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Evaluation of Microbiological Criteria of Raw Milk in Albania

GENTIANA BARDHI[1*], ILIRJANA BOCI[2], EDERINA NINGA[3]

[1]Food National Authority, Tirana, Albania,

2Department of Industrial Chemistry, Faculty of Natural Sciences, University of Tirana, Tirana, Albania,

3 Department of Toxicology, Institute of Food Safety and Veterinary, Tirana, Albania

* Corresponding author e-mail: gbardhi12@yahoo.com

Abstract:

This paper gives the results of the Albanian monitoring plan for the raw milk in 121 domestic subjects: producing farms, collecting points and processing plants. The main objective for this monitoring was the evaluation of milk microbiological criteria. This monitoring was carried out during the year 2013 separated in two phases: 1-31 May and 1-31 October. Milk sampling was made by Regional Directorates Inspectors of National Food Authority in conformity to S SH ISO 707:1999 "Sampling method of milk and milk by-products. The microbial evaluation was carried out based on the norms laid down in Decision of Council of Ministers Nr.1132 date 05.08.2008: "Approving norms for collecting raw milk". 415 samples were analyzed in total for the total content of micro flora as well as somatic cells. The TMC test was determined according to ISO 4833:2003 and SCC was determined according to White-Side-Test (WST), California Mastitis Test (CMT) and ISO 13366-1:1997. The results taken for the two phases of the monitoring plan has shown unsatisfactory results. This indicates that is necessary to improve the existing situation in milk producing farms, collecting points and processing plants as well.

Keywords: Raw milk, microbiological criteria, SCC- Somatic Cell Content, TAC-Total Aerobic Count.

1. Introduction

The principal components of milk are water, fat, protein and lactose. Its high water activity, moderate pH (6.4-6.6) and ample supply of nutrients make milk an excellent medium for microbial growth. Three sources contribute to the micro-organisms found in milk: the udder interior, the teat exterior and its immediate surroundings, and the milking and milk-handling equipment [1]. The microbial content in milk is the main component for milk quality and safety evaluation. It is related the hygiene level during milking process, storage and transport as well. Sources of milk contamination could be of deferent sources: air, water, food, milking process equipment, tanks, and pipes included. To better understand the importance of the hygienic conditions we can say that in many scientific studies is clearly underlined that in bad hygienic condition, total aerobic count may increase up to 500 times or more. So it's obvious that the premises and all the milking equipment should be always clean enough.

Milk temperature: Milk just collected should be immediately processed or stored in such a temperature to keep microbial development under control. Nevertheless it should be taken care, because the cooling process doesn't determine the milk microbial content decrease, and sometimes it happens to have a multiplication of some certain microorganisms.

Milk contains a large number of microorganisms but it is important to know them related to their pathogenic characteristics and the derived consequences during technologic process, caseification, acidification and cheese ripening process.

Animal: its healthy condition, a contaminated udder will bring milk contaminations. Examination for the presence and number of specific micro-organisms is, therefore, an integral part of any quality control or quality assurance plan and it may be applied to a number of areas: raw materials, intermediate samples, finished products, or environmental/equipment sites.

Milk-borne and milk-product borne outbreaks represent 2–6% of bacterial food-borne outbreaks reported by surveillance systems from several countries [4].

The personnel: before milking, some strict hygienic procedures should be followed by the personnel, which unfortunately are under estimated for their real high risk level.

2. Material and Methods

2.1. Sampling area

A National Plan for raw milk monitoring was conducted in order to assess the microbiological quality of raw milk in different Albanian regions. The monitoring plan was separated in two phases, the first phase during month of May 2013 and the second one during October 2013. The sampling of raw milk material was performed in accordance with SSH ISO 707: 1999 for the sampling method of raw milk and by-products of milk origin [6] from the regional inspectors National Food Authority. The subjects involve in the study were the production farms, collecting centers, and milk processing establishment.

2.2. Sampling

The number of sample collected for propose of this study were 416. 296 sample were collected during May and the rest (109 samples) during October. All the samples were collected under aseptic condition.

2.3 Microbial evaluations

The TAC was determined according to the method ISO 4833:2003 [2].

2.4 Somatic Cell Count

Somatic cells content was determined according to White-Side-Test (WST) [8] in all regional laboratories except for the regions of Gjirokastra and Tirana. In Tirana the tests were made in the Institute of Food Safety and Veterinary. In these both regions the tests were made according to California Mastitis Test (CMT) [3] while in the region of Korca the Microscopic Method ISO 13366-1:1997 was used [5].

3. Results and Discussion

The overall assessment was carried out according to the established norms laid down in Decision of Council of Ministers Nr.1132, dated on 05.08.2008 "On approval norms for raw milk collecting" [7] as it follows: For cow's raw milk: The content of total aerobic count (TAC) at 30ºC ≤ 100.000, Somatic cells content ≤ 400.000.

Taking into account the maximum levels allowed during this monitoring plan (in both phases), a total number of 415 milk samples have been taken and tested for the content of total aerobic count and somatic cells.

Figure 1 and 2 shows the relation between the analyzed samples and the non compliant results taken during this monitoring program:

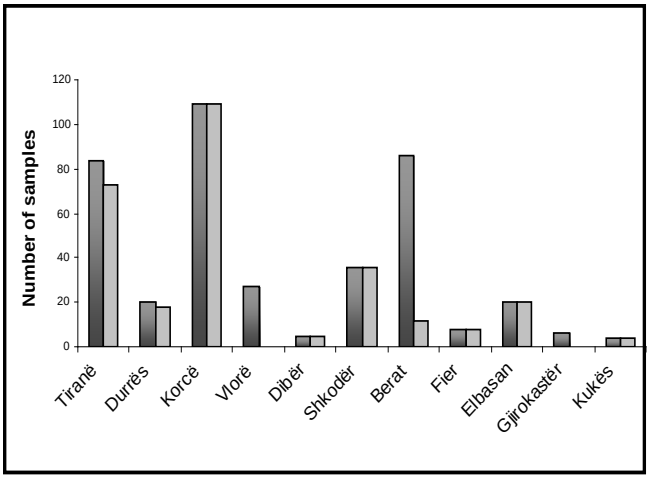
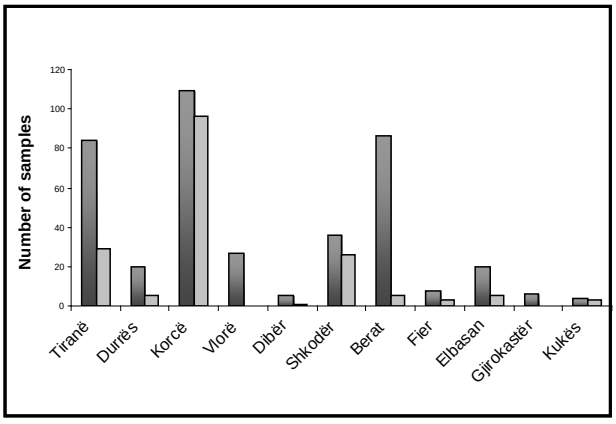


Figure 1: Comparison of number of samples in study and the non compliant results for TAC.

In all the regions was shown to have very height level of TAC although in some of them the number of samples were very low, expected the region of Vlora and Gjirokastra. The reasons for the high content of total aerobic count are numerous and multi-factorial. Some of the most important are mentioned below:

Milk contamination in the milk ducts from the breasts during the process of milking and during its transportation to the cooling tanks,contact with different contamination sources such as unclean milker hands, the skin of the animal's breast, nipples and the milk passage plant. Inadequate milk filtering just immediately after milking.



.**Figure 2:** Comparison of number of samples in study and the non compliant results for SCC.

Malfunctioning of the cooling tanks or their improper hygienic conditions. Milk and its by products should be processed, stored, transported and marketed in frigoriferic condition in order to keep its initial quality and stability, implementing all steps of the so called “Cooling chain”.

Inadequate microbiologic quality of the water used for cleaning the equipment and the plant.

Storage temperature of milk and its exposure to the outdoors environment

While for the somatic cells content during the two monitoring stages a total number of 416 samples have been taken and tested, from which: 295 samples in the first stage: from these: 53% resulted within the allowed level and the remaining of 47% resulted out of the allowed level. 121 samples in the second stage: from these: 73% resulted within the allowed level and the remaining of 27% resulted out of the allowed level.

4. Conclusions

Total Aerobic Count is used to primarily evaluate the hygienic condition of the very first step of the milk production chain and the somatic cells have long been utilized to gauge the infection status of the udder. In this study has been shown the results taken for the two phases of the monitoring plan. Most of the results have shown unsatisfactory results for both TAC and SCC. This indicates that is necessary to improve the existing situation in milk producing farms, collecting points, processing plants as well as well as animal welfare.

5. Acknowledgements

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