

Microorganisms in raw milk

Milk in the udder of healthy milk animal is practically sterile and does not contain any microorganisms. In reality, raw milk after milking always contains a load of bacteria. Quantity, types and species present in milk are determined by many parameters like:

- * health condition of the animal
- * sanitary design and condition of premises
- * hygiene level of milking equipment
- * hygiene level and health of milking staff
- * air quality
- * way of milking and storing milk
- * water quality

The food business operator must be aware that this step is crucial for milk quality from a hygienic and technological point of view. Milk is excellent and rich source of all nutrients necessary for life.

Improper handling and/or lack of hygiene can lead to development of harmful and pathogenic microorganisms.

Regardless the influence of all other parameters, one has to understand differences between hand and machine milking.

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Hand milking

Milking is done by hand into open containers. Microbiological quality depends on cleanliness of the udder, teats, hands, containers and ambient air. Milk is chilled rather slowly or directed straightly for processing. The dominant microflora (50-90%) constitute of lactic acid bacteria strains (Lactococci and Lactobacilli) The remaining bacteria belong to many different families and species. They can be pathogenic or technologically harmful like *Enterobacteriaceae*.

Mechanical milking

Milking is carried out with the use of milking machines. These can be portable milking machines, barn milking systems or milking parlour. Microbiological quality depends primarily on hygiene and maintenance of milking equipment.

The milking installation consists of many elements made of steel, glass, rubber and plastic. This environment is not favourable for lactic acid bacteria but promotes growth of psychrotrophic bacteria. If the installation is not kept clean, these bacteria can multiply. Special attention must be paid to maintaining and keeping the milking machine in good condition. Teat cup liners and other rubber elements must be checked on regular basis for any cracks or crevices.



The term *psychrotrophs* refers to microorganisms that have the ability to grow at low temperatures but have optimal and maximal growth temperatures above 15 and 20°C, respectively. This characteristic makes these microbes a significant issue with regard to food spoilage and safety where food is stored at cold temperatures during production, transportation, processing and post-purchase.

Studies have shown that psychrotrophic bacteria can constitute up to 90% of total bacteria in chilled milk. Some of them belong to pathogenic strains.

Examples of psychrotrophic bacteria found in raw chilled milk:

Pseudomonas, Achromobacter, Aeromonas, Serratia, Alcaligenes, Chromobacterium, Flavobacterium, Bacillus, Clostridium, Corynebacterium, Streptococcus, Lactobacillus, Microbacterium.