

# Dairy Farming

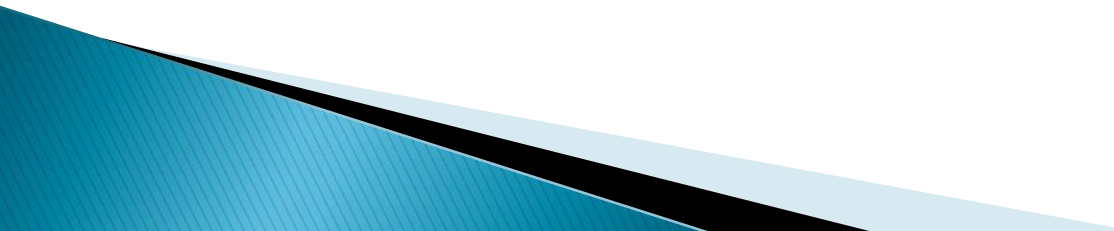
VI Semester B.Sc. Zoology –  
Elective Course XV

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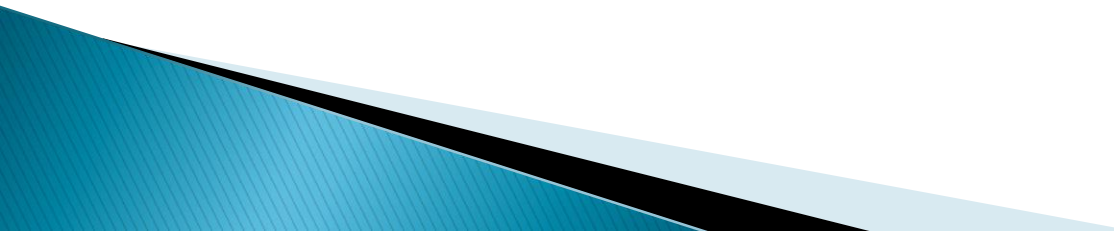
# *DAIRY PROCESSES*



# Introduction

- ▶ In tropical and subtropical countries many difficulties arose during the handling of milk as milk remains sweet only for a short time at high prevailing temperatures.
  - ▶ Highly prone to bacterial contamination which causes physical and chemical changes.
  - ▶ Growth of microorganism causes formation of lactic acid, gas, ropy or stringy conditions of milk.
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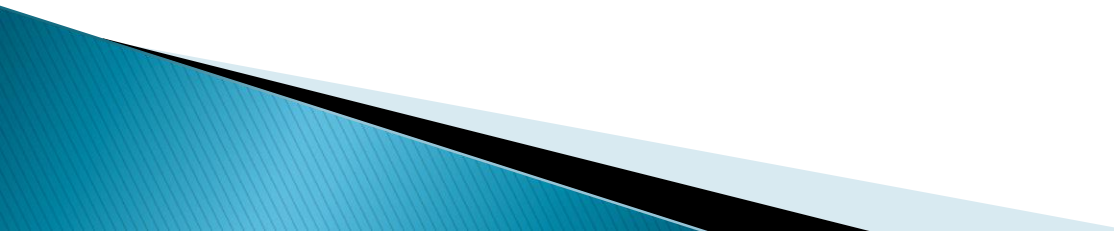
# Straining

- ▶ Sediment in milk indicates carelessness in its production or handling.
  - ▶ Sediment contaminates milk and makes it less salable.
  - ▶ Most of the sediment in milk comes from the bodies of cows and consists of hairs, manure, bedding, etc.
  - ▶ Straining removes only the coarse particles of dirt and removes neither the bacteria nor the fine dirt.
  - ▶ Straining improves the commercial quality of milk, but does not appreciably improve its healthfulness.
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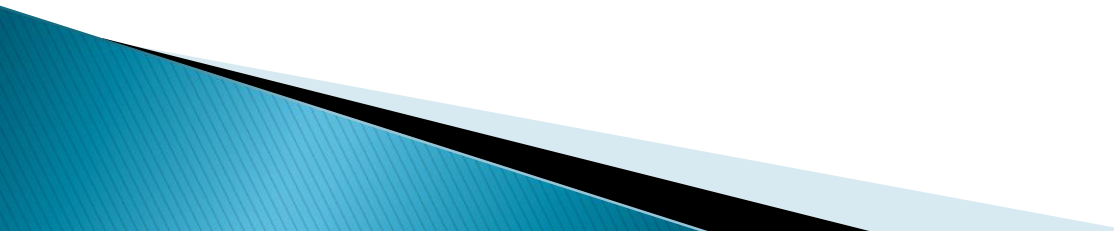
# Straining



# Straining

- ▶ The best system is to prevent, the entrance of dirt into milk. This can be done best by having clean cows in clean stables, milked with clean hands, into clean, small-top pails.
  - ▶ Filter cloth and absorbent cotton are efficient materials for strainers. Cheesecloth and wire gauze are less effective.
  - ▶ Straining cloths should be changed whenever they become soiled. They should be thoroughly washed and sterilized after each using.
  - ▶ Efficient sterilization is accomplished by boiling or exposure to steam for at least five minutes.
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# Filtration

- ▶ A good filtration system protects both milking and cooling equipment from potentially harmful foreign particles.
  - ▶ Farmers benefit from filtration in two ways:
    - They save money by maximizing the longevity and minimizing the maintenance of their milking equipment
    - By producing milk of the highest possible quality they can command the best market price.
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# Filtration






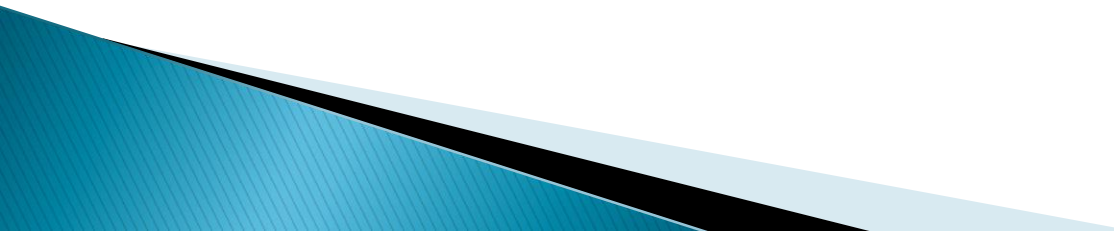
# Filtration

- ▶ Although milk is eventually filtered at the milk plant, effective milk filtration on the farm plays a very important role in:
  - Producing raw milk of the highest quality for the dairy farmer and consumer
  - Showing the effectiveness of teat cleaning prior to milking
  - Help identify udder health problems (e.g. mastitis)
  - Identifying and localizing cow environment problems
  - Ensure the best plate cooler efficiency and hygiene.

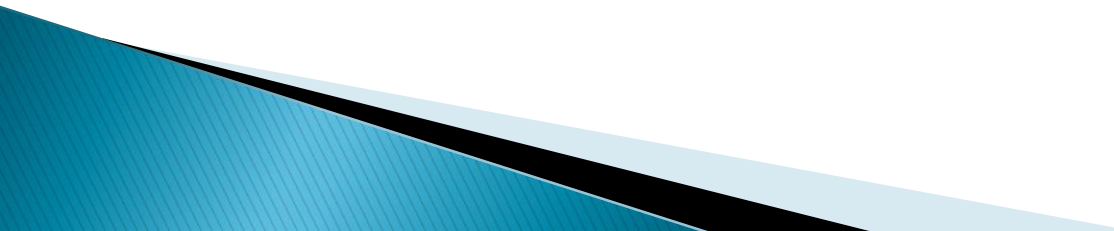
# Filtration

- ▶ Filtration is the process used to separate one substance from another.
  - ▶ Depending upon the industry and the substances to be separated, there are many types of filter systems – electrostatic precipitators, centrifuges, cyclones, scrubbers and mechanical separators.
  - ▶ For on-the farm filtration, a mechanical filter is used to separate the raw milk from any solid particles that may become suspended in it, before it arrives at the bulk milk tank.
  - ▶ Foreign material such as dirt, manure, straw, hair, clots and insects
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# Filtration

- ▶ Although filtration is an effective method of removing dirt and other particles from the raw milk, it does not remove bacteria or other material that may have dissolved in the milk.
  - ▶ Milk will continue to flow across any sediment trapped in the milk filter and this can dislodge bacteria that may be stuck to the particles, which may increase the bacterial count of the bulk milk.
  - ▶ Inspection of the milk filter after milking has finished can provide a great guide to the herd's udder health and to whether the teat preparation regime is adequate.
  - ▶ Any signs of mucous or clots on the milk filter could indicate clinical mastitis in the herd.
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# Cooling

- ▶ The keeping quality of milk is enhanced by artificial cooling on the farm and during transport.
  - ▶ Longer delay in cooling results in more bacteria count which deteriorates quality.
  - ▶ The optimal cooling temperature is  $4^{\circ}\text{C}$  so as to suppress bacterial growth until further processing.
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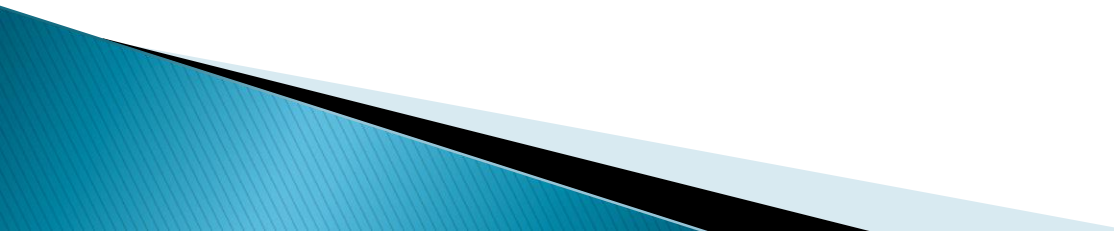
# Cooling tank



# Cooling

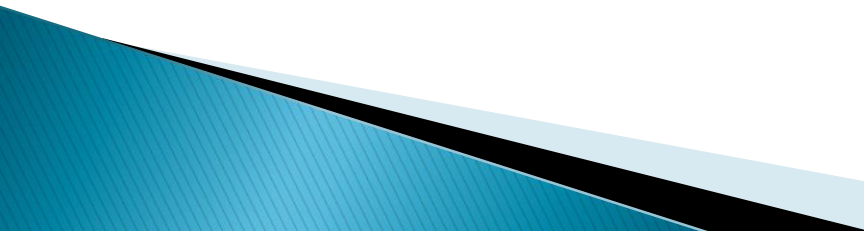
- ▶ Cooling of milk can be done by any one of the following methods:
  - i. By placing it in a can containing cooling medium and stirring for uniform cooling.
  - ii. Using a special can with inner cylinder filled with ice. This method is used to transport from villages to city depots.
  - iii. Using a can by circulating a cooling medium which may be melted ice from an ice tank or a directly expanding refrigerant.

# Cooling media

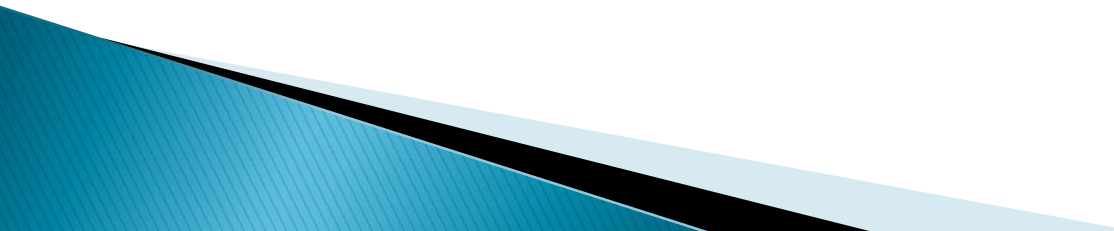
- ▶ Cold water, chilled brine, chilled water or directly expanding refrigerant maybe used for cooling milk.
  - ▶ The final temperature attained naturally depends upon the temperature differential between the cooling medium and milk and on the heat-exchange efficiency of the equipment employed.
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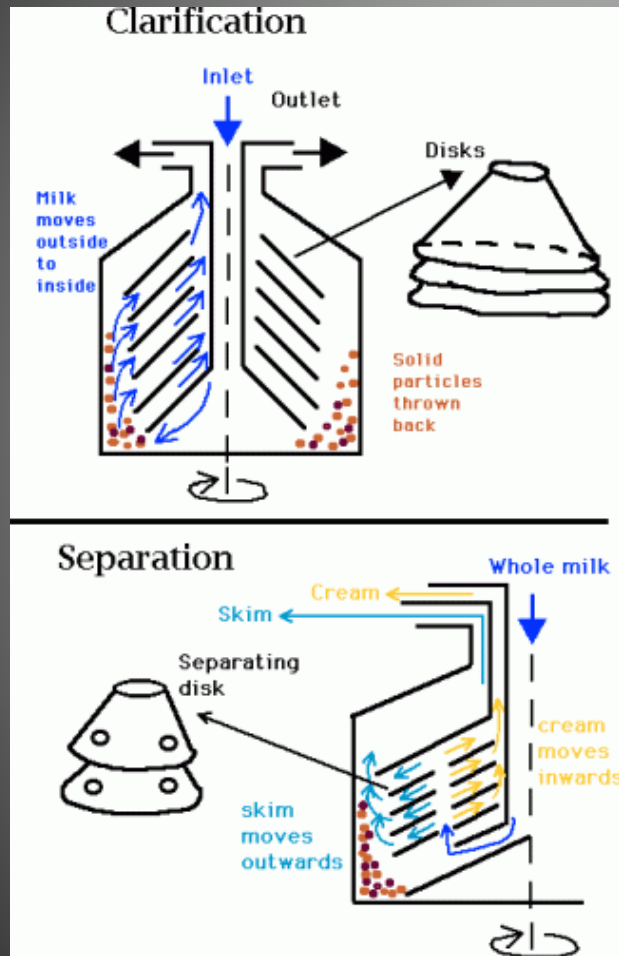
# Storage of chilled milk

- ▶ The temperature of chilled milk will increase if stored in ordinary storage vats or tanks. Insulated tanks are used, the insulating materials being cork and onazote.
  - ▶ Insulation thickness depends on ambient temperature.
  - ▶ Suitable insulation for Indian conditions are 5cm onazote or 10cm cork.
  - ▶ Refrigerated tanks only used for final chilling of milk.
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# Clarification

- ▶ The processing of milk on dairy begins with clarification which is the removal of any sediments present generally in a centrifugal clarifier.
  - ▶ During clarification not only sediment but also some of the cells and bacteria present in milk are also removed.
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# Clarification



# Pasteurization

- ▶ Pasteurization refers to the process of heating the milk to at least 63°C for 30 minutes or 72°C for 15 seconds causing minimal changes in the composition, flavour and nutritive value of milk. After heating, the milk is immediately cooled to 5°C or below.

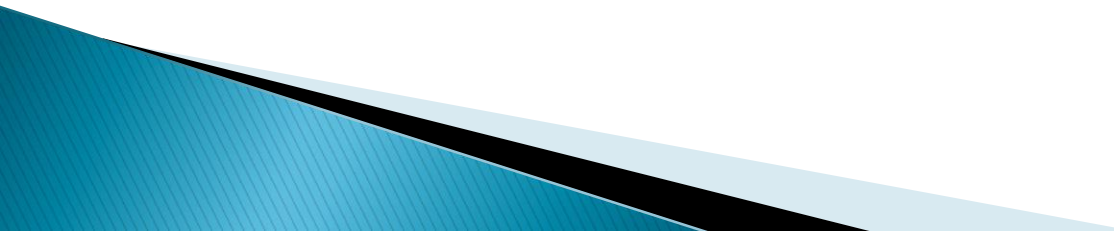
# Pasteurization

## ▶ Purpose–

1. To render milk safe for human consumption by destruction of pathogenic microorganisms (100%).
2. To improve the keeping quality of milk by the destruction of almost all spoilage organisms (85–99%).

# Pasteurization

## ▶ Objection–

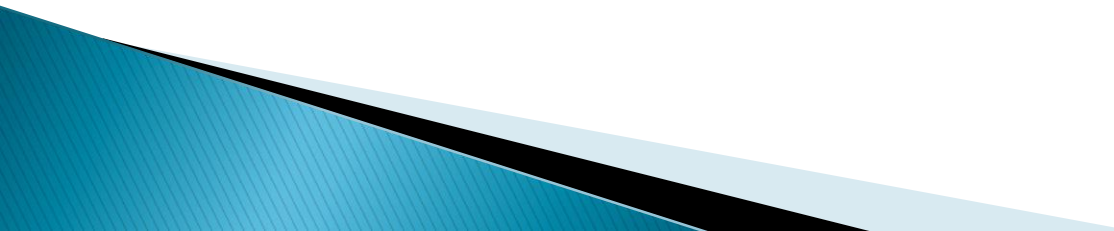
1. It diminishes significantly the nutritive value of milk.
  2. It reduces the *cream line* or *cream volume*.
  3. Pasteurized milk will not clot with rennet.
  4. It fails to destroy bacterial toxins in milk.
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# Method of pasteurization

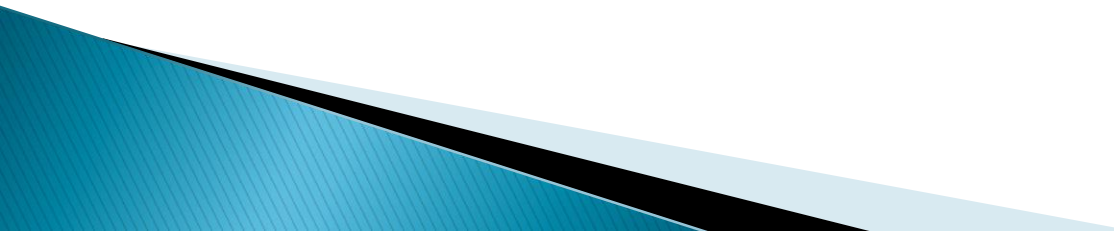
1. Bottle Pasteurization– Bottles filled with raw milk and tightly sealed with special caps are held at  $63\text{--}66^{\circ}\text{C}$  for 30 minutes. Then the bottles pass through water sprays of decreasing temperatures which cool both the product and bottle.
2. Low Temperature Long Time (LTLT) Pasteurization– In LTLT method, the milk is heated at low temperatures for along time. Heated to  $63^{\circ}\text{C}$  for 30 minutes and cooled to  $5^{\circ}\text{C}$ . Heating indirect through metal walls.

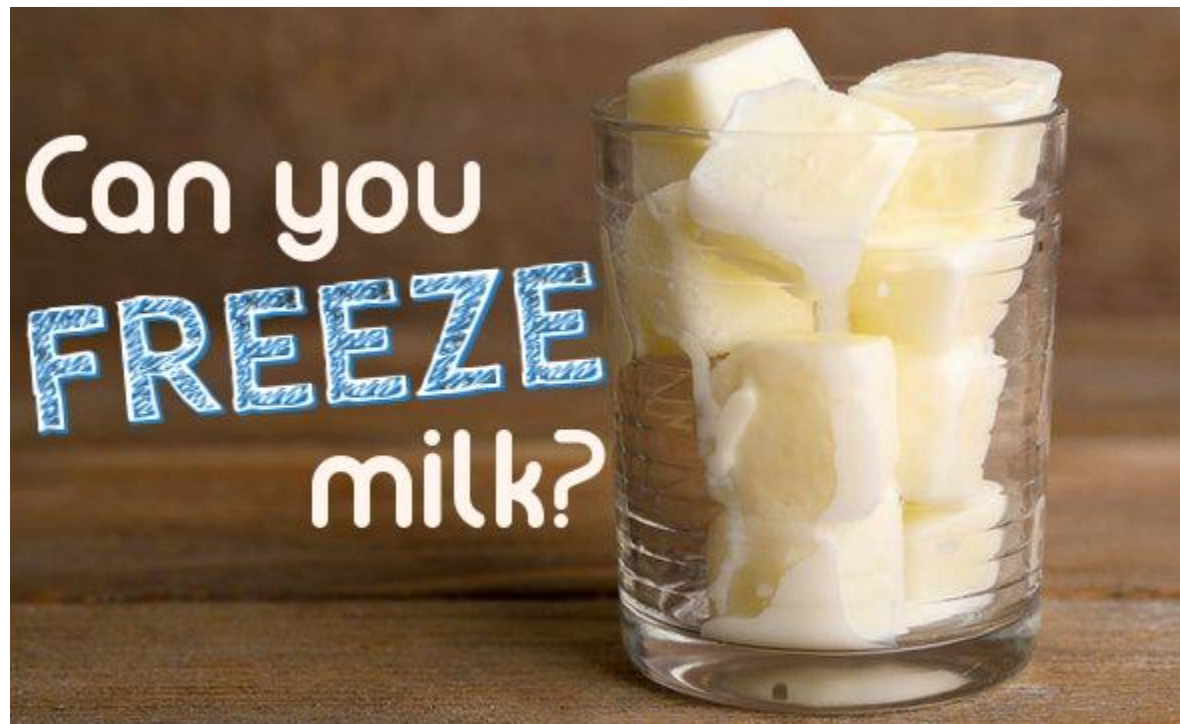


# Method of pasteurization

3. High Temperature Short Time (HTST) Pasteurization– In HTST the milk is heated at a high temperature for a short time. The HTST, pasteurizer gives a continuous flow of milk which heated to  $72^{\circ}\text{C}$  for 15seconds and promptly cooled to  $5^{\circ}\text{C}$  or below. It is the modern method of pasteurizing milk. Used where large volumes of milk has to be handled.
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# Freezing

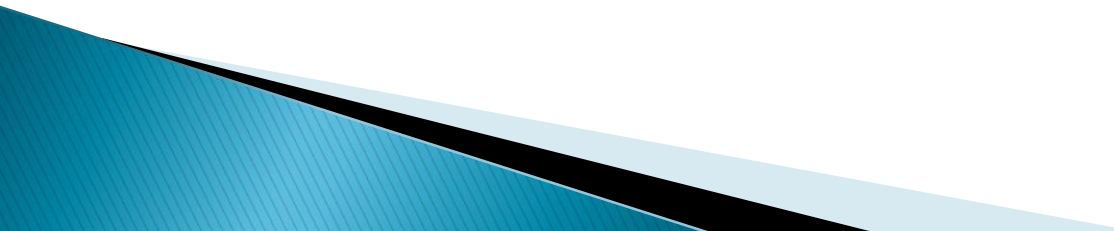
- ▶ Freezing milk is an incredibly easy way to extend its shelf life.
  - ▶ Leave room for your milk to expand.
  - ▶ Date your container.
  - ▶ Put the milk container in the freezer.
  - ▶ Store for up to 2–3 months
  - ▶ Consider freezing in ice cube trays
  - ▶ Thaw your milk in the fridge.
  - ▶ For quicker thawing, soak in cold water
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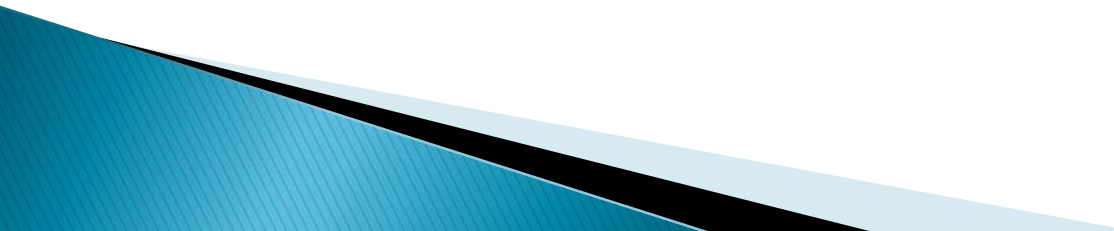
# Freezing

- ▶ Don't use heat to thaw the milk
- ▶ Serve within 5–7 days of thawing
- ▶ Shake well before serving

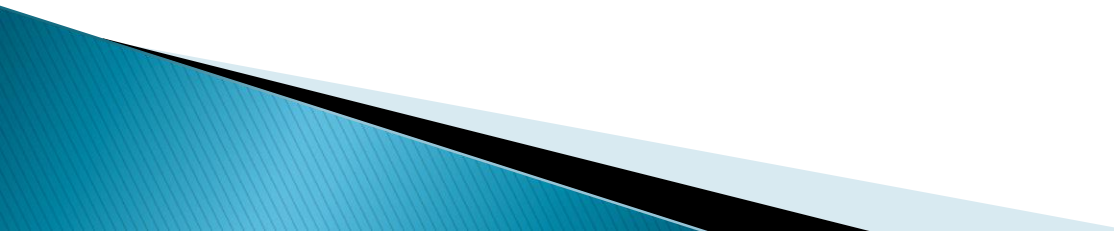
# Recombined milk

- ▶ Recombined milk is prepared by mixing together milk fat, nonfat, milk solids and water.
  - ▶ It shall be homogenized and contain at least 3.0% milk fat and at least 8.5% SNF.
  - ▶ Reconstituted milk cannot be considered as recombined milk because the milk fat is absent.
  - ▶ In recombined milk the milk fat must come from a source separate from that of the nonfat milk solids.
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# Soft curd milk

- ▶ Milk that forms soft curd when coagulated with rennet or pepsin under standard procedure.
  - ▶ Soft curd milk has curd tension of less than 25g and is characterized by low casein and low calcium content.
  - ▶ Mother's milk is the best for feeding human infants since it forms a soft curd when coagulated in the stomach and is apparently more quickly digested by infants than cow or buffalo milk.
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# Skimmed milk

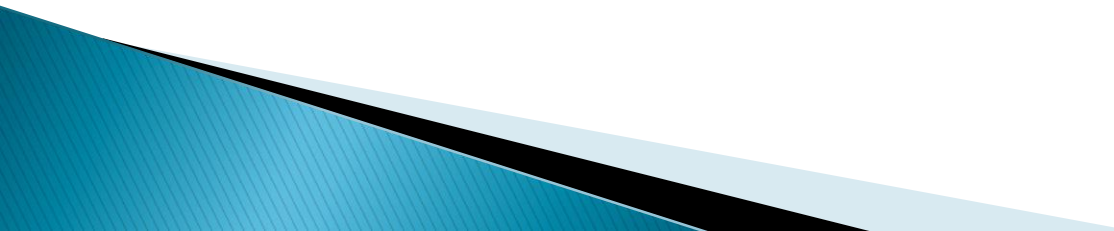
- ▶ Skimmed milk is made when all the cream is removed from whole milk.
  - ▶ Skimmed milk contains less fat than whole milk thus being recommended by nutritionists for people trying to lose weight.
  - ▶ It has a watery taste which some consumers do not enjoy.
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# Skimmed milk



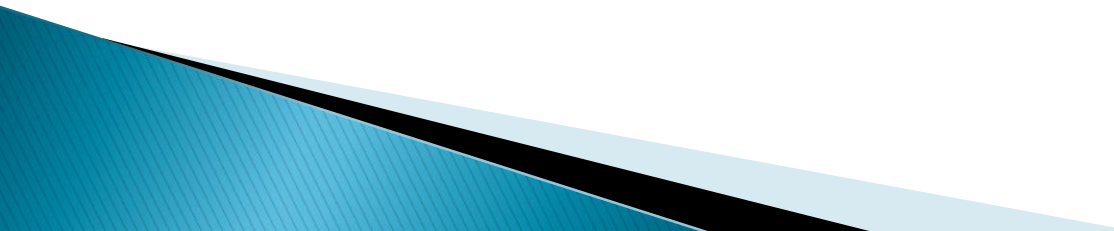
# Toned milk

- ▶ Toned milk refers to milk obtained by addition of water and skim milk powder to whole milk.
  - ▶ Toned milk should contain a minimum of 3.0% fat and 8.5% solids.
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# Toned milk



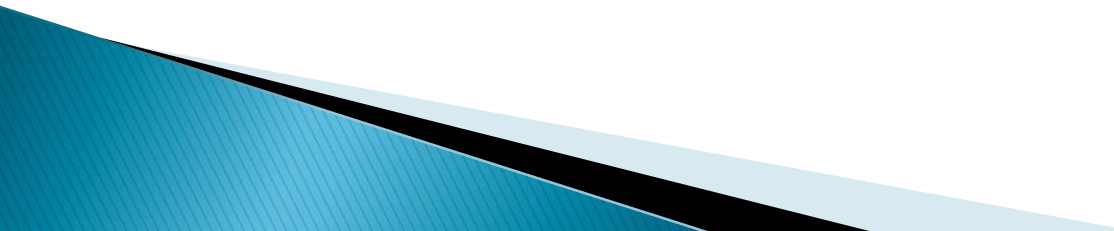
# Skim milk powder

- ▶ Skim milk powder is the product obtained from the skim milk of cow or buffalo milk or a combination by the removal of water.
  - ▶ It may contain added calcium chloride, citric acid and sodium citrate, sodium salts of orthophosphoric acid and polyphosphoric acid, not exceeding 0.3% by weight of the finished product.
  - ▶ Skim milk powder may not contain more than 1.5% milk fat and moisture may not exceed 1.5%.
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# Skim milk powder



# Condensed milk

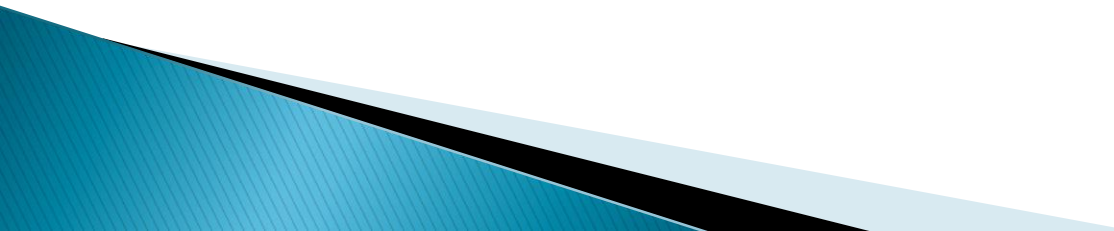
- ▶ Condensed milk is cow's milk from which water has been removed.
  - ▶ Often in form of sweetened condensed milk with sugar added.
  - ▶ Sweetened condensed milk is very thick and can last for years when canned without refrigerating if unopened.
  - ▶ Used in dessert dishes in many countries.
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# Condensed milk





# Reconstituted milk

- ▶ Reconstituted milk is made by mixing water and milk powder.
  - ▶ Only gives approximately the composition.
  - ▶ Temperature control and agitation facilitate the incorporation of the powder solids into the water.
  - ▶ Powder quality, drying method and whether the powder is regular or instantized, affect the speed and degree of solubility of powder.
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# Reconstituted milk





***EVERY ENDING  
IS REALLY JUST A  
NEW BEGINNING***

