Ministry of Food Processing Industries
Government of India

सत्यमेव जयते

NIFTEM
KNOWLEDGE • INNOVATION • OUTREACH

CHEESE PROCESSING

AATMANIRBHAR BHARAT

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

INTRODUCTION

- Cheese is one of the oldest processed food by mankind. It is believed that cheese originated accidently as a result of some activities of the nomadic tribes across rivers of Tigris and Euphrates, around 8000 years ago. Bags made of animal skin were used to store food items, particularly surplus milk. During warm climate, fermentation of milk sugar would result into curdling of milk
- Cheese making was basically a farmhouse practice till 18th century. Scientific developments during the early 19^{th} century have provided guidelines, which has a great impact on cheese making and ripening process.
- Traditionally, cheese was kept for months or sometimes even years for ripening and development of typical texture and flavour. Scientific development and research has accelerate the cheese ripening process and to achieve the desired texture and flavour in a very less time.

INTRODUCTION

According to the FSSR (2011), cheese means the ripened or un-ripened soft or semihard, hard and extra hard product, which may be coated with food grade waxes or polyfilm, and in which the whey protein/casein ratio does not exceed that of milk. Cheese is obtained by coagulating wholly or partly milk and/or products obtained from milk through the action of non-animal rennet or other suitable coagulating agents and by partially draining the whey resulting from such coagulation and/or processing techniques involving coagulation of milk and/or products obtained from milk which give a final product with similar physical, chemical and organoleptic characteristics.

The product may contain starter cultures of harmless lactic acid and/or flavour producing bacteria and cultures of other harmless microorganisms, safe and suitable enzymes and sodium chloride. It may be in the form of blocks, slices, cut, shredded or grated cheese.

LEGAL STANDARD OF CHEESE

Type of Cheese	Moisture Content (maximum) %	Milk Fat Content on dry basis (minimum) %
Hard pressed cheese	39	48
Semi hard cheese	45	40
Semi soft cheese	52	45
Soft cheese	80	20
Extra hard cheese	36	32
Mozzarella cheese	60	35
Pizza cheese	54	35

CLASSIFICATION OF CHEESE (on the basis of their rheology, and the manner of ripening)

1. **Very hard (grating)** - Moisture < 35% on matured cheese and ripened by bacteria, e.g. Parmesan, Romano.
2. **Hard** - Moisture < 40%
   a)Ripened by bacteria, without eyes: Cheddar
   b)Ripened by bacteria, with eyes: Swiss
3. **Semi-hard** - Moisture 40-47%
   a) Ripened principally by bacteria: Brick.
   b) Ripened by bacteria and surface microorganisms: Limburger
   c) Ripened principally by blue mould:
4. **Soft** - Moisture > 47%
   a) Un-ripened – Cottage
   b) Ripened – Neufchatel

COMPOSITION AND NUTRITIONAL VALUE OF CHEESE

- Cheese is one of the nutritious dairy products.
- The nutritional value depends on many factors such as animal species and breed, stage of lactation, fat content, manufacturing and ripening process.
- In general, cheese contains relatively small amounts of the water-soluble constituents whey proteins, lactose, and water-soluble vitamins.

COMPOSITIONAL VALUE OF CHEESE

Variety	Moisture	Fat	Protein	Ash (salt-free)	Salt	Calcium	Phosphorous	Energy (Calorie/ 100g)
Cheddar	37.5	32	25	2	1.5	0.86	0.6	398
Mozzarella	54	18	22.1	2.3	0.7	-	-	290
Cottage (un-creamed)	79.5	0.3	15.0	0.8	1.0	0.1	0.15	200

TYPES OF CHEESE

- Cheddar cheese
- Gouda cheese
- Swiss cheese
- Parmesan cheese
- Mozzarella cheese
- Cottage cheese
- Cream cheese
- Processed cheese
- Cheese spreads
- Cheese sauces and dips






Requirements

- Milk
- Starter culture
- Rennet
- Emulsifying salts
- Acidifying agents
- Salt

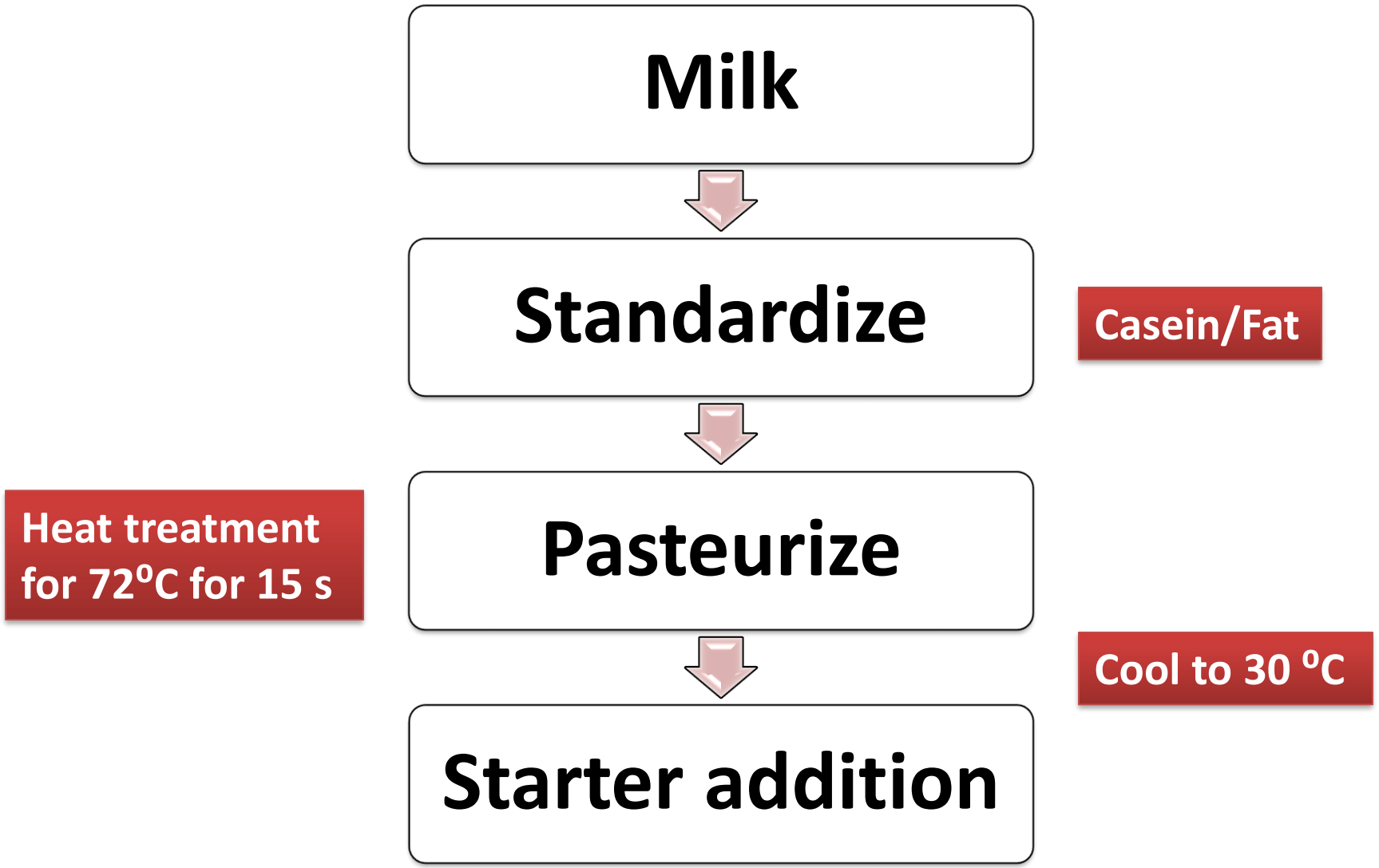
FROM MILK TO CHEESE

- **In the cheese vat:** Conditioning of cheese milk
- Additives:
  – Calcium chloride
  – Saltpetre, if permitted by law
  – Starter bacteria, appropriate to type of cheese
  – Rennet as coagulant

Coagulum

- Cutting into grains (curd) and removing part of the whey
- Adding water to wash curd (semi-hard cheese production)
- Heating, scalding, directly or indirectly, depending on type of cheese
- Collection of curd for pre-pressing and/or final molding/pressing, and if required
- Brine salting or for cheddar cheese
- Cheddaring followed by milling, salting, hooping, and pressing
- Formed, pressed, and salted cheese to ripening room storage for required time

PROCESS OF PREPRATION



PROCESS OF PREPRATION

Rennet addition

Coagulation

Cutting

Cooking

Whey drainage

PROCESS OF PREPRATION

Milling

Salting

Hooping and pressing

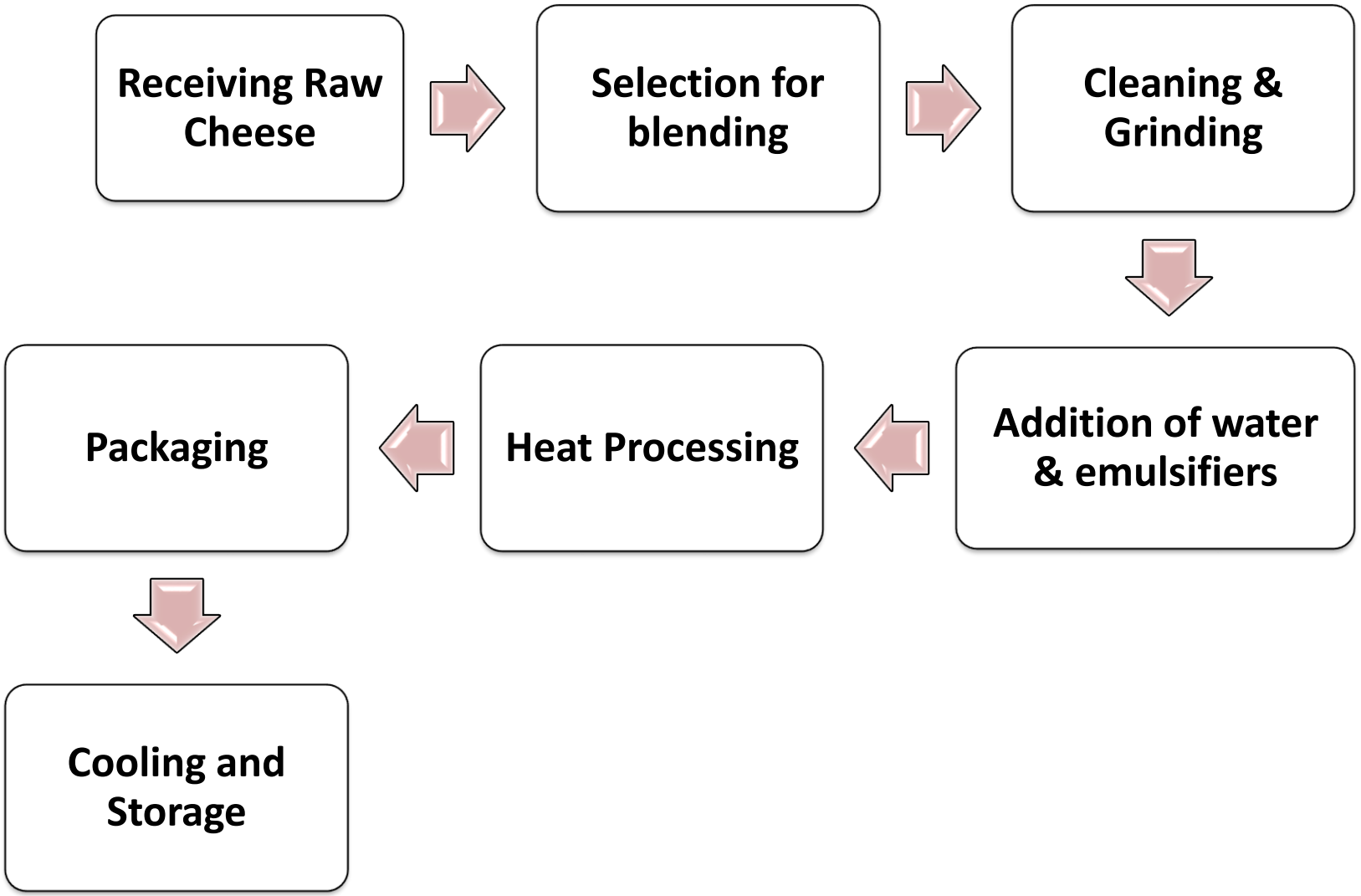
PROCESS OF PREPRATION

Coating

Ripening

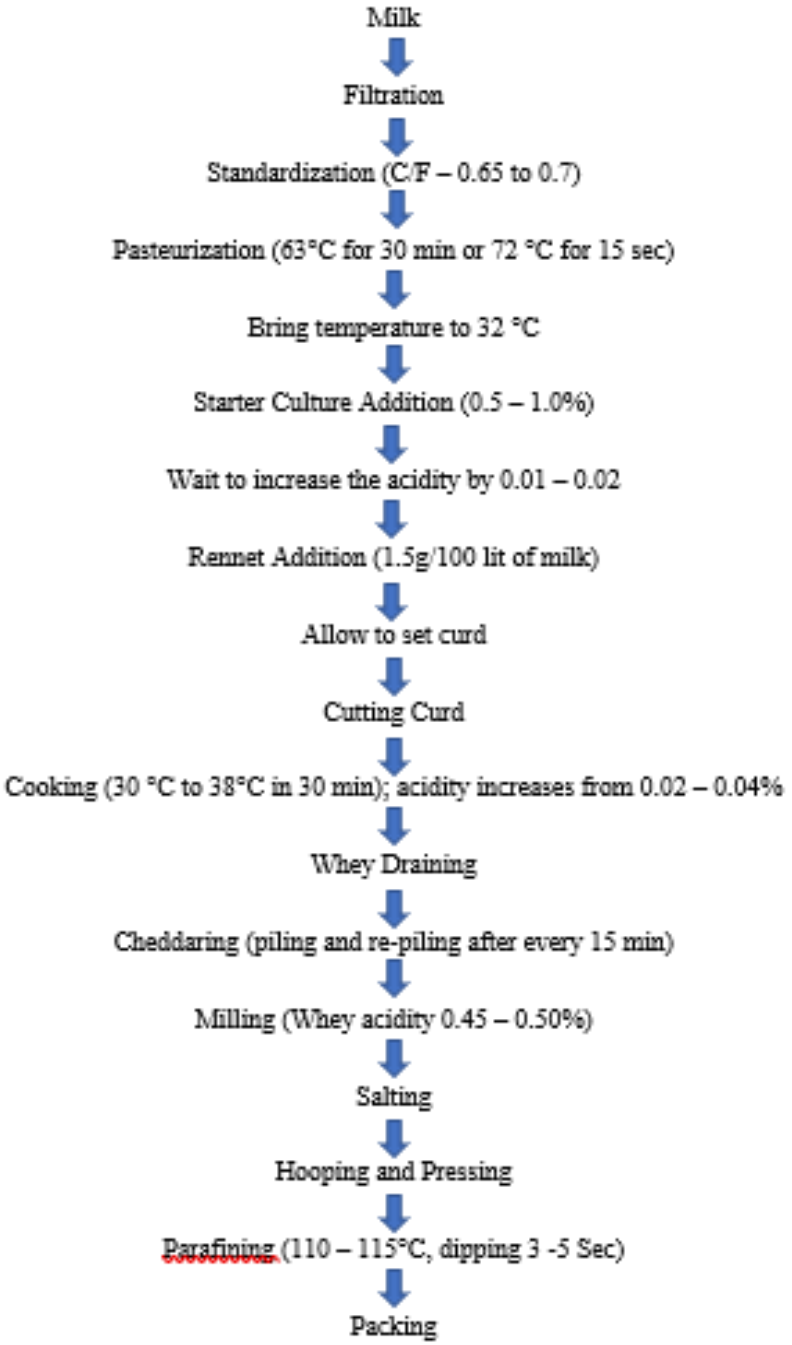
Packaging

PROCESS OF PREPRATION (Processed Cheese)



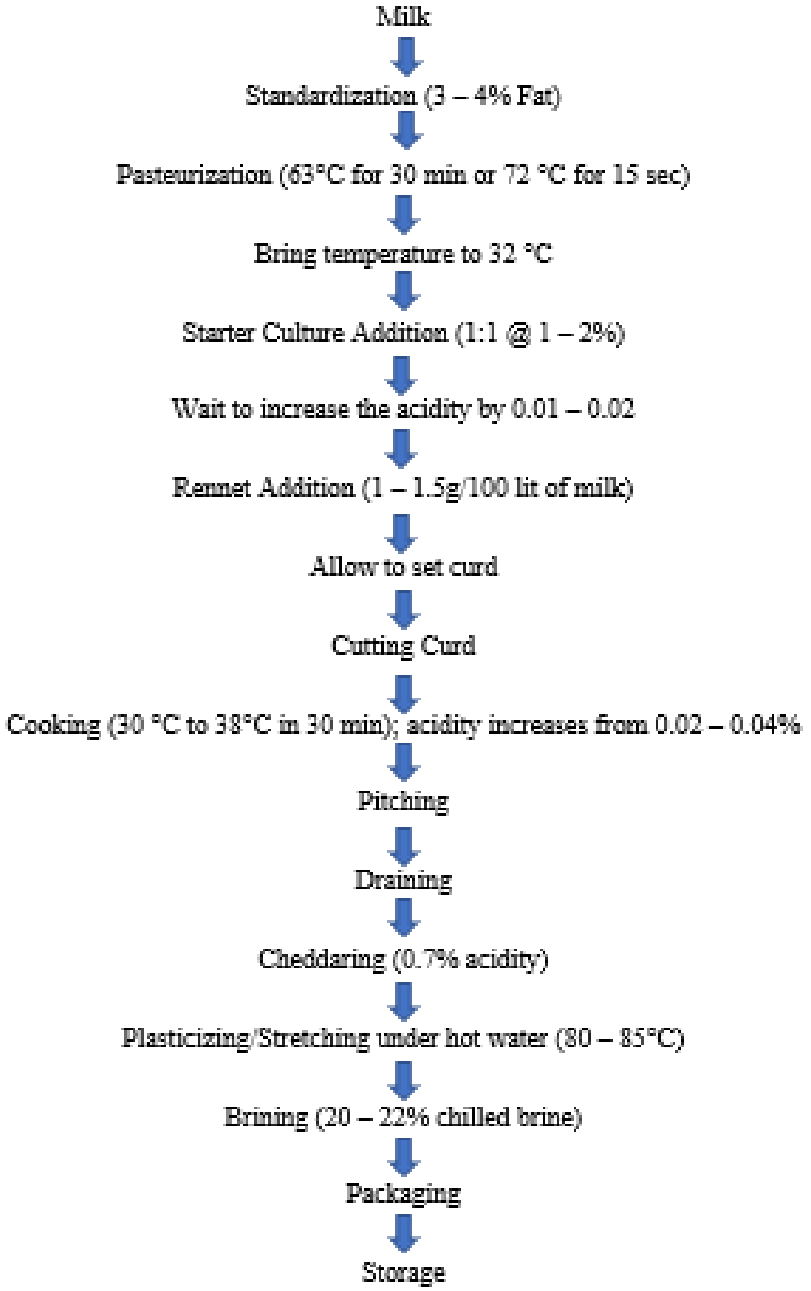
Flow chart for Cheddar Cheese

- Cheddar cheese is an outstanding example of the close-textured hard cheese, which is the most popular cheese in the world.
- A fat–casein ratio of 1.47 is generally considered optimum for Cheddar cheese.
- An optimal fat level of 3.2% in milk is desirable for making cheddar cheese.
- It contains 1.5–3% salt.
- Mesophilic cultures are used along with rennet to form milk coagulum.



Flow chart for Mozzarella Cheese

- Mozzarella is a soft, mild cheese that's commonly used to make pizza.
- Fat content: 45%, Calcium content: 403 mg/100g.
- Mozzarella cheese is not aged like most cheeses. It is eaten fresh and within few hours after it is made.
- It can be kept in brine for up to a week or longer when sold in vacuum-sealed packages.



CHEESE PROCESSING MACHINERY

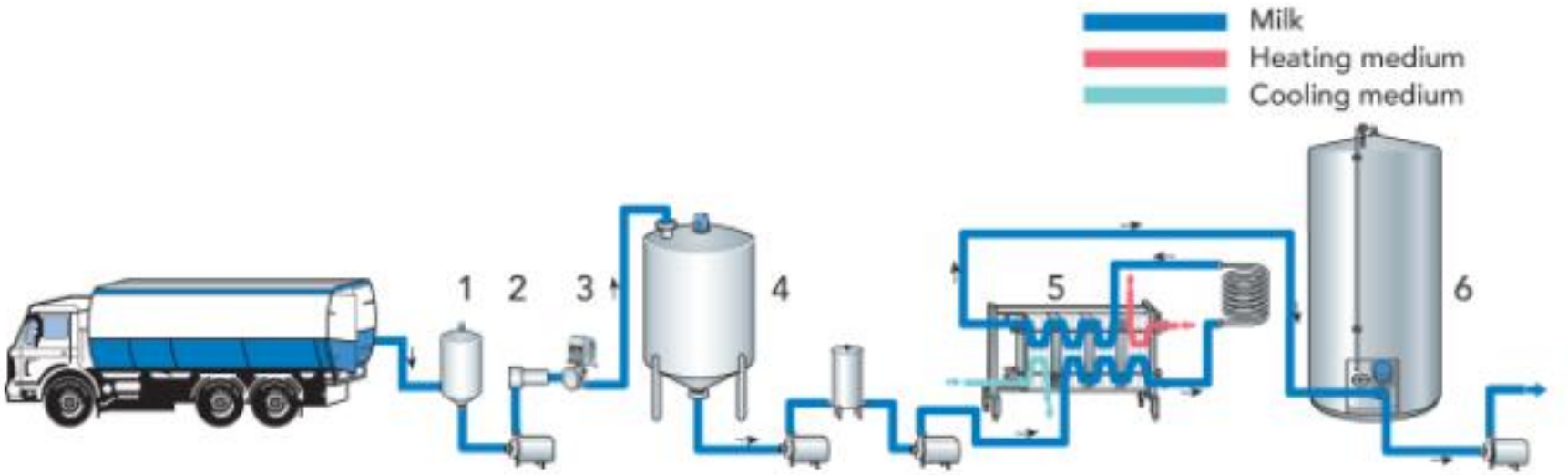
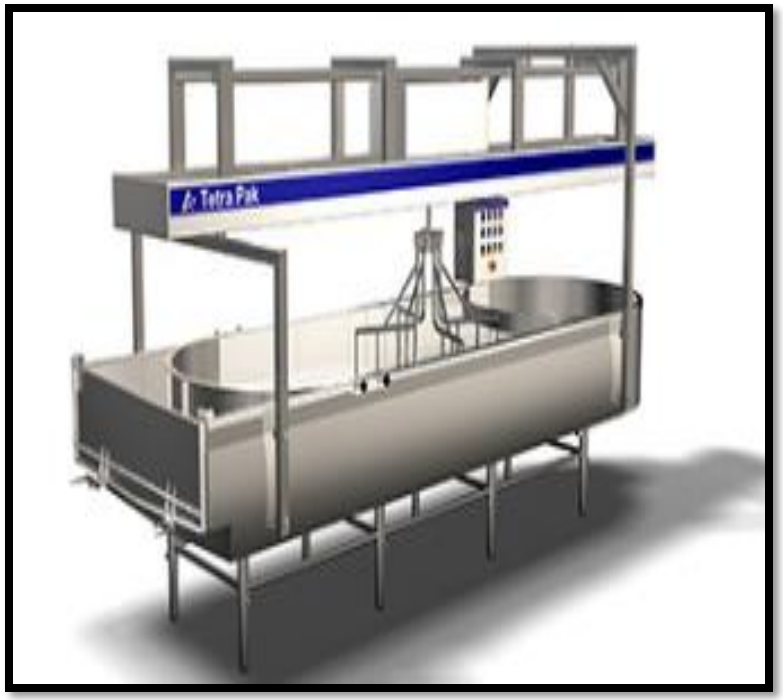


Fig. **Milk reception and pasteurization unit** a) Air eliminator, b) Filter, c) Milk meter, d) Intermediate storage tank, e) Thermization/pasteurization and cooling, f) Silo tank (source: – Tetrapak Handbook)

EQUIPMENT REQUIRED

- **Cheese Vat**



EQUIPMENT REQUIRED

- **Hoops**
- **Cheese press**

EQUIPMENT REQUIRED

- **Processing kettle**

- **Grinder/Cheese mill**

EQUIPMENT REQUIRED

Miscellaneous:

- Paraffin heater
- Cheese wires

STORAGE REQUIREMENTS

- **Ripening/cold room**

PACKAGING MACHINES

- ✓ Individual cheese packet
- ✓ Vacuum packaging
- ✓ Box making and packing machine

STORAGE CONDITION OF CHEESE

- The recommended temperature range for storing cheese is between 35 and 45 degrees Fahrenheit, at a high humidity level, preferably at the bottom shelf of refrigerator to avoid accidentally freezing.
- A proper storage requires following :

➢ **Natural Hard Cheese and Semi-Hard Cheese and Processed (Cheddar, Swiss, Parmesan, Brick, Bleu, etc.):** Refrigerate in original package and over wrap tightly in aluminum foil, plastic wrap or plastic bag tightly closed to avoid drying.

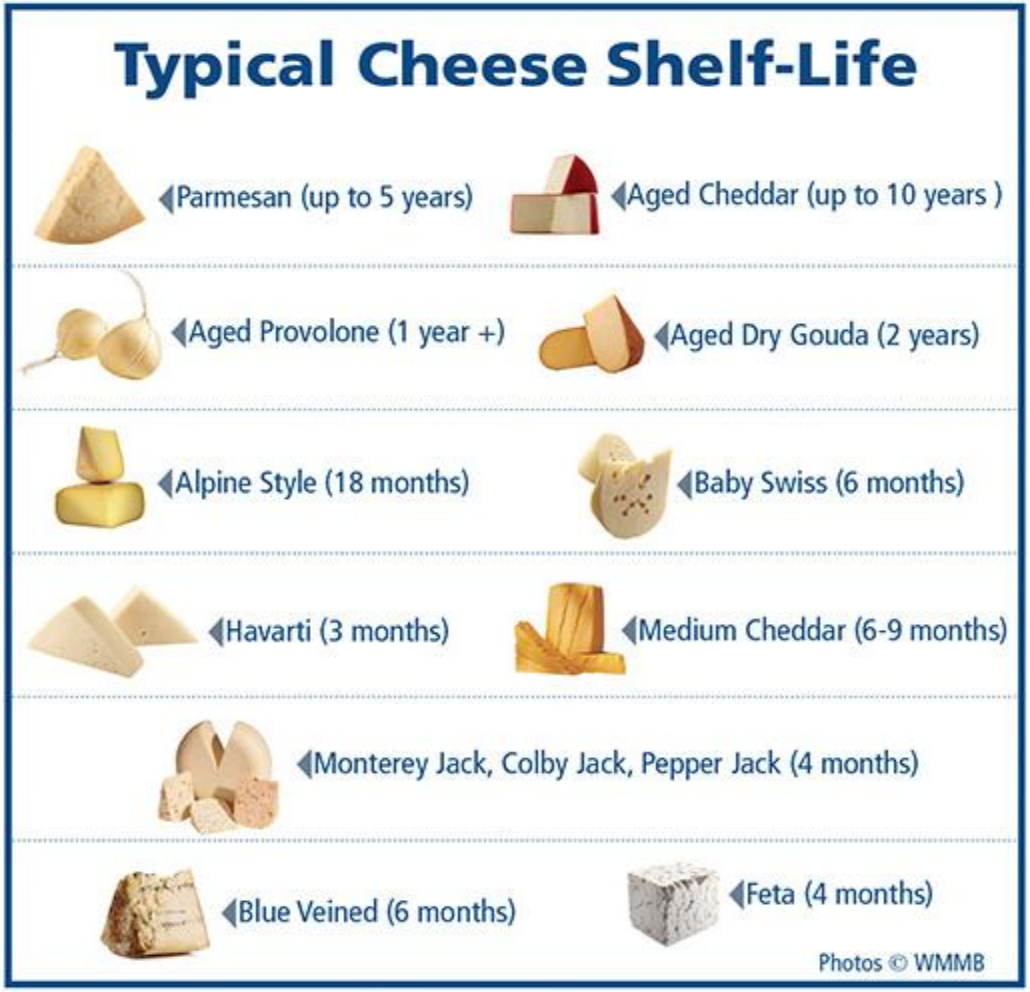
➢ **Soft Cheese (cream, cottage, limburger, camembert):** Refrigerate tightly covered.

SHELF LIFE OF CHEESE

The shelf life of cheese can vary from a few weeks to multiple years depending on its composition and how it is packaged.

<u>Area of concern</u>

1. Growth of yeast and mold.
2. Moisture
3. Texture, off-flaors issues



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