Research and Reviews: Journal of Food and Dairy Technology

e-ISSN: 2321-6204
p-ISSN: 2347-2359

A Short Review on Milk Spoilage

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Review Article

Received: 12/03/2017
Revised: 26/03/2017
Accepted: 31/03/2017

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Keywords: Milk spoilage, Microbial growth

ABSTRACT

Milk and its products consists an essential ingredient of our food. All products are suitable for microbial growth. It is essential to know the chemical reactions of milk and its spoilage.

INTRODUCTION

Microorganisms degrade the proteins, carbohydrates, fats of milk and produce noxious end products this process is called as spoilage. It is due to the bacteria lactobacillus or streptococcus species ferment the lactose to lactic acid and acetic acid turning the milk sour [1-5].

They produce acids which curdle the protein and forms sour curd. Presence of Micrococcus, Proteus and Bacillus may results into sweet curdling [6-8].

If milk gets contaminated with Gram negative bacteria such as *E. coli*, *Enterobacter aerogenes* or Clostridium Sp. then gas and acid formation is formed from the lactose [9-15].

MANIFESTATIONS OF SPOILAGE

1. Lactic acid production/ Souring
2. Proteolysis
3. Lipolysis
4. Sweet curdling

SPOILAGE PROCESS

When an increase and then a rapid decrease in heat occur, bacteria such as lactococci and lactobacilli can form. Milk actually spoils when bacteria convert the lactose into glucose and galactose, which results in the production of lactic acid. Spoilage bacteria are the microorganisms which are too small to be seen without a microscope that cause food to deteriorate and develop unpleasant odors, tastes and textures [16-25].

Milk contains a sugar called lactose. It also contains harmless bacteria called lactobacillus, which uses lactose for energy and creates lactic acid as a by-product. It is the lactic acid which makes milk taste sour [26-30].

e-ISSN: 2321-6204
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MICROORGANISMS INVOLVED IN MILK SPOILAGE

The microbial content of raw milk is important for the production of hygienic dairy foods. Spoilage is a word, to describe the deterioration of a food colour, texture or flavour where it is unsuitable for human consumption. Microbial spoilage involves the degradation of carbohydrates protein and fats by microbes or their enzymes [31-35].

The microbes which are primarily involved in spoilage of milk are psychrotrophic organisms. Mostly psychrotrophs are inactivated by pasteurization temperatures, but few microbes like *Pseudomonas fragi*, *Pseudomonas fluorescens* can produce lipolytic and proteolytic extracellular enzymes which are heat stable and can spoil the milk. Some species of Clostridium, Cornebacterium, Bacillus, Lactobacillus, Arthrobacter, Micrococcus, Microbacterium and Streptococcus are heat stable and grow at cooler temperatures which cause spoilage problems [36-41].

ACID COAGULATION

Interaction of lactic acid with calcium bound to casein-precipitation of casein-curd (pH range 4.64 to 4.78) Lactic streptococci – *S. lactis*, *S. cremoriscremoris* (room temperature) gets inhibited at 1%. Lactobacilli- *L. casei* (at room temperature), *L. acidophilus* and *L. Bulgaricus* (optimally at (optimally ataround 40°C). Gets inhibited beyond 2% level of lactic acid [42-45].

MILK BORNE DISEASES

Major diseases are brucellosis, tuberculosis, Q fever. *Mycobacterium bovis* is present in milk and passes from human intestine to blood and spreads to other organs. Brucellosis is a blood disease which is caused by Gram negative rod, *Brucella abortus*. It is transmitted to man through cow milk then the bacteria infect the organs. Other diseases associated with milk are toxoplasmosis, pneumonia, anthrax, streptococcal infections, etc.

SOURCES OF FLORA

1. At the farm level
2. Utensils
3. Coat of the cow
4. Feed
5. Faecal matter
6. Environment

CONTROL MEASURES

1. Maintaining hygienic conditions at the farm level.
2. Sanitising hands before milking.
3. Milk utensils should be sterilised properly.
4. The heat treatment given to the product should be should be adequate (kill heat-sensitive gas producers-coliforms).

CONCLUSION

Pasteurization process is the first step in eliminating or reducing the levels of many spoilage microorganisms. However, preventing post process contamination by spoilage microorganisms and decreasing the growth of

e-ISSN: 2321-6204
p-ISSN: 2347-2359

surviving organisms. Novel technologies and preservatives are needed to prevent the growth of spoilage microorganisms and increase the shelf life of dairy products. The next century will bring many challenges to the dairy processor, but maintaining the quality and shelf life of this highly nutritious food should not be one of them.

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p-ISSN: 2347-2359

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