

CHEESE MANUFACTURE

Cheese

- Cheese has been defined as a product made from the curd obtained from milk by **coagulating the casein**.
- With the help of rennet or similar **enzymes** in the presence of lactic acid produced by adding **microorganisms**.
- From which part of the **moisture has been removed by cutting and/or pressing** which has been shaped in a mould, and then **ripened by** holding it at some time at suitable temperature and humidity.
- Cheese consists of milk **fat, casein and insoluble salts, together with water** in which small amounts **soluble salts, lactose and albumin** are found.

Food and nutritive value of cheese

- It is an excellent source of milk **proteins**.
- A rich source of **calcium and phosphorus**
- Excellent source of several fat soluble vitamins, such as **A,D,E&K;**
- A concentrated source of energy.
- Ex: Cheddar cheese has about **400 calories /100 g**.

GENERAL METHODS OF MANUFACTURE

Milk



Souring /ripening



Clotting /coagulation by rennet



Cutting and drainage of whey.

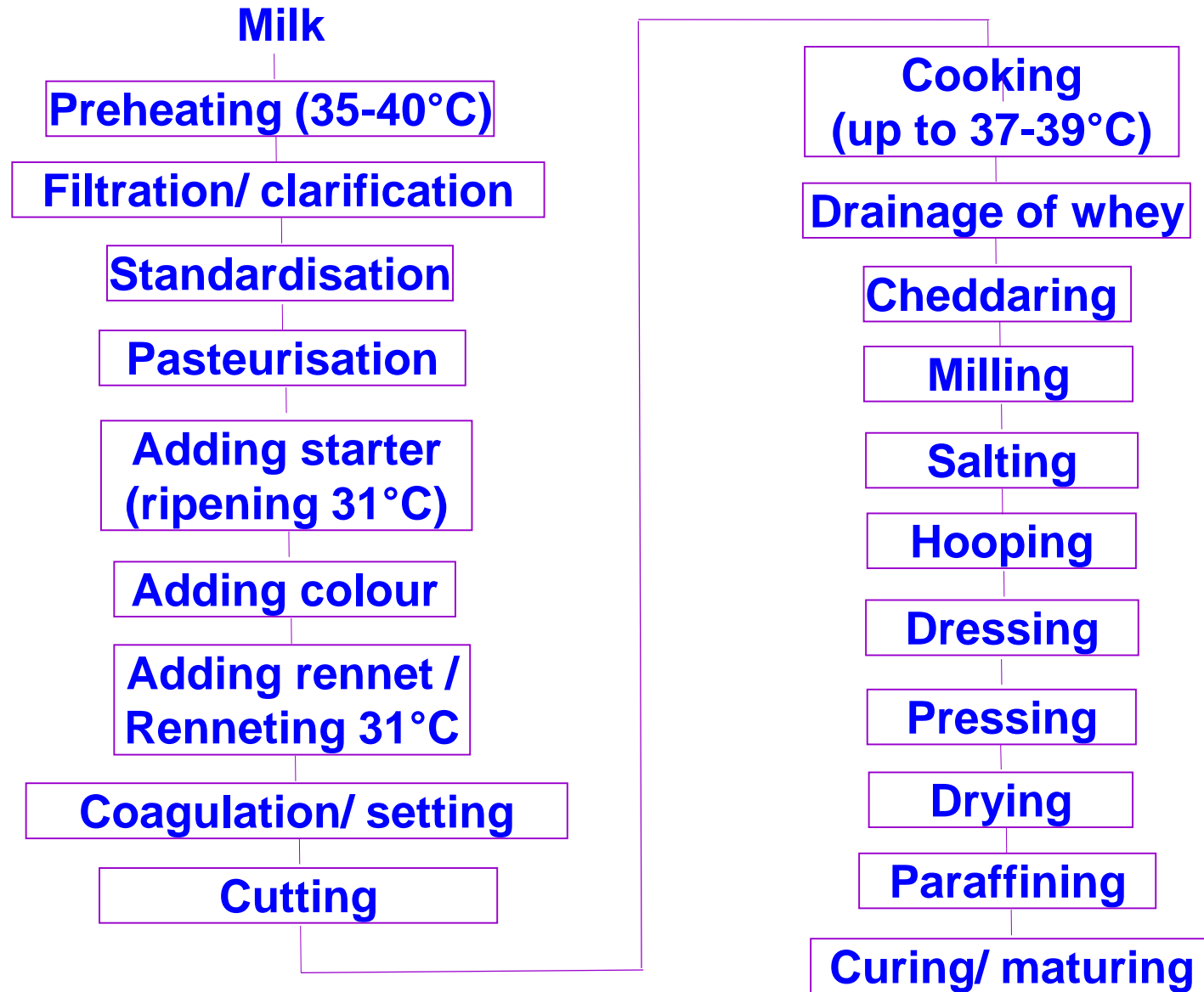


Consolidation/Matting of the curd.



Maturing /curing

Cheddar Cheese



Receiving milk

- Only high-grade milk can yield high grade cheese. Successful cheese factories follow a system of daily, efficient grading of all milk received.
- Determining the **odour** of milk.
- Inspecting the **appearance** of milk ,
- Determining the percentage of **titrable acidity**.
- Examining milk for **microbiological load**.

Filtration and clarification

- To remove visible dirt in milk . The milk is usually preheated to **35 to 40°C** for efficient filtration and clarification.

Standardization

In cheese making standardization refers to adjustment of the **casein to fat** ratio in cheese to **0.68 to 0.70**.

The objectives are

- To regulate the fat in the dry matter of cheese.
- To produce the maximum amount of cheese per kg. of fat in cheese milk.

Pasteurization

The usual temperature time employed for pasteurization of cheese milk is holder **63°C for 30 min. HTST: 72°C for 15sec.**

The objectives of pasteurization of cheese milk are

- . To destroy all pathogens

Adding starter

- . Ripening is done by the addition of starter.
- . The starter is the heart of the cheese.
- . A bad starter is almost certain to give low quality cheese.
- . A good starter may makeup for other defects, such as contaminated milk.
- . A cheddar starter usually contains **S. lactis and /or S. cremoris .**
- . The usual time to add the starter is before all the milk has been received in the vat. The amount of starter added is to the extent of **0.5 to 1 per cent of the milk.**
- . The temperature of addition is **30 to 31°C.**

Adding colour

- The colour is usually diluted with approximately **20 times its volume of potable water for even distribution.**
- The usual amount of colour is **30 to 200 ml or more for 1000 kg of milk.**

Renneting

- Adding rennet to milk in cheese making is commonly known as **renneting or setting**.
- Rennet contains two principal enzymes viz., **rennin, and pepsin**.
- Rennin is an **extremely powerful clotting enzyme, which causes rapid clotting without much proteolysis**.
- On the other hand pepsin induces **proteolysis leading to bitterness** in cheese.
- Rennet is available as **liquid or powder or as tablet**.
- **Rennet:** it is a sulphur containing protein. **One part can clot about 5 million parts of milk**.

Coagulation

- This refers to liquid milk changing to a semi-solid junket. The first signs of coagulation are that bubbles of air stirred into the milk surface take longer to break and a spatula dipped into the milk and withdrawn shows small flakes of curd.

Cutting

- This refers to cutting of the 'firm' coagulum into cubes of a specific size.

Cooking

- . This refers to the heating of curd cubes; it begins within **15 minutes of cutting**.
- . The heat is **applied slowly to begin with**.
- . If the temperature is raised too rapidly, a condition similar to ‘case-hardening’ will result, and the curd cubes will be hard on the outside but soft and ‘water-logged’ inside.

Drainage of whey

- This refers to the removal of whey from the curd.
- When the cubes have been reduced to about one-half of their size at cutting, the acidity approaches a desirable limit and the cube attain a desirable consistency, stirring is stopped and the cubes are dropped to the bottom of the vat and piling them up together.

Cheddaring

This refers to the combined operations of packing, turning, piling and repiling the curd cubes.

- **Packing:** After the bulk drainage of whey, the curd cubes are kept closely together in two heaps with a channel in between. This is known as packing and takes 5 to 15 minutes after drainage of whey.
- **Turning:** As soon as the blocks of curd can be handled without breaking, they are rolled bottom-side in the vat.
- **Piling and repiling:** Within 30 to 45 minutes of packing, blocks of curd are turned and laid one over another in twos or threes. This is called piling. Then the position of the curd block is altered and this is known as repiling.
- The cheddaring operation usually lasts **for two hours or more** and is very important not only for moisture control but also for improving body and texture..

Milling

- This refers to the mechanical operation of cutting the blocks of cheddared curd into small pieces with the help of a cheese mill.

Salting

- This refers to the addition of common salt to the curd pieces.
- Salt in cheese affects flavour, body and texture, and keeping quality.
- Cheese without salt is often soft, ripen quickly and rapidly develop unpleasant flavors.
- Generally varies from 1 to 2 % (average 1.5 %).

Hooping

- This refers to the curd being placed in hoops or moulds in which the cheeses curd is pressed into its final shape.
- For hooping operation all the added salt should have completely dissolved and the temperature at hooping should be 30-32^o C.

Dressing

- Refers to the arrangement of the cheese cloth before and after pressing.

Pressing

- . This refers to the operation of forcing the particles of milled and salted curd in the hoops into the smallest possible space to give cheese its final shapes.
- . Cheese pressing is done with the help of presses which may be, Screw or Pneumatic or Hydraulic or spring types.

Drying

- . It involves first taking the cheese out of the hoop and then stamping of date, batch, variety name etc., and keeping in a drying room at **12 to 16 ° C** for a few days.
- . The cheese is turned at 24-hour intervals so that both ends and sides of the cheese can dry.

Paraffining

- This refers to the operation of dipping the cheese for a few seconds in a bath of **melted paraffin**, whereby a thin coating of the paraffin is applied to the surface of the cheese.

Objectives

- To reduce the loss of moisture during curing
- To prevent extensive mould growth
- To protect it against insects

Curing

- The curing/maturing of cheese refers to the storage of cheese for at least **2 to 3 months** at a given low temperature (**0-16°C**) during which its physical, chemical and bacteriological properties are profoundly changed, resulting in the development of a characteristic flavour, body and texture.

Factors affecting cheese manufacturing

1. **Type of** milk used
2. **Degree of souring** and type of souring organisms added
3. **Temperature of renneting** and subsequent cooking or scalding of the curd in the whey
5. Pressure applied to
6. Time, temperature and relative humidity of ripening

Thank you