



CURD PROCESSING

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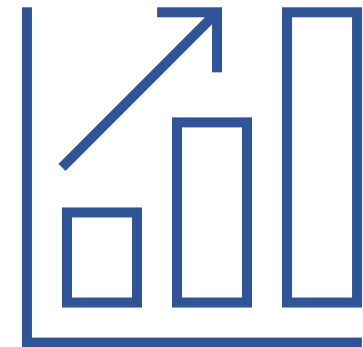
1. Introduction

- A **fermented product** prepared using fermentation technique used to preserve milk constituent for longer duration.
- It is defined as semi-solid product obtained from pasteurized cultured milk using harmless LAB (Lactic acid bacteria) or other bacterial culture.
- The fermentation:
 - **Gives acidic taste** to milk,
 - Improve its sensory characteristic making it **more palatable/digestible** and
 - Provides some **therapeutic advantages** not originally present in milk.
 - breakdown lactose into lactic acids and some flavouring compound such as **diacetyl**.



1.1 Status of Dahi in Indian Market

- The market analysis report shows that market size of curd reaches to Rs. 1365.5 billion in 2022.
- It is expected to grow curd market to Rs. 3175.0 billion by 2028 with growth rate of 15.1%.
- Currently, Maharashtra have highest market share followed by Uttar Pradesh and Andhra Pradesh & Telangana.
- Health-conscious consumers favoring healthier options drive innovation, like low-fat, high-protein variants, in the sector.
- Furthermore, due to busy lifestyle the demand of packed curd has risen leading to further growth in the market .



1.2 Nutritional Status of Curd (Whole Milk Curd)

- As per FSSAI regulation 2011, dahi prepared from whole milk must have nutritional composition as mentioned below:

#	Parameter	Values (%)
1.	Water	85-88
2.	Carbohydrates	4.6-5.2
3.	Sugar (Lactose)	4.6-5.2
4.	Protein	3.2-3.4
5.	Fat	5-8
6.	Ash*	0.7-0.75
7.	Acidity (lactic acid)	0.5-1.1

- Rich in calcium*, good source of potassium, phosphorus and magnesium.
- Dahi is also a good source of vitamin D, leading bone strengthening in coordination with calcium and phosphorus.

2. Raw Material

1. Milk of good quality

2. Bacterial cultures*

- * Lactic acid bacteria such as *Lactobacillus* strains like *Lactococcus lactis* etc: Produces **lactic acid** from lactose resulting increase in acidity,
- * *Streptococcus diacetyl lactis*: Produces **diacetyl (buttery flavour)**
- * *Streptococcus Cremoris*: Produces **lactic acid** from glucose as in misti dahi.
- * *Leuconostoc citrovorum* or *Leuconostoc Dextranicum*: Produces **dextran** and **levan** (exopolysaccharides) from sucrose contributing to specific aroma.

3. Processing Methods

- Curd or dahi processing is done from ancient times by fermentation of milk using natural microflora.
- Hence, it can be produced using any of traditional or modern industrial method.

1. Conventional/ Traditional Method:

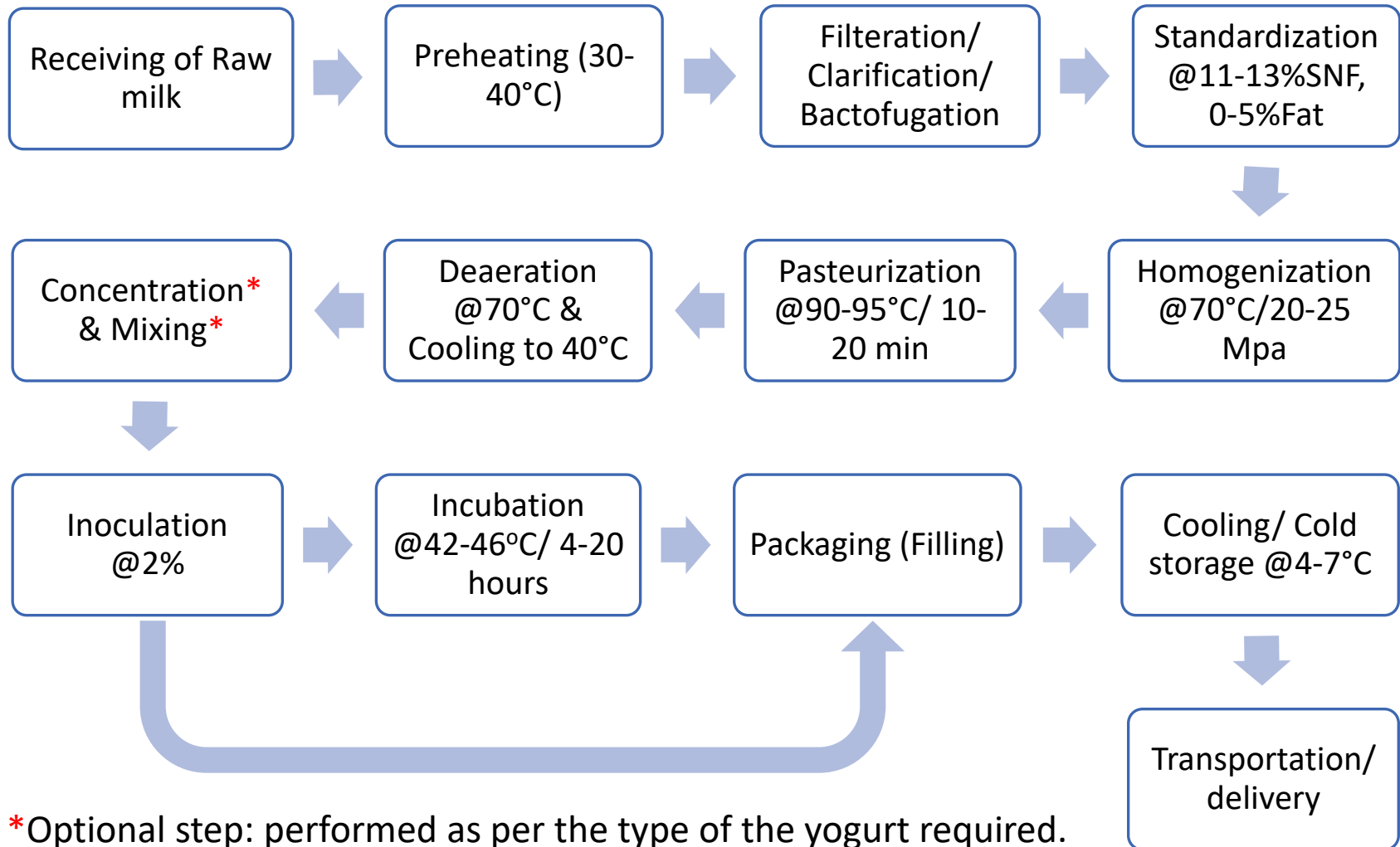
- To make dahi, milk is boiled for 5-10 min and cooled at ambient temperature, small portion of buttermilk or curd incorporated, and leavened overnight to solidify.

2. Industrial method

- This method is inspired by tradition method. Hence, processing of dahi done at industrial level includes similar method but in systematic way.



3.1 Process Flow Diagram



3.1(a). Filtration/ Clarification

- After preheating at 30-40°C of suitably selected milk majorly buffalo milk, clarification is done.
 - To remove any **extraneous matter/ contaminants** esp. vegetative microbes.
- Done using Clarifier & Bactofuge machine.
 - It separates microbes based on **density difference** (bacteria is heavier than milk).



3.1(b). Standardization

- Milk is standardized using industrial standardization machine with
 - Standardized fat content: fat-free or full fat,
 - SNF content: a minimum 2% increase.
- Effect of standardization on dahi quality
 - Enhances body texture and **custard consistency**,
 - Boosting protein,
 - Boost calcium, and other minerals content, and
 - Reducing spoiling during storage



3.1(c). Homogenization

- After standardization, milk is again heated to **60°C** and transferred to milk homogenizer
 - To melt milk fat and
 - To increase homogenizer efficiency.
- Milk is homogenized using single stage homogenization with 175kg/cm² pressure.
- Homogenization results:
 - Reduction in cream layer formation during incubation, and
 - Improve texture of dahi



3.1(d). Pasteurization

- After that it is pasteurized at higher temperature **@ 90-95°C/ 10-20 min** than usual to destroy maximum microorganism and kill pathogenic microbes.
- **Benefits:**
 - Denatures and coagulates milk albumin and globulins
 - Destroy microbial contaminants
 - Removes incorporated air
 - Releases peptones and sulfhydryl groups (Nutrients for fermentative microbe)



3.1(e). Inoculation & Incubation

- The pasteurized milk cooled **@37°C** is taken into mixing & coagulating vats where inoculum addition and mixing performed.
- Specific dahi culture added at the rate of **1 to 1.5%**.
- For incubation, either cultured milk stored in it for **8 to 10 hours** (until pH reaches **4.4-4.5**) or supplied to packed and then stored at incubating room/chamber **@37-42°C** temperature.



3.1(f). Packaging (Filling)

- The packages (SKUs) used for packaging of curd are:
 1. Plastic bag/pouches
 2. Plastic cup, jar
 3. Plastic pots
 4. Earthen pot etc.,
- Packaging material used are LDPE, LLDPE, EVOH, MLLDPE, PVC and other resin compounds for manufacturing of various packages.
- Packaging done at two stages,
 - First after inoculation,
 - Secondly, after flavouring and fruiting depending upon types of yogurt needs to be manufactured.



3.1(g). Cooling/ Cold Storing

- After packing, curd rapidly cooled around **4-7°C**
 - to stop the fermentation process,
 - to preserve the curd freshness and flavor and,
 - To ensures the curd's desired texture and consistency by preventing excessive fermentation or whey separation.
- Furthermore, cold storage done at a controlled temperature to ensure curd safety until its expiry date.



4. Possible Defects in Curd

#		Defects	Cause	Corrective Measure
1	Body & Texture	Watery	Low solids, poor milk quality, insufficient heat treatment	Proper Standardization
		Hard & lumpy	Over ripening	Controlled ripening
		Whey off	Low solids, Higher acidity	Proper Standardization and limited fermentation
		Ropiness	Faulty fermentation	Controlled fermentation
2	Flavour	Bitter & cheesy	Peptonising proteolytic organisms	Controlled fermentative growth
		Cooked Flavour	Overheating	Uniform & accurate heating
		Flat	Low acid and diacetyl production	Controlled fermentation, acids addition
		Rancid	Lipolytic organisms	Proper pasteurization
		Fruity & alcoholic	Yeast and molds growth	Controlled fermentation, & good hygiene practices.
		Malty defect	Growth of <i>S. lactis</i> var. multigenes	Controlled fermentation

5. References

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