

Lesson 1

INTRODUCTION AND SIGNIFICANCE OF DAIRY MICROBIOLOGY

1.1 Introduction

The branch of biology that deals with the study of microorganisms and their different metabolic activities is termed as Microbiology. The microorganisms are playing a very important role in human civilization and their development. They play an important role in food dairy, Environment till and destruction of microorganisms.

The different branches of Microbiology are:

1. Agricultural and Soil Microbiology.
2. Aquatic and marine Microbiology.
3. Dairy and food Microbiology.
4. Environmental Microbiology.
5. Industrial Microbiology.
6. Medical and pharmaceutical Microbiology.
7. Rumen Microbiology.
8. Space Microbiology

1.2 Definitions

The study of Microorganisms that are associated with milk and milk products in all aspects is defined as Dairy Microbiology. In milk microorganisms play a vital role in production of many products

1.2.1 Milk

Milk is described as a whole, fresh, clean, lacteal secretion obtained from the complete milking of healthy milch animal containing the minimum prescribed levels of fat and solids non-fat (SNF).

1.2.2 Hygienic Milk

Hygienic milk is concerned with the production of clean, wholesome milk that is free from bacteria or other disease causing micro-organisms and maintenance of this condition from farm to the consumers. Milk is considered as the most nutritious and complete food for neonates and adult human beings both.

The approximate composition of major constituents in milk of different animal origins is given in Table 1.1.

Table 1.1 Percent composition of milk of different animal origins

Source (Animal)	Percent composition				
	Total Protein	Casein	Whey protein	Fat	Carbohydrate
Buffalo	4.0	3.5	0.5	7.5	4.8
Cow	3.5	2.8	0.7	3.7	4.8
Goat	3.6	2.7	0.9	4.1	4.7
Sheep	5.8	4.9	0.9	7.9	4.5

Source: e-cources ICAR

Bacteria, yeasts, moulds and viruses are very important in determining the quality of final dairy product. The control growth of these microorganisms determined the final desirable Product. Milk is considered as a complete food having balanced amount of protein fat and sugar However, these nutritional values have ability to flourish the growth of many which may cause sometime undesirable changes in milk and its products. Milks sanitary qualities are influenced by many factors in the course of production, processing, and delivery to the consumers.

1.3.Examples of some of the dairy products depend on microbial activities:

1. Cheese: This dairy products industry dependent to a larger extent on the desirable enzymatic changes caused by microorganisms. The flavours and the texture of cheese are largely depending on the conversion of milk constituents by various species. The bacterial and mould species are added in a proper quantity to cheese during manufacturing and much of the microbial activity in that takes place during ripening are due to microbial species that enter the milk by chance at different stages.

2. Butter production: The taste and aroma of butter are depend on the microbial activity of Starter cultures, that are selected mixed bacterial cultures responsible for acid- and flavor-production. The conditions in which optimum flavour develops and the relationships with microbes are well known, and certainly the changes brought about by the starters are desirable.

3. Similarly Dahi, Yogurt, sour cream, and buttermilk are few other examples of fermented milks made by microorganisms added in different composition and proportion to milk, cream, and skim milk, respectively. These products have different taste texture and flavour imparted by different groups of microorganisms.

4. Some of the important economically valuable products like vitamins, solvents, and food adjuncts can also be done by different intervention of microorganisms on a commercially scale now a days.

5. Some of the milk constituents that have no economic importance and that are usually wasted must be converted to stably oxidized and non toxic substances prior to their discharge into the environment. Here also microbial activity is responsible for the desired changes in the organic constituents of dairy wastes during sewage treatment.

1.3.1. Importance of Microbes in Milk:

- We can assess the quality of milk and milk products by knowing the microbial load in it. Every products have a certain permitted level of microbial load above which it is considered as not safe for consumption.
- The natural flora present in milk is if permitted to multiply can cause spoilage of milk.
- Since milk is a complete food it is potentially susceptible to contamination with pathogens, therefore it must be stored properly to avoid its excessive growth and precautions must be taken to destroy them.
- Certain microbes produce chemical changes that are desirable in the production of cheese, yogurt and fermented milk products.

1.3.2 Disease spread through Milk and Milk products

Dairy products which are consumed without any proper treatment may harbour a groups of harmful microorganisms that may affect human health. Studies have proved that diseases in both man and animals are sometimes caused by the pathogens spread by milk. The sources of pathogens in dairy products, their conditions under which they grow, and methods of

