Chilling of Milk.

Importance of Chilling.
Chilling of milk means rapid cooling of raw milk to sufficiently low temperature so that the growth of microorganisms present in milk is checked. In chilling process the temperature of milk should be reduced to less than 10 °C preferably 3 - 4 °C. Milk inside the udder is almost sterile and as soon as it leaves the udder, it is exposed to atmosphere. The microorganisms gain entry into the milk, the moment it comes to atmosphere. Various sources which contribute to the microflora in milk are containers, udder of the animal, dust and dirt particles, fodder, leaves, atmospheric air, the milker and the animal itself. The number and types of microorganisms would depend upon the conditions and the sources of contamination.

As soon as microorganisms get into the milk, they start growing rapidly because milk contains all the nutrients required for their growth, and the conditions for their growth are favourable. If the growth of microorganisms is not checked then their growth will continue and several biochemical changes will take place in milk. Due to these changes the quality of milk is adversely affected so much so that sometimes milk becomes unfit for consumption as fluid milk. Since most of the milk is produced in the rural areas under unhygienic conditions and atmospheric temperature remains fairly high throughout the year, keeping quality of raw milk is very low. If milk has to be transported to longer distances, considerable time is involved between production and heating process. During this period milk must be protected from spoilage by the action of microorganisms. Chilling, therefore, is considered necessary soon after it is received at the chilling canter. The most effective means of controlling the growth of microorganisms without affecting the physico-chemical properties and nutritive value of milk is to chill it. Lower temperatures inhibit the growth of most of the microorganisms. It should be clearly understood that chilling process does neither kills microorganisms nor it renders milk safe for human consumption. It is only a means of checking the growth of microorganisms for sometime.

Methods of chilling:
1. Can Immersion
2. In Can Cooling
3. Surface Cooler
4. Tubular Cooler
5. Plate Chiller
6. Bulk Milk Cooler

PASTEURIZATION OF MILK:
The term pasteurization as applied to market milk today refers to the process of treating every particle of milk to at least 63 degrees
Centigrade for 30 minutes or 72 degrees Centigrade for 15 seconds in approved and properly operated equipment. After pasteurization, the milk is immediately cooled to 5 degrees Centigrade or below.

Need for pasteurization of milk:

As it is difficult to exercise strict supervision over all milk supplies, it becomes necessary to pasteurize milk so as to make it safe for human consumption. Any impairment of nutritive value is of the slightest importance.

Advantages:

1. To render milk safe for human consumption by destruction of cent percent pathogenic micro-organisms.
2. To improve the keeping quality of milk by destruction of almost all spoilage organisms. (85 - 99 %)

Disadvantages:

1. Pasteurization encourages slackening of efforts for sanitary milk production.
2. It may be used to mask low quality milk.
3. It diminishes significantly the nutritive value of milk.
4. It reduces the “cream line” or cream value.
5. It fails to destroy bacterial toxins in milk.

Methods of Pasteurization:

There are a number of methods and among them, two methods are most commonly used in dairy/dairies. They are:

1. Batch Pasteurizer (also known as L.T.L.T.)

This is also called the Low Temperature Long Time method. The milk is heated to 63 degrees Centigrade for 30 minutes and promptly cooled to 5 °C or below. This method of pasteurization is normally practiced in dairies where small volume of milk is handled.

2. High Temperature Short Time Pasteurizer (H.T.S.T.)

In this method of pasteurization, the process involves the heating of milk to 72 degrees Centigrade for 15 seconds. This process or type of pasteurization is most commonly practiced in dairies where large volume of milk is handled.

HOMOGENIZATION:

Definition: Homogenization can be defined as “the process designed to reduce the size of fat globules and making a permanent emulsion of milk fat and serum by the use of machine called as “homogenizer”. Homogenized milk is milk, which has
been treated in such a manner as to insure break up of the fat globules to such extent that after 48 hours of quiescent storage no visible cream separation occurs on the milk.

**Advantages:**

1. No formation of cream layer.
2. Fat in milk does not churn due to rough handling or excessive agitation.
3. Becomes more palatable.
4. Produces soft curd and is better digestible, hence recommended for infant feeding.

**Disadvantages:**

1. Increased cost of production.
2. Fat recovery is a problem - cannot churn.
3. Greater tendency for milk seepage through bottle caps.