Food Biotechnology
Preparation of Wine

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Introduction

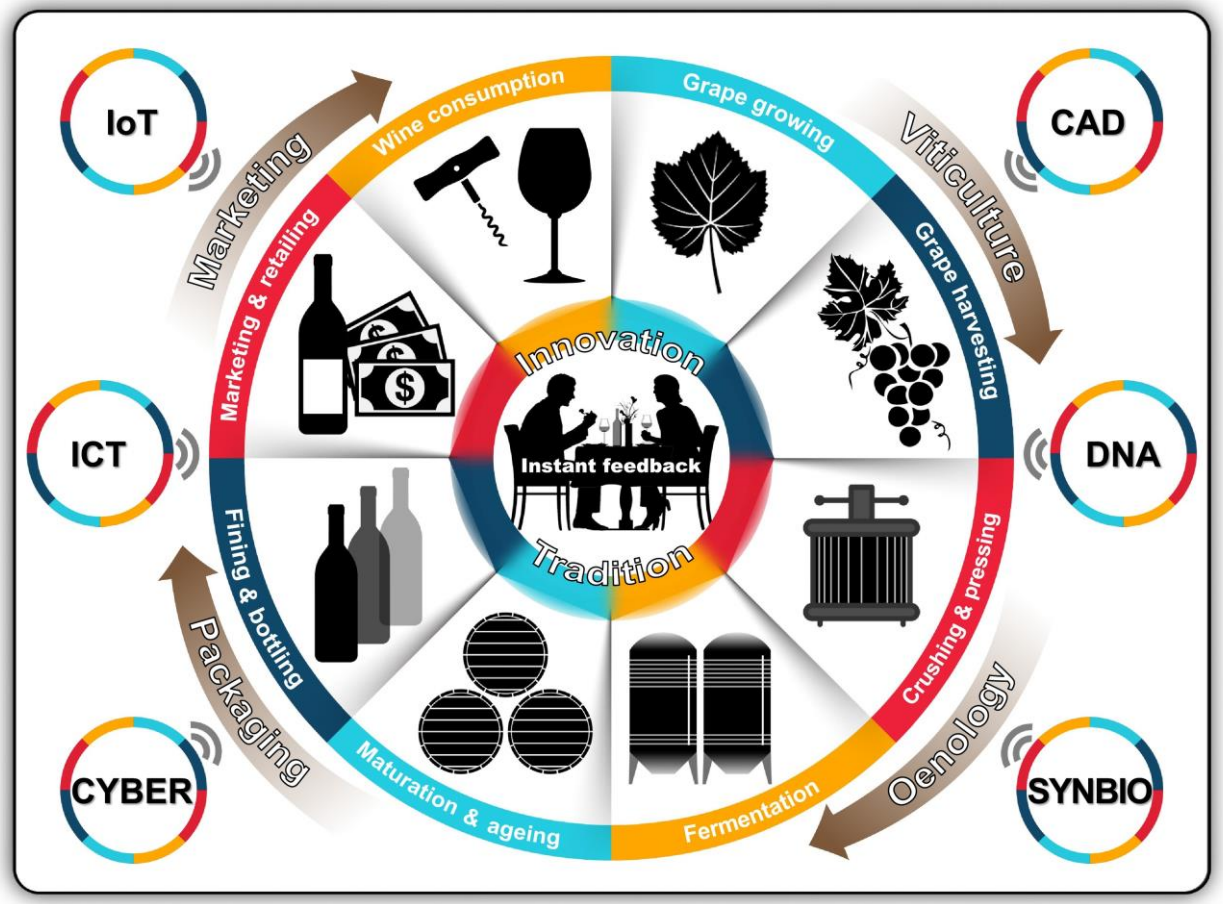
- Fermentation is biotechnology in which desirable microorganisms are used in the production of value-added products of commercial importance.
- The production of wine from grapes is one of the world's oldest biotechnological processes.
- Wine is a kind of undistilled alcoholic beverage mainly prepared from fruit juice. (mainly from grapes).

Introduction

- The alcoholic fermentation is nothing but conversion of grape sugars to ethanol, is conducted by yeast of the genus *Saccharomyces.*
- Grape wine is the most common types of wine and are classified in to two types
  - Red wine – Contain red pigment from the skins of the red or purple variety of grape.
  - White wine – White grape or fermentation of grape without skin.

Process of making Wine

- **Stages of preparation of Wine:**
  1. Preparation Juice
  2. Fermentation
  3. Racking
  4. Storage & aging



Process of making Wine

- **Stages of preparation of Wine:**

1. **Preparation Juice:**

- Appropriate variety of fruits and berries are harvested.
- They must contain high amount of fermentable sugars.
- Grapes usually contain 5-25% total soluble sugar.
- Thus, obtained fruits are crushed and extracted mechanically.

Process of making Wine

- **Stages of preparation of Wine:**

1. **Preparation Juice:**

- This process releases juice and a little bit pigment.
- The whole mass is known as Must.
- For white wine preparation, the skin is removed.
- The harvested fruits are de-steamed for white wine preparation which is not required for red wine preparation.

Process of making Wine

➢ Stages of preparation of Wine:

2. Fermentation:

- ➢ Fermentation is done in tank made up of wooden.
- ➢ The optimized Must is inoculated with 2-10% of inoculum and fermentation is carried out under optimum temperature.

Process of making Wine

- **Stages of preparation of Wine:**

  2. Fermentation:

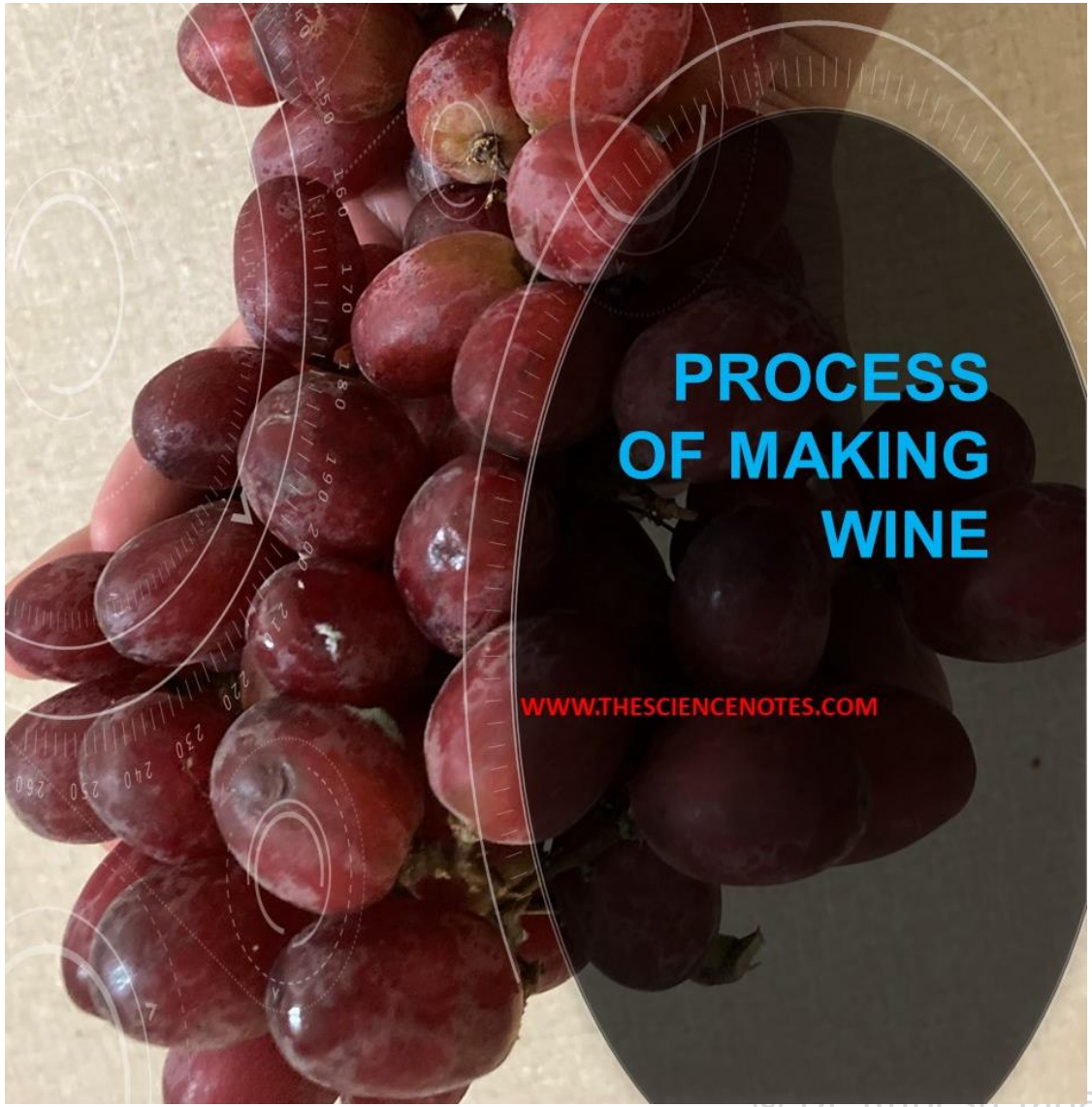
  - **Red wine** preparation-
    - 22-27 °C for 3-5 days
  - **White wine** preparation-
    - 10-21 °C for 7-14 days
  - During the fermentation, the content is mixed twice a day by pressing the floating skin for proper aeration.
  - It also **helps in color extraction**.

Process of making Wine

- **Stages of preparation of Wine:**

2. Fermentation:

- This fermentation allows rapid multiplication of yeast cell as well as sugar fermentation to ethanol.
- In heat stabilization technique, it is gently heated in between 50-60 °C for an hour and kept overnight.
- High temperature inhibit the Yeast.
- Very low temperature slow down the action of yeast.



Process of making Wine

➢ Stages of preparation of Wine:

3. Racking:

- In racking operation, the clear wine is drain off from the sediment.
- The wine containing dead yeast cells and other materials which settle at the bottom of the vat or tank is transfer to a fresh container.
- This procedure is repeated for serval times until the desired clarity of the wine is obtained.

Process of making Wine

➢ Stages of preparation of Wine:

3. Racking:

- If the sugar content is over 30 %, the fermentation is considered inefficient because alcohol accumulate and inhibits the activity of yeast before all sugar is converted to alcohol.
- Therefore, after the active fermentation (Primary fermentation), the fermented juice is removed from the residues and kept in a storage tank under light pressure of Co2 for 7 to 11 days at 21-29 C for secondary fermentation.

Process of making Wine

➢ Stages of preparation of Wine:

4. Storage & aging:

- The wine is now stored in wooden tanks or plastic coated concrete tanks for aging.
- The tanks are filled completely and sealed to keep out air.
- Final aging takes places in the bottle.
- Aging for a long period (months or year) results in desirable changes in flavor of the wine.
- The final alcohol content of wine varies between 6 to 9 %.

Process of making Wine

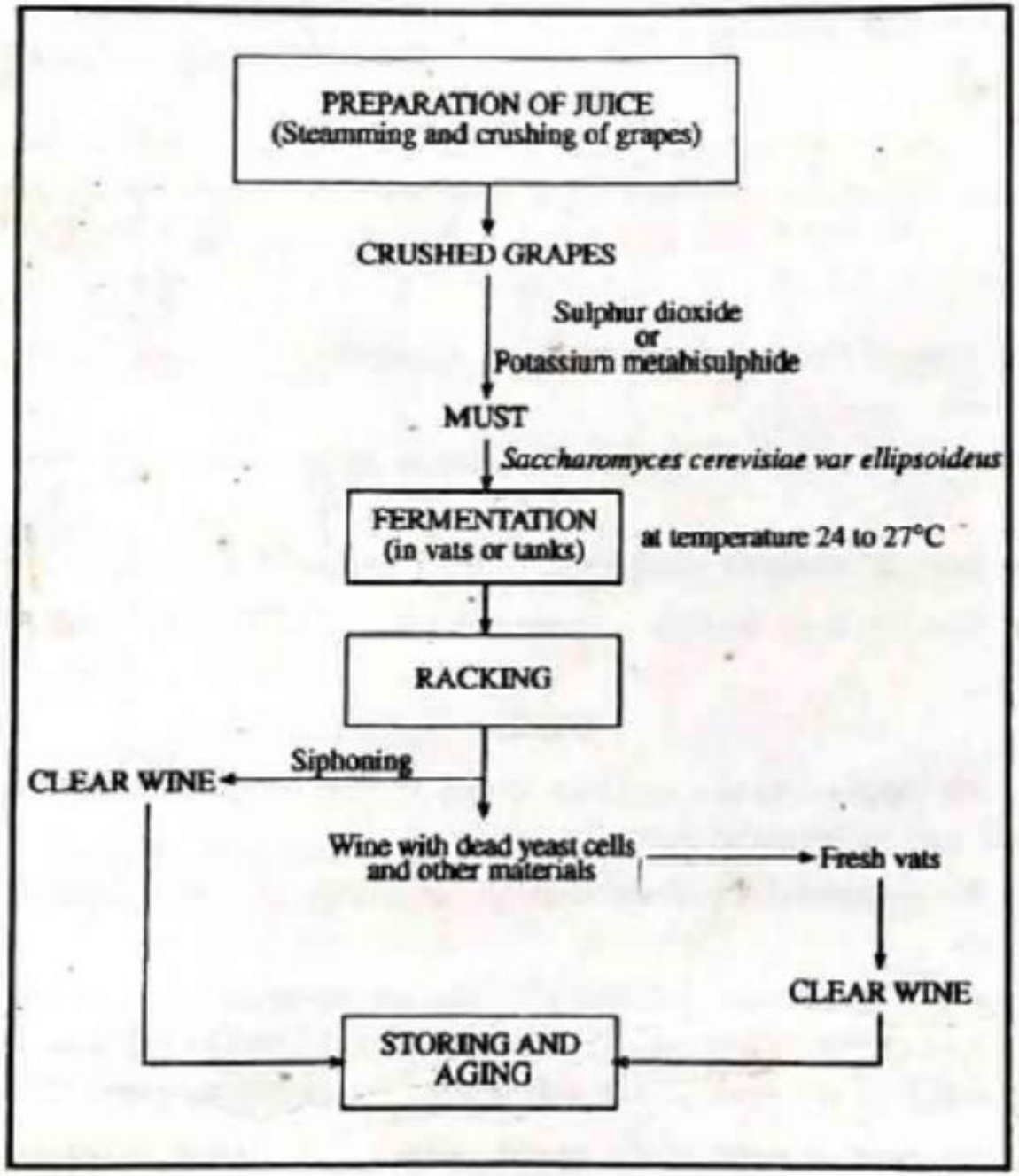


Fig. 6.5 : Flow diagram of manufacture of red wine

Food Biotechnology
Preparation of Yogurt

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Introduction

- Yogurt is a type of sour milk but thick in Consistency.
- Yogurt was originally made from goat's milk.
- But now-a-days it is also made from cow's milk.

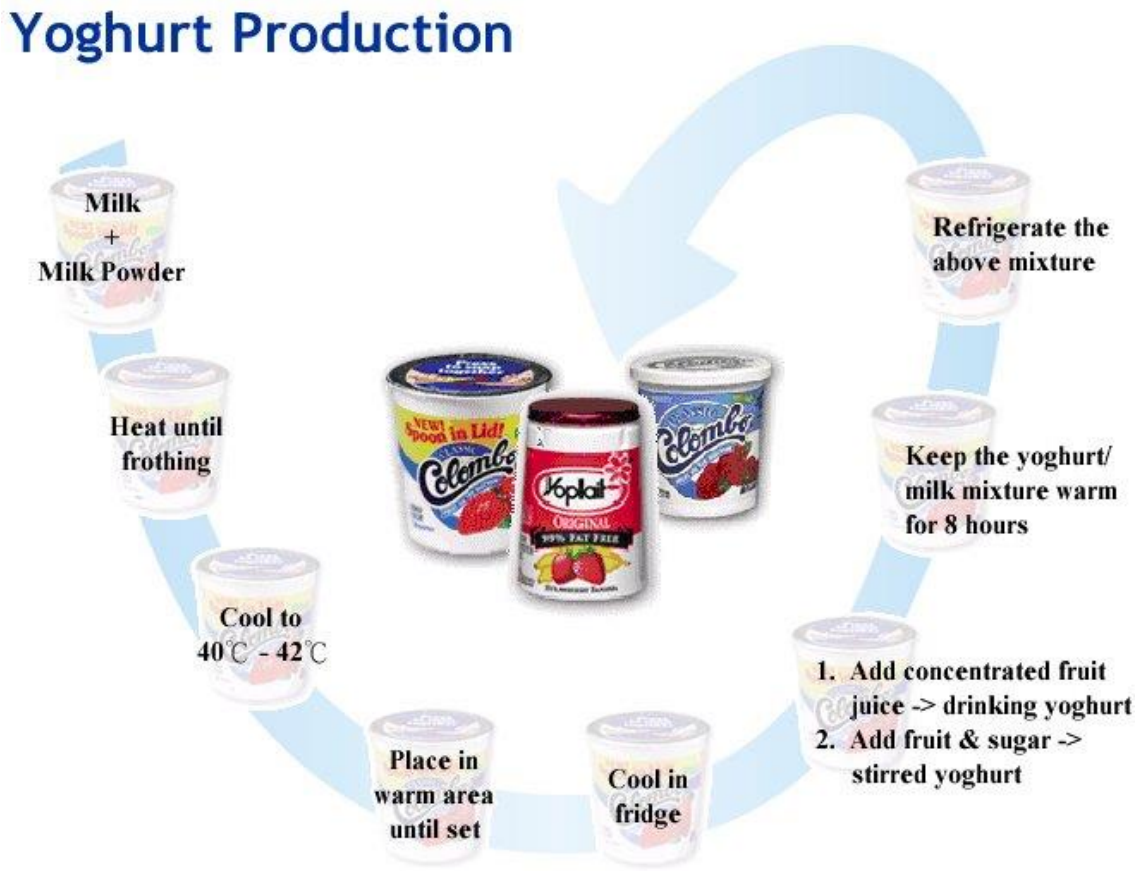
Preparation of Yogurt

- 1. The whole milk or skim or partly skim milk is boiled down, to one half its initial volume.
- However, a more or less similar effect can be achieved by adding 4 to 5 % dry-milk solids to whole milk or by using condensed milk.
- In this case, the heat treatment can be as high about 93.5°C for as long as 90 minutes

Preparation of Yogurt

- 2. The milk after boiling or heat treatment, allowed to cool down.

- 3. After cooling, the milk is inoculated with 2 to 3 percent starter, that is, the material containing microorganisms to induce a desired fermentation.



Preparation of Yogurt

- Two species of bacteria i. e.
  1. *streptococcus thermophilus*
  2. *Lactobacillus bulganicus*

are responsible for the production of yogurt

- 4. The inoculated milk or culture is then incubated at 45 °C.

Preparation of Yogurt

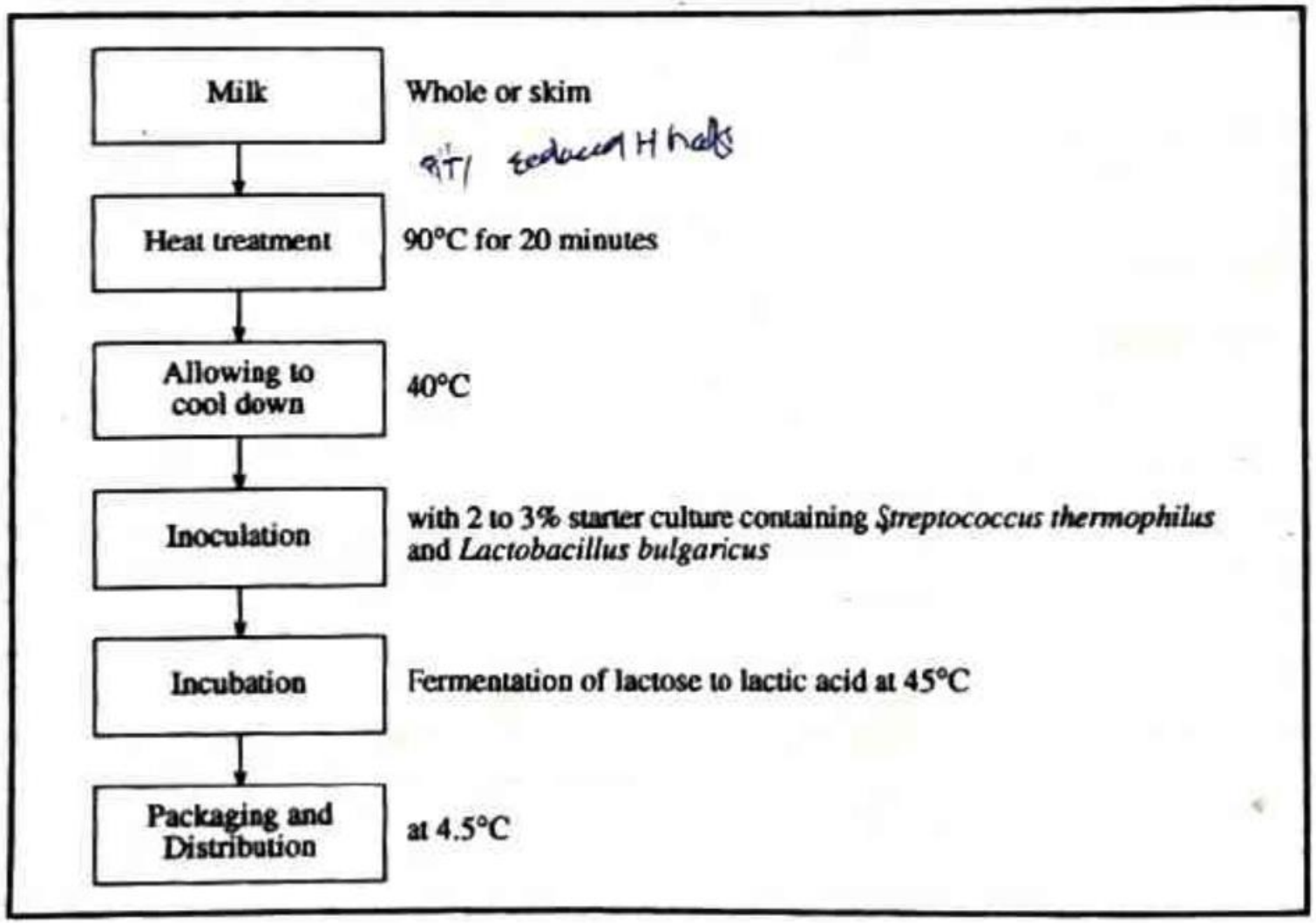


Fig. 6.6 : Flow diagram of preparation of yogurt

Food Biotechnology
Preparation of Cheese

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Introduction

- Cheese is the curd substance formed by the coagulation of the milk of certain mammals by rennet or similar enzymes in the presence of lactic acid produced by added microorganisms.

Procedures of Cheese Making

- 1. The starter culture, containing a mixture of lactic *streptococcl* or *lactobacilli* such as *Streptococcus cremoris* and *Streptococcus lactis* and *Lactobacillus bulgricus* is added to the milk.
- 2. As the microorganisms grow, they produce acid, because these microorganisms, milk sugar lactose convert to lactic acid as the temperature is raised to 30°C (86°F).

Procedures of Cheese Making

- 3. The milk now coagulates because the major protein in milk, casein precipitates as the milk becomes sour i.e. acidic.

- 4. To facilitate coagulation of the casein and inhibit its digestion, an enzyme rennet, derived from the stomach (abomasum, the fourth chamber or the real stomach) of the nursing calves (ruminants) is added.

Procedures of Cheese Making

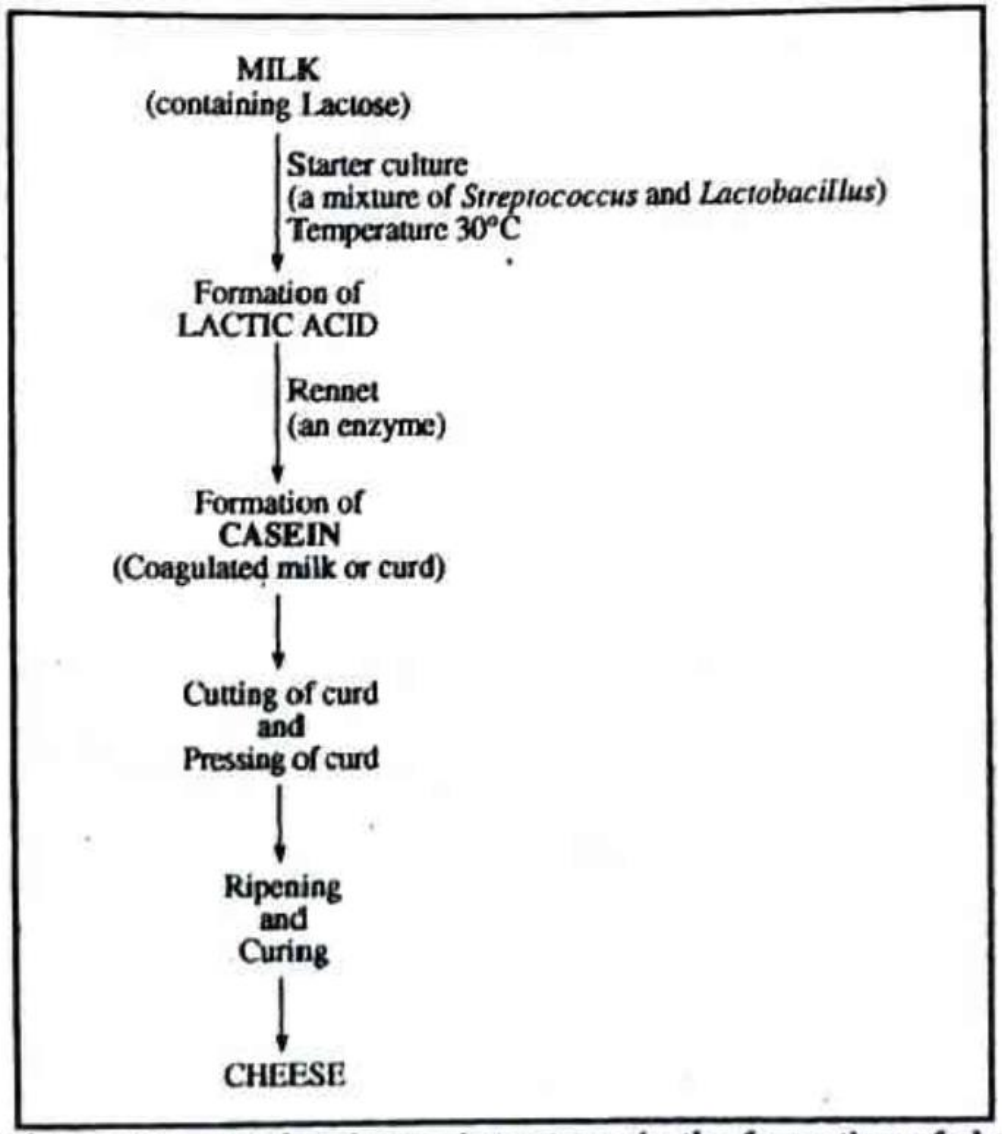

Fig. 6.7 : A diagram showing various stages in the formation of cheese

Procedures of Cheese Making

- 5.With or without cooking, the curd is cut with special knives to release as much whey possible.
- The degree of cutting also affect the final product.
- 6. The curd is pressed to remove even more whey
- 7. The curd is now placed in a suitable container for ripening & curing (Preservation and flavoring process).

Thank You