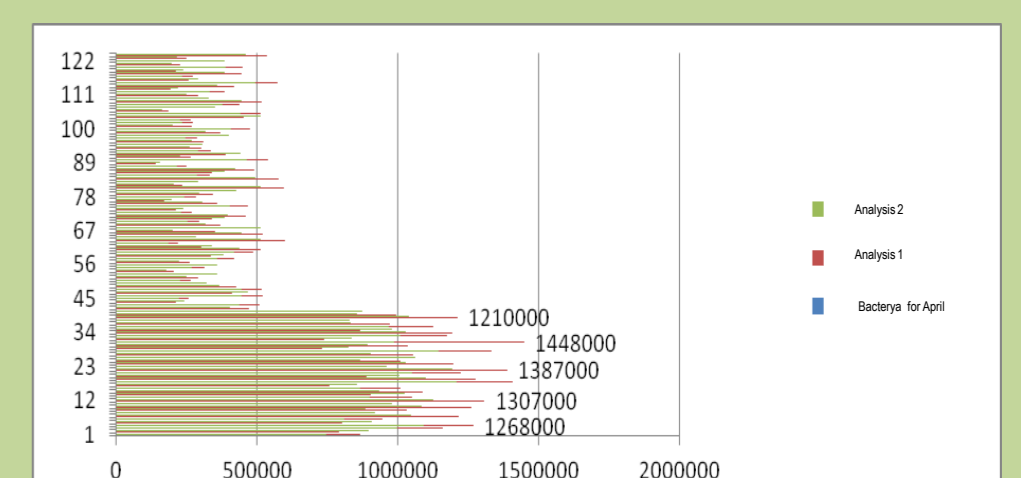


Figure 4. Total number of bacteria for April

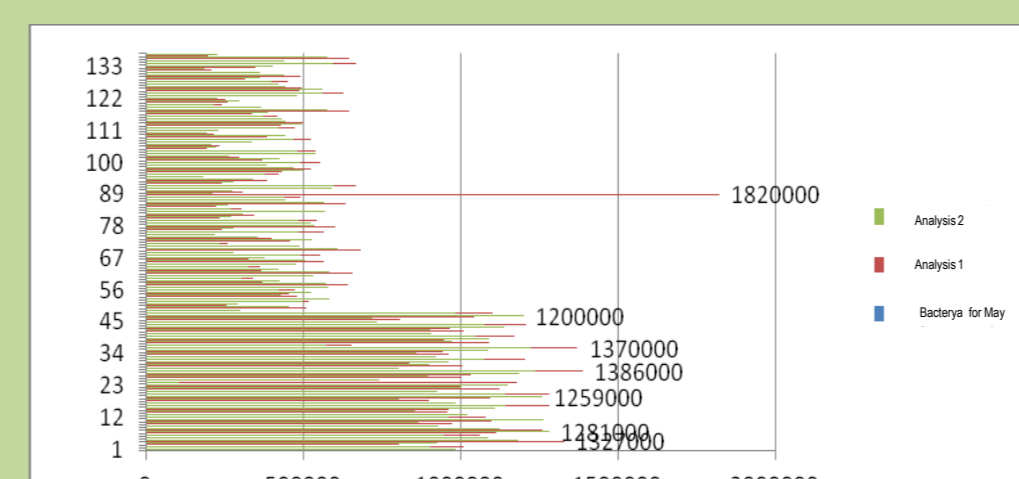


Figure 5. Total number of bacteria for May

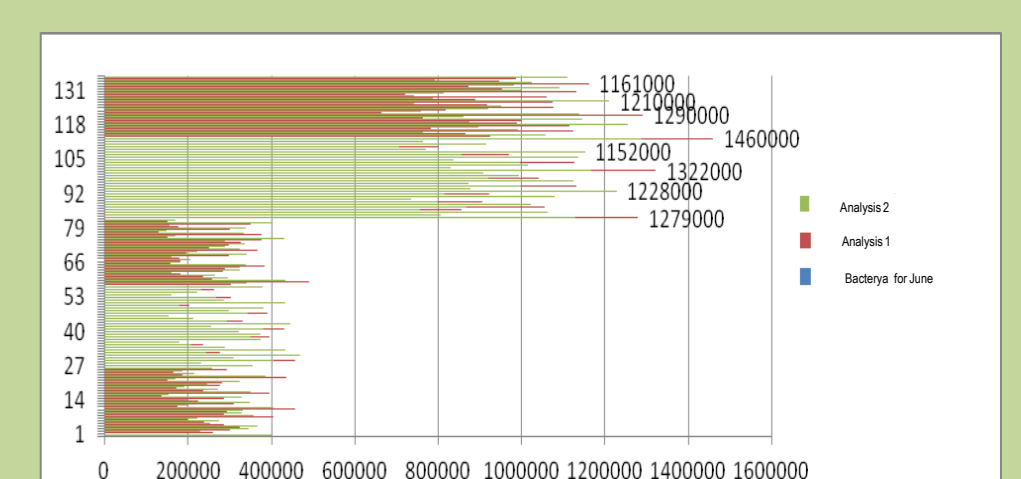


Figure 6. Total number of bacteria for June

Conclusion

According to the data obtained from our research, the main problem for the quality of raw milk selected from the Ovče Pole region is the increased number of bacteria. This problem can be solved by educating farmers for better hygiene during milking, transport and storage of bulk milk. The second approach to solving this problem is to stimulate farmers to invest in automated milking lines, instead of manual milking, which would avoid microbiological contamination of raw milk.

Reference

1. Analytical and Bioanalytical Chemistry, 395, 1215e1224. Sana;
2. Bramley, A.J. and C.H. McKinnon. 1990. The microbiology of raw milk. pp. 163-208 In Dairy Microbiology, Vol. 1. Robinson, R.K. (ed.) Elsevier Science Publishers, London;
3. EU (Council Directive 92/46 EEC);
4. Службен весник на РМ, бр. 197 од 28.10.2016 година (Official Gazette of the Republic of Macedonia, No. 197 of 28.10.2016);
5. T. G. Karmen and G. S. Teger, "The Microbiological Quality of Raw Milk after Introducing the Two Day's Milk Collecting System," Acta Agriculturae Slovenica, Vol. 92, No. 1, 2008, pp. 61-74;