The Hygienic Quality of Raw Milk Produced by Dairy Farms

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Abstract. This paper has as main purpose the analyse and evaluation of raw milk hygienic quality in dairy farms, considered as a link in the frame of the milk commodity chain. This study also intend to assess the sanitary veterinary surveillance system of cow milk hygienic quality and to set up a set of advisories with a view to improvement of milk and milk products quality and defending consumers health. The study was realized at the level of a milk commodity chain comprised of about 1.000 dairy farms (milk sources) with around 3.600 milk cows in January 2004 – December 2008 period. Analysis of milk microflora revealed the important pollution of raw milk with Staphylococcus sp. and Streptococcus sp. at the level of milk sources. Official control of milk quality expressed by TGC and SCC evaluation indicates for this specific milk commodity chain that only 39% of the investigated milk situates under the limit of 100.000 germs per milliliter and 52.5% under the limit of 400.000 somatic cells per milliliter.

Keywords: milk commodity chain, hygienico-sanitary milk parameters, milk microflora, milk sources, comparative analysis.

INTRODUCTION

Ensuring cow milk hygienic quality become a public safety issue. Beyond the necessity of permanent supply at low costs, this product must be hygienico-sanitary safe. Milk sanitary security can only be assured in the frame of a milk commodity chain approach, where all actors involved are responsible and actively involved in defending hygienic milk quality (VALEEVA and col. 2004).

This approach will enable a better traceability therewith the identification of critical points inside the milk commodity chain that can emerge hazards able to severely affect the hygienico-sanitary milk parameters.

Milk security approach starts at the level of dairy farms and requires permanent responsibility especially concerning the veterinary services that must have as the main duty to meet the consumers requirements and exigencies (FAO, 2003).

The researches included in this study regarding the efficiency of the sanitary veterinary surveillance system of cow milk hygienic quality at the level of dairy farms, aims to square up to the next purposes:
- identification of milk health parameters monitored at farm level;
- analyse and evaluation of milk quality;
- assessment of sanitary veterinary surveillance system of cow milk hygienic quality;
- setting up a set of advisories with a view to improvement of milk and milk products quality and defending consumers health.

MATERIAL AND METHODS

The study was realized at the level of a milk commodity chain comprised of about 1,000 dairy farms (milk sources) with around 3,600 milk cows in January 2004 – December 2008 period. In order to evaluate subclinical mastitis we used R-Mastitest cowside test system which allows to test milk from individual quarters, at the beginning and at the mid lactating period to all lactating cows producing processing milk. To study the structure and configuration of milk microflora, all milk samples collected in cases of mastitis or changes of organoleptic characteristics of raw milk were analysed within the departamental sanitary veterinary laboratory.

The method for evaluation of SCC, both for individual determinations and for collectivities from the bulk tank milk is FOSOMAT IC 5.000 (FOSS DANEMARK flux cytometry). The sistem of automat reading has a frequency of 500 stamples per hour. The count procedure bases on the conversion of milk cells into particles, fluorescent organic bodies, by their treatment with a fluorescent dyestuff that marks and identifies the DNA. The principle of total germ count evaluation bases on the view of bacteria from a milliliter of milk by coloration with a fluorescent dyestuff (etydium bromide) and introduction of a milk measure in the form of a bio film to microscope. Each bacteria is perceived and quantified by way of an electronic impulse and directly expressed in UFC.

The obtained data was systematized and graphically expressed, average values being established, which were compared with the literature.

RESULTS AND DISCUSSIONS

Regarding the incidence of subclinical mastitis, we established a medium incidence of 5.24% in the five consecutive years, with a maximum value in 2007, of 7.78%, and a minimum value in 2008, of 1.42%. In 2004-2007 period, the veterinary action of mammary gland inflammatory disorders survey was entirely granted by the veterinary state authority. This reveals the importance of state policies and implication regarding milk health survey and can explain the decline of the cowside tests performed (1509 in 2008 up against 7556 in 2007).
From the analysis of data it was found that in the period taken into study, the mean incidence of clinical mastitis into the milk commodity chain was 3.8%, with a maximum value of 4.4% registered in 2007, and a minimum value of 3.16% registered in 2008. Studies made by BARKEMA and col. (1998) in the Netherlands, regarding the incidence of clinical mastitis revealed a mean incidence rate between 0.252 and 0.278, much lower than those obtained by us.

In similar studies made by ALAGIC and col. (2003) upon the incidence of clinical mastitis, monthly incidence ranged from 4.39% to 13.44% in a herd without any mastitis control program in place. Unfortunately, reality for most of the current dairy production in our country approaches rather the situation revealed in this second study.

To study the structure and configuration of milk microflora, all milk samples collected in cases of mastitis or changes of organoleptic characteristics of raw milk were analysed. The milk samples were microbiologically cultured within the departamental sanitary veterinary laboratory to identify bacterial pathogens.

The mastitis pathogen with the highest annual prevalence was \textit{Staphylococcus \ensuremath{\beta} hemolyticus}. The mean prevalence was 38.07\% ranging from 65\% in 2006 to 84.6\% in 2005. Similarly, other pollution germs where met into evidence, \textit{Streptococcus \ensuremath{\beta} hemolyticus} with an annual mean prevalence of 37.05\%, \textit{Staphylococcus \ensuremath{\alpha}, \ensuremath{\beta} hemolyticus} with an annual mean prevalence of 2.15\%, followed by \textit{Klebsiella spp.} with 2.02\% and \textit{Bacillus cereus}, the least prevalent with a percentage of 0.25. Analysis of these data reveals the important pollution of raw milk with \textit{Staphylococcus} and \textit{Streptococcus} germs.
at the level of milk sources. None of the samples were found to contain multiple potential pathogens.

Analysis of self-control results collected in two consecutive years on this segment of milk commodity chain, disclose the significant weight of compliant samples regarding the mesophilic aerobic germs per milliliter. We identified a percentage of 96 compliant samples in 2007, 4% of samples in 100,000 – 1,000,000 germs per milliliter category and no sample with 1,000,000 or over 1,000,000 germs per milliliter. Situation was similar in 2008, with 98.5% compliant samples.

In what concerns the results regarding the somatic cells count per milliliter, on the same samples, we have also ascertained that the majority of the samples, 100% in 2007 and 98.1% in 2008 were compliant with the European requirements of milk quality for this specific hygienic quality parameter. Only 1.9% of the samples were found to contain more than 600,000 milk cells per milliliter in 2008.

However, the official control of milk quality, carried out in the same period and at the same level of the commodity chain revealed in 2008, results rather different of those obtained in the self control program. Thus, only 39% of the samples proved to be compliant with the European requirements of milk quality regarding the mesophilic aerobic germs and 52.5% in what concerns the somatic cells count.
CONCLUSIONS

- The mean incidence of clinical mastitis into the milk commodity chain was 3.8%, while the subclinical mastitis had a mean incidence of 5.2%. Similar studies made upon the incidence of clinical mastitis, revealed an annual incidence that ranged from 0.252% to 13.44% depending on the mastitis control program in place.
- Analysis of milk microflora revealed the important pollution of raw milk with *Staphylococcus sp.* and *Streptococcus sp.* at the level of milk sources. None of the samples were found to contain multiple potential pathogens.
- Official control of milk quality expressed by TGC and SCC evaluation indicates for this specific milk commodity chain that only 39% of the investigated milk situates under the limit of 100,000 germs per milliliter and 52.5% under the limit of 400,000 somatic cells per milliliter.
- Supervision and control of milk hygienic quality by official programs substantiate a significant tendency of milk health bettering at the dairy farm level.

BIBLIOGRAPHY