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QUALITY CONTROL OF MILK AND DAIRY PRODUCTS FOR FOOD SAFETY

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Introduction

As we all know, nowadays, food safety and quality are important issues that need to be given more attention all over the world, mainly from the nutritional quality and human point of view. Food safety is a scientific field study that deals with processing, preparation and storage methods to prevent food-related diseases. Food can be used as a source of disease transmission from one person to another; it also serves the growth environment of nutrients for bacteria that can cause food poisoning and a dangerous tool for consumer health. Factors that may be a potential source of risk in food include improper agricultural practices at all stages of the food chain and traditional milk production along with poor hygienic environments. Quality assurance is mandatory before milk is consumed. Milk and dairy pollutants are divided into two, namely infectious and non-infectious agents. Milk and dairy products exported to the world market must pass the strictest quality standards. The risk analysis and critical checkpoint system (HACCP) requires critical inspection at each stage of the food production process to determine the likelihood of physical, chemical or microbiological contamination. To achieve this, it is necessary to control the quality of milk at the root level of the grass.

Food-safety hazards specific to milk and milk products, Biological hazards

Milk and dairy products can be damaged by a variety of micro-organisms, including many zoonotic bacteria and some viruses for example, retroviruses and cytomegalovirus (Kaufmannet al., 2002) (Table 1). Generally, the microbiological quality of milk during milking is normally good. But, once the milk is secreted from the udder, it can be contaminated by pathogenic microorganisms from many sources (Loessner and Golden, 2005). (Table 1)

Bacteria	Effect on milk quality
Genus pseudomonas (Pseudomonas fluorescens, Pseudomonas fragi), Genus Bacillus (Bacillus polymyxa, Bacillus cereus)	Spoilage
Brucella spp, *Genus staphylococcus (Staphylococcus aureus), Genus streptococcus (Streptococcus agalactiae), Genus mycobacterium (Mycobacterium tuberculosis)*	Pathogenic
*Genus enterobacter (*Enterobacteraceae spp)	Both s± p
Genus streptococcus (*Streptococcus thermophilus), Genus lactococcus (Lactococcus lactis), Lactococcus lactis sub speices Lactococcus cremoris, Genus leuconostoc (Leuconostoc lactis)*	Acid fermentation
Genus lactobacillus (L. lactis, L. bulgaricus , L. acidophilus propionibacterium species	Acid production
Lactococcus lactis subspp lactococcus lactis diacetylactis	Flavor

Milk quality indicators

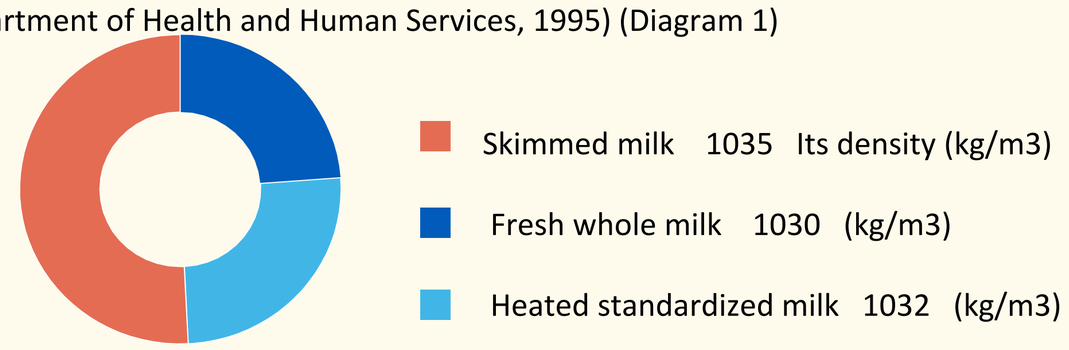
Milk quality indicators Quality milk contains normal chemical composition, completely free from disease causing bacteria and harmful toxic substances, free from sediment and extraneous substances, have lower level of titratable acidity, has good flavor, sufficient in preserving quality and low in bacterial counts (FAO, 2010). It is also the lacteal secretion, practically free from colostrums, obtained by the complete milking of one or more healthy cows. (Table2)

Table 2. Physical quality measures of milk

Indicator of milk quality	Quality of cow fresh milk	Quality of ewe fresh milk	Quality of goat fresh milk
density	3.111.028-1.034 g/cm 3	1.034-1.042 g/cm3	1.121.024-1.040 g/cm3
pH value	6.5-6.7	6.5-6.8	6.4-6.7
Freezing point	< -0.517°C	< -0.56° C	<- 0.54°C

Density and freshness of products

The density of milk, among others, is usually used for quality test mainly to check for addition of water to milk or removal of cream. Addition of water to milk minimizes milk density, while removal of cream increases it (O'Connor, 1994) (Chart A)., five days after and fifteen days before parturition (U.S. Department of Health and Human Services, 1995) (Diagram 1)



Organoleptic test

Testing milk for organoleptic characteristics is often called sensory testing and done using the normal senses of sight, smell and taste in order to know the overall quality. Organoleptic tests are sometimes employed to determine if certain type of food or pharmaceutical products can transfer tastes or odors to the materials and components they are packaged in.

Clot-on-boiling test

It is one of the oldest test to determine too acidic milk (pH<5.8) or colostrums, containing mastitis. It is known when the milk is changed to form a curd which means the milk must contain many acids, rennet producing microorganisms and colostrums shed from the cow as soon as the cow gives birth. Such milk cannot stand the heat treatment in milk processing and must be rejected (O'Connor, 1994).

Compositional quality measure of milk

Milk is a highly nutritious substance which contains macro and micro-nutrients, additionally possessing quite a lot number of active compounds that play significant role in both nutrition and health protection (Boza and Sanz Sampelayo, 1997). The composition of milk varies from one milk to another due to a considerable number of factors including breed, age, feed, disease, stage of lactation and milking techniques. (Table 3)

Components	Average content (%)	Ranges
Water	87.1	85.3-88.7
Lactose	4.6	3.8-5.3
Fat	4.0	2.5-5.5
Protein	3.3	2.3-4.4
Casein	2.6	1.7-3.5
Mineral substance	0.7	0.57-0.83
Organic acid	0.17	0.12 -0.21
Miscellaneous	0.15	-

Overview of milk quality

In most dairy industrialized countries, milk quality is defined by the level of somatic cells count (SCC) and the microbial load of milk in the pre-pasteurized bulk tank. These are the key components of international regulation put in place for milk quality, udder health and the prevalence of clinical and subclinical mastitis in dairy herds (Fatine et al., 2012). High levels of SCC and microbial load indicate poor milk quality due to the fact that it contains reduced curd firmness and increased fat and casein loss in whey.

Conclusion

Milk is a safe and nutritious food that should be harvested, processed and handled properly. Identifying source of contaminants in food production and processing, as well as implementing good production practice, is very important for ensuring consumers' health. As milk leaves the cow, it is dominated by lactic acid bacteria.

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