Ministry of Food Processing Industries
Government of India

NIFTEM
KNOWLEDGE • INNOVATION • OUTREACH

LIQUID MILK PROCESSING

AATMANIRBHAR BHARAT

PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme)

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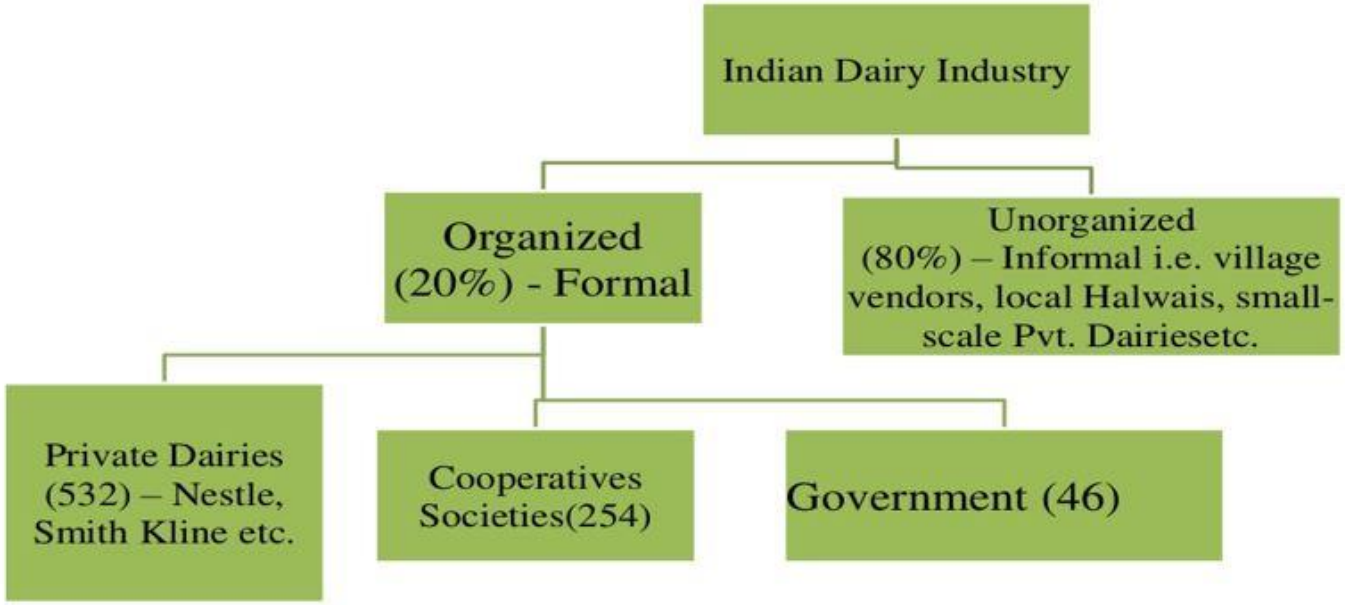
INTRODUCTION

- ✓ Milk, liquid secreted by the mammary glands of female mammals to nourish their young for a period beginning immediately after birth.
- ✓ Milk is a nutritious choice as it provides nine essential nutrients our body needs.
- ✓ Milk contains essential nutrients like high-quality protein, calcium, vitamin D and more. These nutrients help our bodies function properly.
- ✓ Several variants of market milk is available and in different types of package (pouch, glass bottle, PET, HDPE container, aseptic pack)

Structure of Indian Dairy Sector



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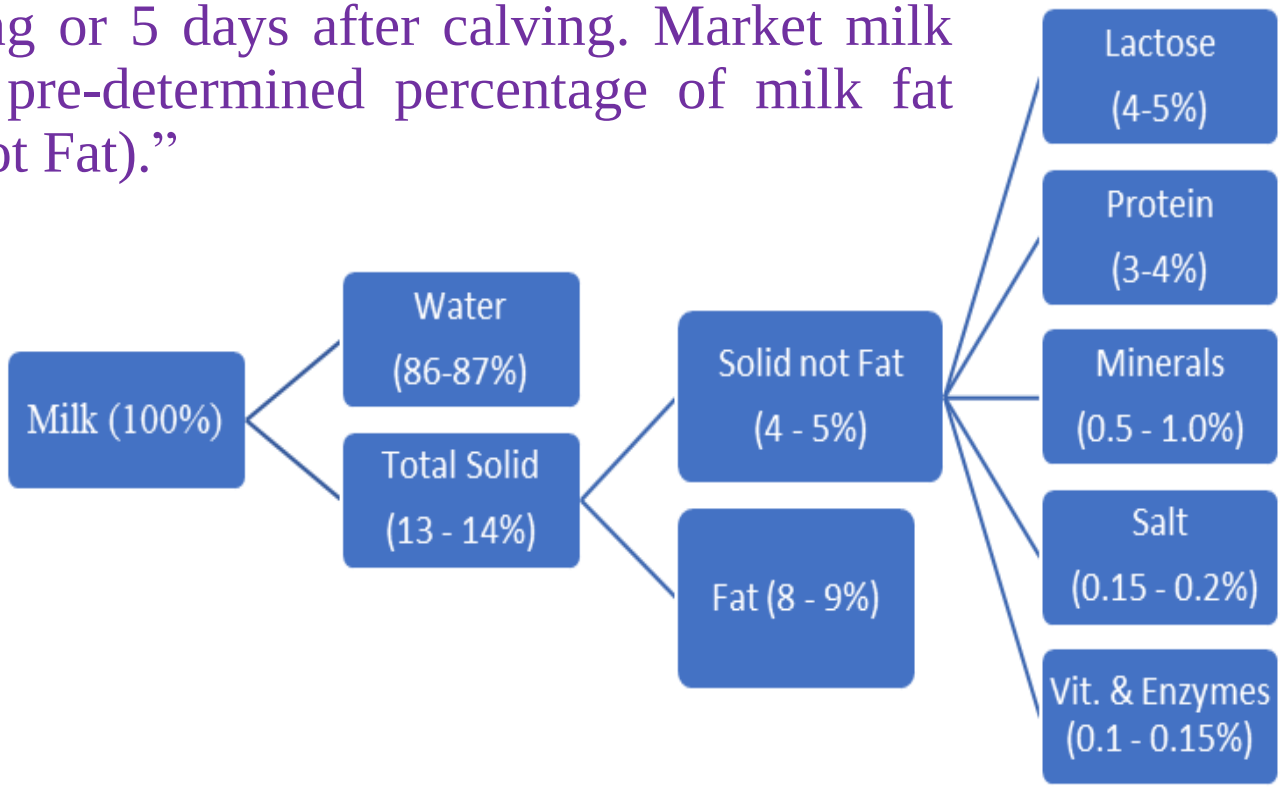
INTRODUCTION

As per FSSAI, "Milk is a whole, fresh, clean lacteal secretion obtained by complete milking of one or more healthy milch animals excluding that obtained within 15 days before calving or 5 days after calving. Market milk must possess the pre-determined percentage of milk fat and SNF (Solid Not Fat)."



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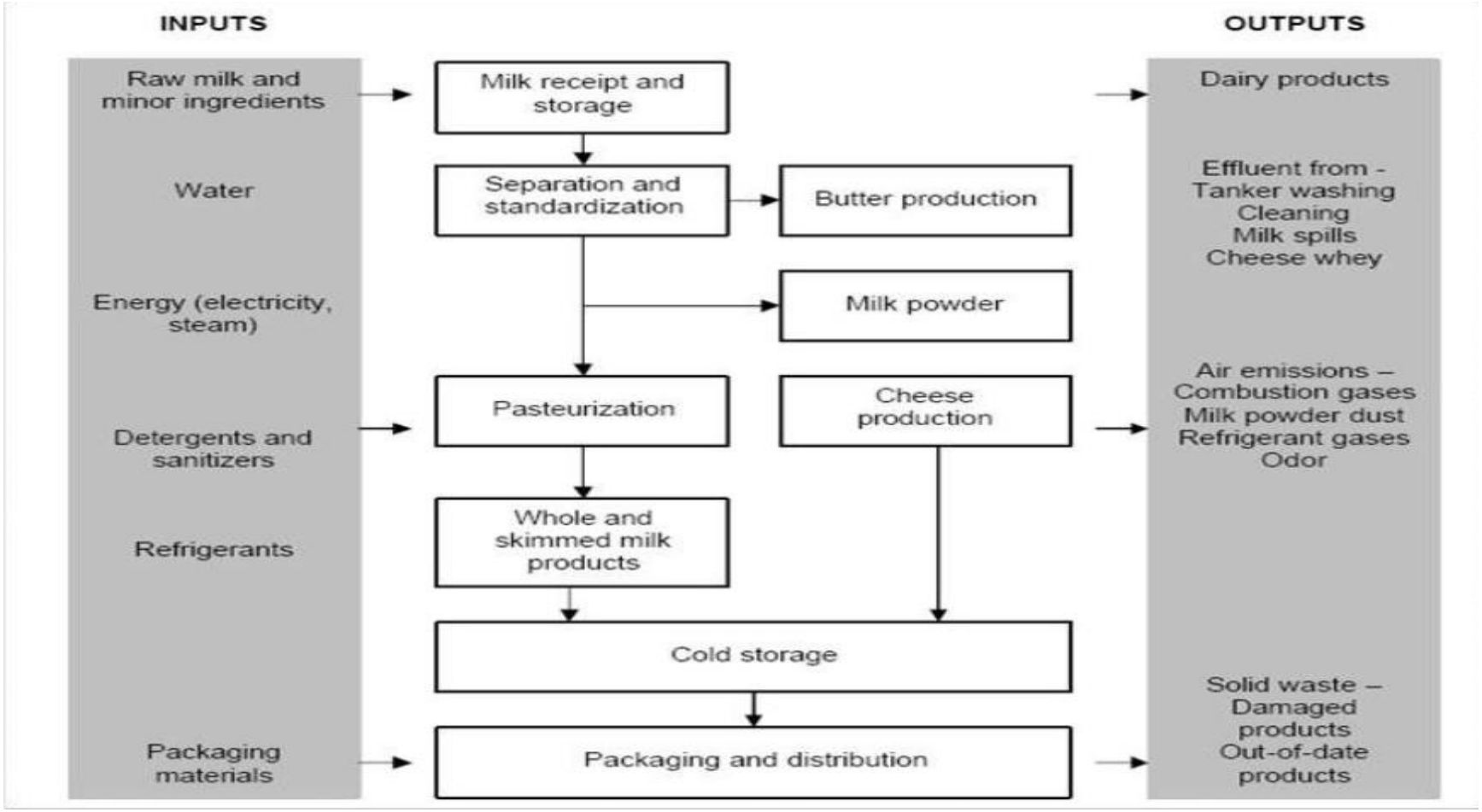
Flow Chart of Dairy Processing Activities



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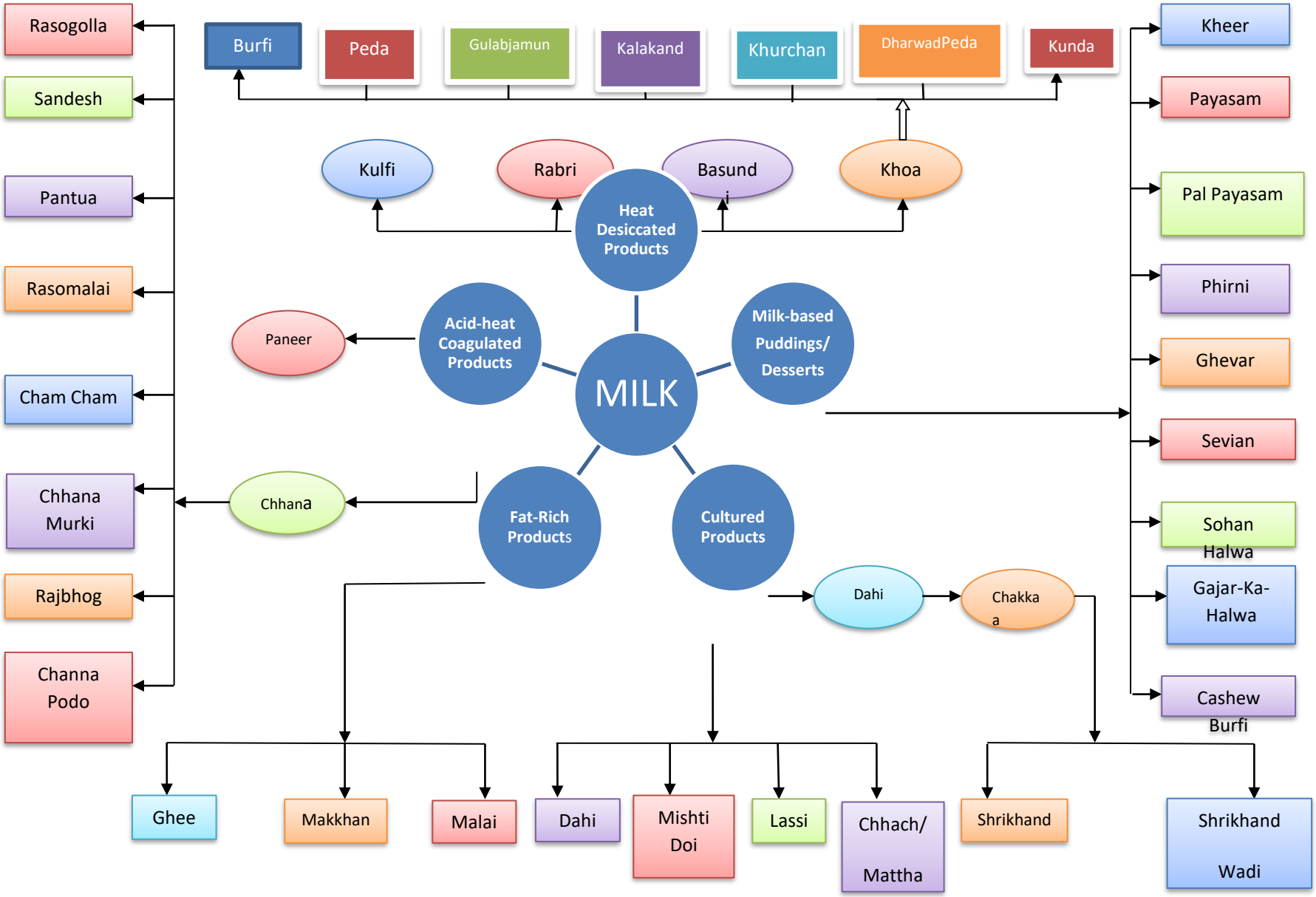
MILK PRODUCTS



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NUTRITIONAL VALUE OF MILK

Nutritional Factor	Description	Energy Value
Protein	Milk protein is casein, a high-quality protein. All essential amino acids are present in Milk.	4.1 kCal/g
Minerals	Milk contains phosphorus and calcium.	-
Vitamins	Milk contains vitamins A, D, thiamine, and riboflavin.	-
Fat	Milk fat is responsible of good flavor and physical properties. The fat content in cow milk is generally from 3.5 to 4.5 %	9.3 kCal/g -
Lactose	Lactose is the sugar component of milk and it supply energy.	4.1 kCal/g

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Process Flowchart

Milk collection (can/tanker)

↓

Quality check (Platform test)

↓

Weighment

↓

Filtration (duplex inline filter), Chilling of milk

↓

Transfer of milk to Raw milk silos

↓

Washing of cans and can lids

(Provided with can steaming block, dip saver, tipping bar etc.)

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Equipment Required

1. Can unloading assembly
2. Weighment tank
3. Filtration (duplex inline filter)
4. Chilling of milk (PHE)
5. Milk silos
6. Bulk coolers
7. Cream Separator
8. Pasteurizer unit
9. Homogenizer
10. Lab facilities for raw and processed milk
11. Pouch filling machine
12. CIP Station

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Process Flowchart

Raw milk from silos to balance tank by milk transfer pump

↓

Homogenizer

↓

Pasteurizer

↓

Processed Milk Silo

Packaging

Standard Operating Procedures (SOP's) of Milk Processing and Packaging

i) **Raw Milk Reception**: Raw Milk tankers/ cans is weighed either in weighbridge or in weighing bowl, Batch wise sampling & testing need to be done as per defined procedures.

ii) **Filtration**: The accepted milk is weighed and unloaded in the Dump Tank and Pumped through a chiller after property filtering, such milk is stored in the silos through the previously cleaned, sterilized/ steamed pipe line, and silos act.

Standard Operating Procedures (SOP's) of Milk Processing and Packaging

iii. **Chilling:** Filtered milk is chilled through a chiller ensuring the temperature not more the temperature not more than 5 deg c. chilled milk is stored in the silos through the previously cleaned, sterilized/ steamed pipe line, silos etc.

iv. **Pasteurization:** Milk Pasteurization is done at the recommended pasteurization temperature and holding time.

v. **Milk Storage:** The Standardized milk is then transferred to horizontal milk storage tank.

Standard Operating Procedures (SOP's) of Milk Processing and Packaging

vi. **Filling:** Filling is carried out in sachets in filling machine as per required quantities of 200 ml, 500ml and 1 liter. The Sachets or bottles then stored in Crates.

vii. **Cold Room:** Crates are then brought cold room and stores at a temperature of below 5^0C

viii. **Dispatch:** Milk is ten dispatched through refrigerated vans marinating a temperature of below 5^0C

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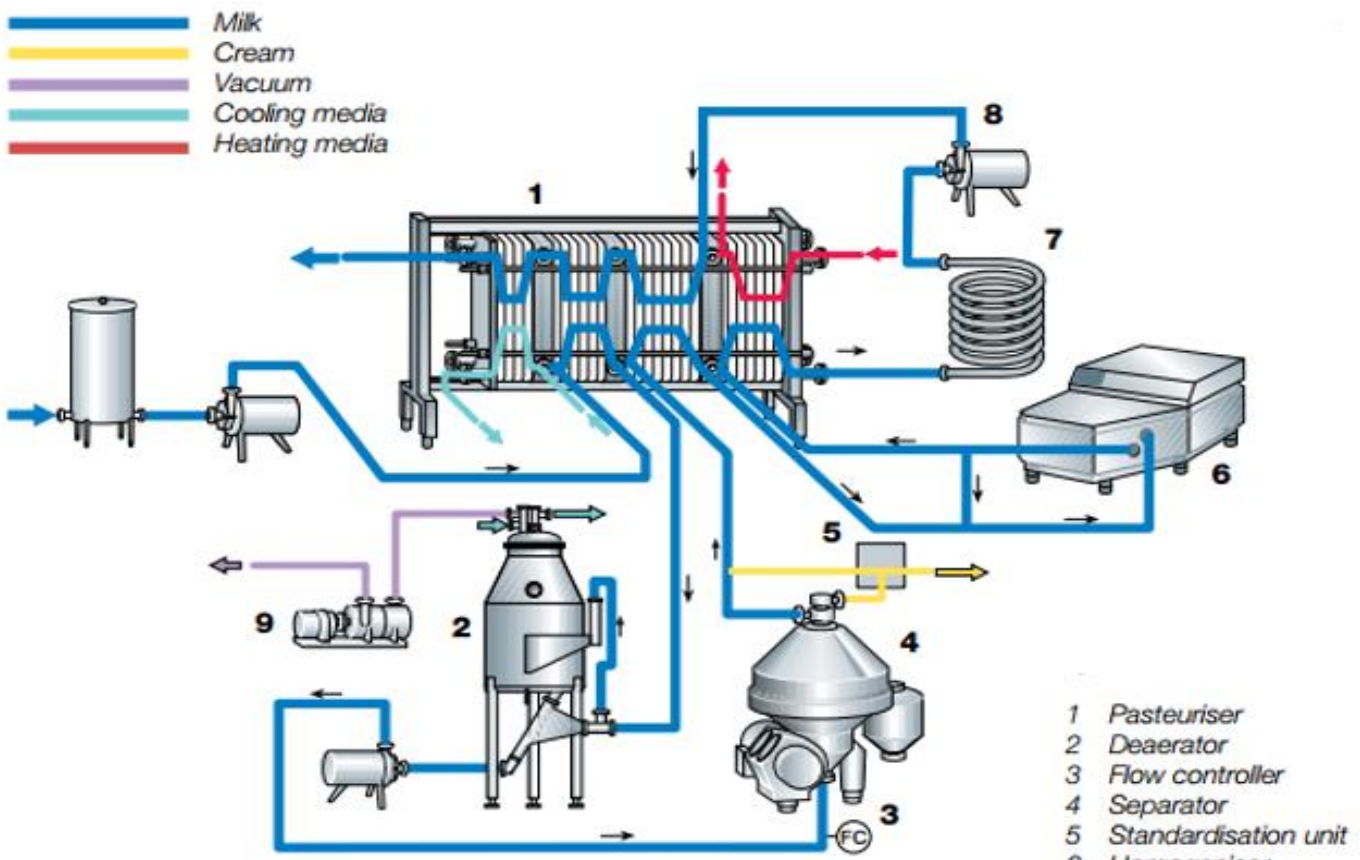
MILK PASTEURIZATION PROCESS (WITH CREAM SEPARATION AND HOMOGENIZATION)



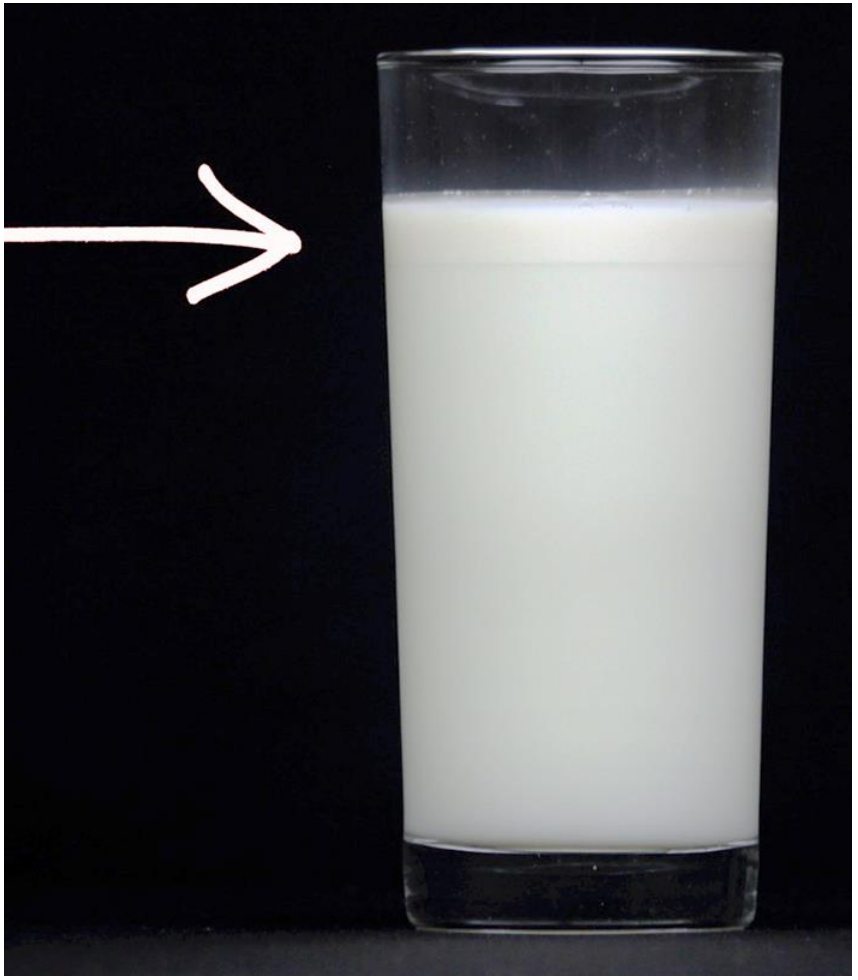
CREAM SEPARATION

Cream separation is mainly done

1. To recover fat from milk: Fat is used to prepare value added products such as cream, butter, ghee etc.
2. To obtain a low fat or fat-free milk (Skim milk): Skim milk is used to prepare skim milk powder, dairy whitener, condensed skim milk etc.
3. To standardize the fat content of milk.

CREAM SEPARATION

1. **Gravity Method:** In this method, milk is hold undisturbed for some time. Cream being lighter than other compositions, comes up and is taken out manually. This is not a controlled method and hence proper separation cannot be ensured.



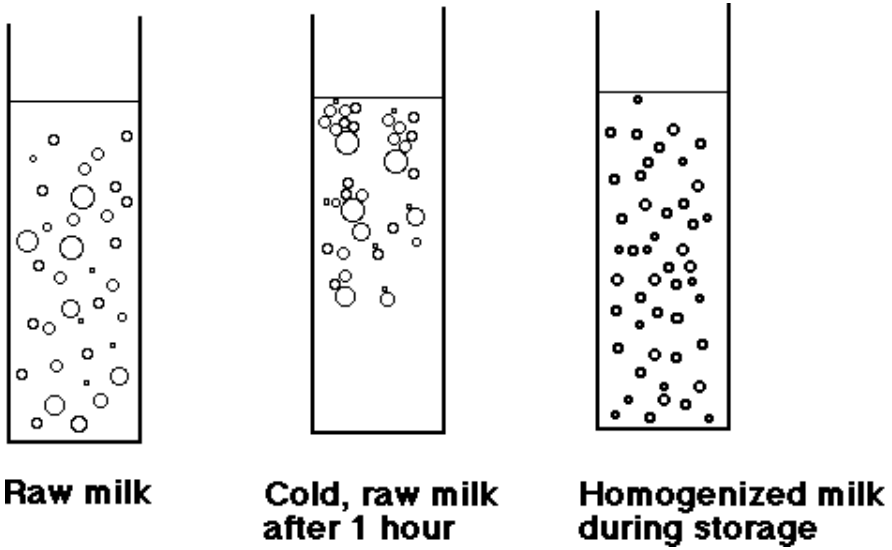
CREAM SEPARATION

2. Centrifugal Method: In this method, a centrifugal agitation is given to the milk with some agitator manually or a dedicated machine called cream separator. Cream separator is installed along with pasteurizer, normally after regeneration section 1. The percentage of cream to be separated from the milk can set in the machine.

Blue - incoming whole milk
Pink - separated cream
Yellow - skim milk moving down cones
Green - skim milk moving up & over cones

Homogenization

- ✓ Homogenization is the process of reducing the size of fat globules in milk.
- ✓ It prevents the formation of a cream layer and easy digestion.
- ✓ Homogenized milk has a uniform flavour throughout.
- ✓ It tastes richer, smoother and creamier than unhomogenized milk due to an increase in the surface area of the fat globules which are uniformly distributed in milk



Packaging Machine (in bottles)

Linear bottle Filling Machine

Rotary Bottling machine

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PACKAGING MACHINES

MILK POUCH PACKING MACHINE

- ✓ Automatic FFS (form fill and seal) machine.
- ✓ Filling Range: 200ml, 250ml, 500ml & 1ltr
- ✓ Filling System: Gravity filler
- ✓ Packing Material: LDPE film

  width:324±2mm
- ✓ Filling Range: 200ml, 250ml, 500ml
- ✓ Pouch length: Mechanical adjustment
- ✓ All contact parts: Stainless Steel

Packaging Machine (pouch)

Single Head VFFS

Double Head VFFS

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PACKAGING MACHINES

AUTOMATIC MILK FILLING MACHINE

- ✓ Piston fillers are a great option for packaging liquids.
- ✓ Filling Range: 500ml to 1 liter
- ✓ Filling Speed: 500 bottle per hour or more
- ✓ All contact parts: Stainless Steel

Packaging Machine (bottles)

Linear bottle Filling Machine

Rotary Bottling machine

PACKAGING MACHINES

ASEPTIC PACKAGING MACHINE

Tetra Brik® Aseptic is one of the world's most efficient beverage carriers. Using no unnecessary material, weight, space or energy, its rectangular package shape stacks neatly on pallets, in transport containers, on supermarket shelves and at home.

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PACKAGING MATERIAL FOR LIQUID MILK

- Paper and paper based products
- Glass
- Tin plate
- Aluminum foil
- Plastics
- Low polymers
- High polymers
- Laminates

QUALITY OF PROCESSED MILK

The quality of processed milk and the shelf-life depends on the following factors:

a) raw milk quality,

b) processing conditions,

c) storage temperature,

d) oxygen pressure,

e) light, and

f) package configuration.

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ADULTERANTS IN LIQUID MILK

Major adulterants used in milk having serious adverse health effect are

1. urea,
2. formalin,
3. detergents,
4. ammonium sulphate,
5. boric acid,
6. caustic soda,
7. benzoic acid,
8. hydrogen peroxide,
9. sugars and
10. melamine

CONTACT DETAILS

National Institute of Food Technology Entrepreneurship and Management

Ministry of Food Processing Industries

Plot No.97, Sector-56, HSIIDC, Industrial Estate, Kundli, Sonipat, Haryana-131028

Website: http://www.niftem.ac.in

Email: pmfmecell@niftem.ac.in

Call: 0130-2281089