



ULST Timisoara
**Multidisciplinary Conference on
Sustainable Development**
30-31 May 2024



MONITORING THE QUALITY AND HYGIENE OF RAW MILK IN A MILK PROCESSING PLANT LOCATED IN CLUJ COUNTY

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Abstract: In recent years an increasing demand and consumption of natural, raw and unprocessed products, was observed. Usually, those products are considered healthier and higher-quality products than the processed ones. At the same time, it is well known that the quality of milk and milk products on the market depends on various factors such as the microbiological quality of raw milk and in particular the initial number of microorganisms. The number and types of microorganisms in milk immediately after milking, defined as the initial microflora of the milk, directly reflect microbial contamination during production, collection and handling stages. Somatic cell number (SCN) has also become one of the most important indicators of the milk quality. The Regulation (EC) No. 853/2004 of the European Parliament allows raw cow's milk to be received and processed if it contains no more than 100.000 germs (expressed in colony-forming units - CFU) and less than 400.000 somatic cells per milliliter. Recent studies monitoring the quality of raw milk in small and medium-sized milk production units located in the western part of Romania, have revealed inconsistent values of integrity, hygiene and freshness parameters. Another major problem is represented by the widespread use of antimicrobials, used to treat various livestock diseases and the possibility that these antimicrobials may later contaminate the milk and reach the final consumer. Ultimately, these actions may lead to the development of antimicrobial resistance. As a result, the present paper aimed to assess the quality and the hygiene of raw cow's milk together with the testing of samples for the presence of antimicrobial residues, in the milk samples originated from five primary production units in Transylvania and processed by a factory in Cluj county, in order to provide a comprehensive insight of the current situation and the risks for the final consumers.

• Introduction

Bovine milk and dairy products have been used for human nutrition since antiquity and they are also considered highly valued traditional products even today. On the other hand, nowadays, association between nutrition and health is well known (11). Thus, most consumers are aware of the health properties of food, which has led to an increasing trend in the demand for natural and safe products for human consumption (10).

At the same time, milk and dairy products also contain numerous bioactive compounds that make them included in the functional foods group. These products are not only used by the human organism to bring nutrients and energy, but also to improve the human's health by decreasing the risk of disease and even to improve the organism's ability to respond to exposure to various pathogens (17). The contribution of milk to the maintenance of health and harmony of the organism can also be attributed to its composition. Milk is an important source of lipids, carbohydrates, calcium, phosphorus, magnesium, protein, zinc, iodine and of course important vitamins such as B2, B12, D and A vitamins (9).

• Material and method

The study was conducted between 2016 and 2018, in a milk processing plant, located in Cluj county. A total number of 300 bovine milk samples were collected from five primary production units (annotated A, B, C, D and E) located in different places in Cluj county. The units were monitored for the quality and hygiene during the qualitative and quantitative reception of milk, as a first step in the processing stage. Analyses of raw milk samples were carried out twice a month, during the survey period.

In order to assess the milk quality, physical and chemical analyses were performed for the following parameters:

- total solids (TS) content (%);
- fat (%);
- protein (%);
- lactose content (%);
- cryoscopic point;
- the presence of antimicrobials;

Acidity was determined to assess the freshness. The hygienic quality of milk was monitored using two indicators: total aerobic mesophilic bacterial count (APC) and somatic cell count (SCC).

• Conclusions

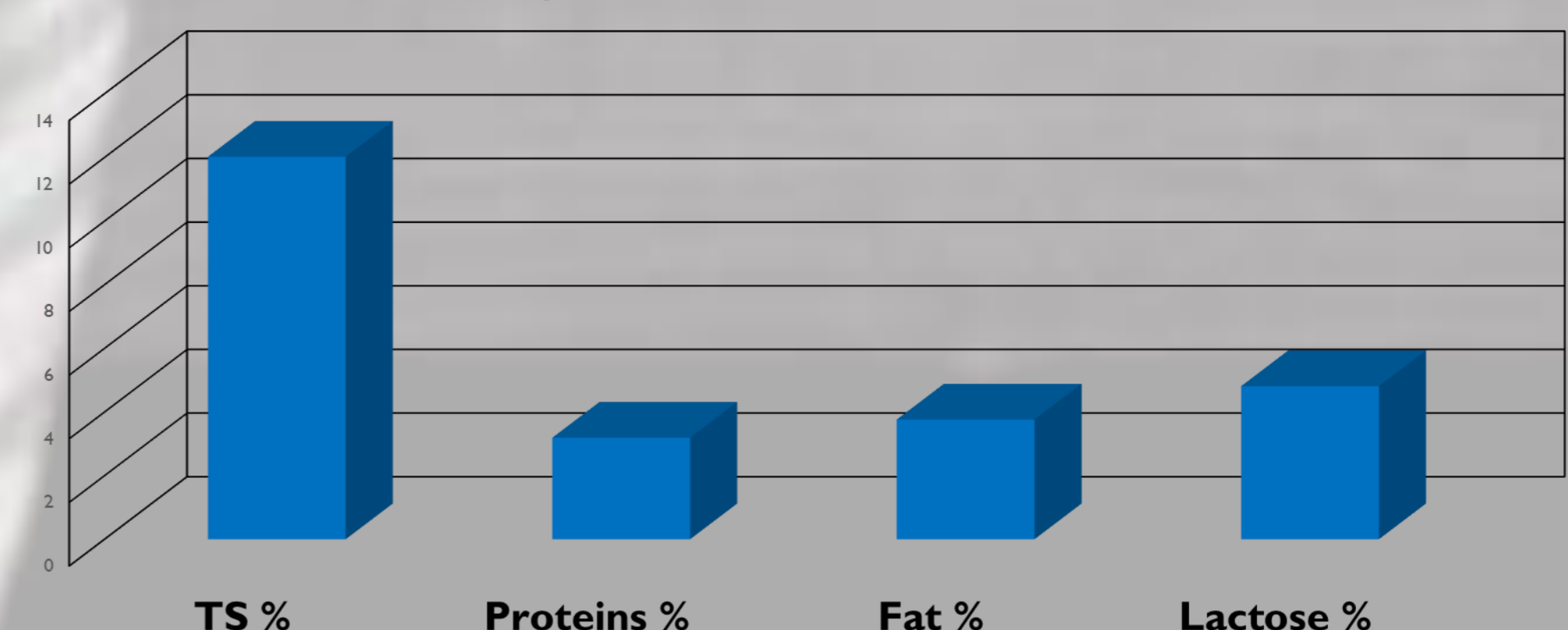
The milk provided by the five farms to a milk processing plant in Cluj county is not always an alternative that offers real benefits to the processor in terms of nutritional value and product safety. The variations in the chemical composition of raw milk which means that products of inconsistent nutritional value are delivered. The presence of antimicrobial residues in milk delivered to the processing plant makes this product a significant risk for both the processor and the final consumer. The results exceeding the maximum permissible limits found for somatic cell count and total number of germs reveal hygienic and health problems of cows and milking equipment in terms of ensuring minimum milking hygiene conditions and mammary gland health management.

• Results and discussions

Overall, the total solids (TS) had an average value of 12.02% with a minimum of 10.00% and a maximum of 14.05%.

The average value of protein (with very high nutritional value containing in optimal proportions all essential amino acids), was 3.19%, with a minimum of 1.7% and a maximum of 5.41%. The fat percentage ranged from 1.51% to 4.83% with an average of 3.76%. Lactose, the reducing diglucose specific to milk, was on average 4.81% in the analysed samples with a minimum value of 2.59% and a maximum of 7.72%.

Physico-chemical parameters



Of the 300 processed samples, a total of 14 (4.66%) showed antimicrobials residues. The APC is the main indicator of milk salubrity but also an indicator of the presence of different bacteria potentially pathogenic for the final consumer. Thus, in farm A only one sample (1.66%) had values above the maximum allowed limit. In farm B no APC values above the limit were obtained. Two samples (3.33%) collected from farm C, four (6.66%) samples from farm D also four (6.66%) samples from farm E had values which exceeded the maximum permitted limit

Average values of APC

