Dairy Products Processing

Dairy Products -

- Beverages
  - Flavoured-Milk
  - Smoothies
  - Milk-Shakes
- Dried
  - SMP
  - WMP
  - Casin
  - Whey-Protein
  - Lactose
  - Buttermilk-Powder
- Fat- Rich
  - Butter
  - Cream
  - Fat
  - Ghee
- Milk
  - Pasteurized
    - Full-Cream
    - Standard
    - Toned
    - Double-Toned
    - Lite
  - UHT
    - ESL-Pouch
    - Tetra-Brick
- Cultured
  - Fresh
    - Plain-Dahi
    - Probiotic
    - Yogurts
  - UHT
    - Butter-Milk
    - Lassi
    - Milk-Shakes
- Coagulated
  - Paneer
  - Cheese
- Indulgence
  - Ice-cream
  - Frozen-Yogurt
  - Sweets

Factors affecting Quality of Milk Products

A) <u>Milk Quality</u>

- Protein
- Fat
- Inhibitors

B) <u>Milk Processing</u>

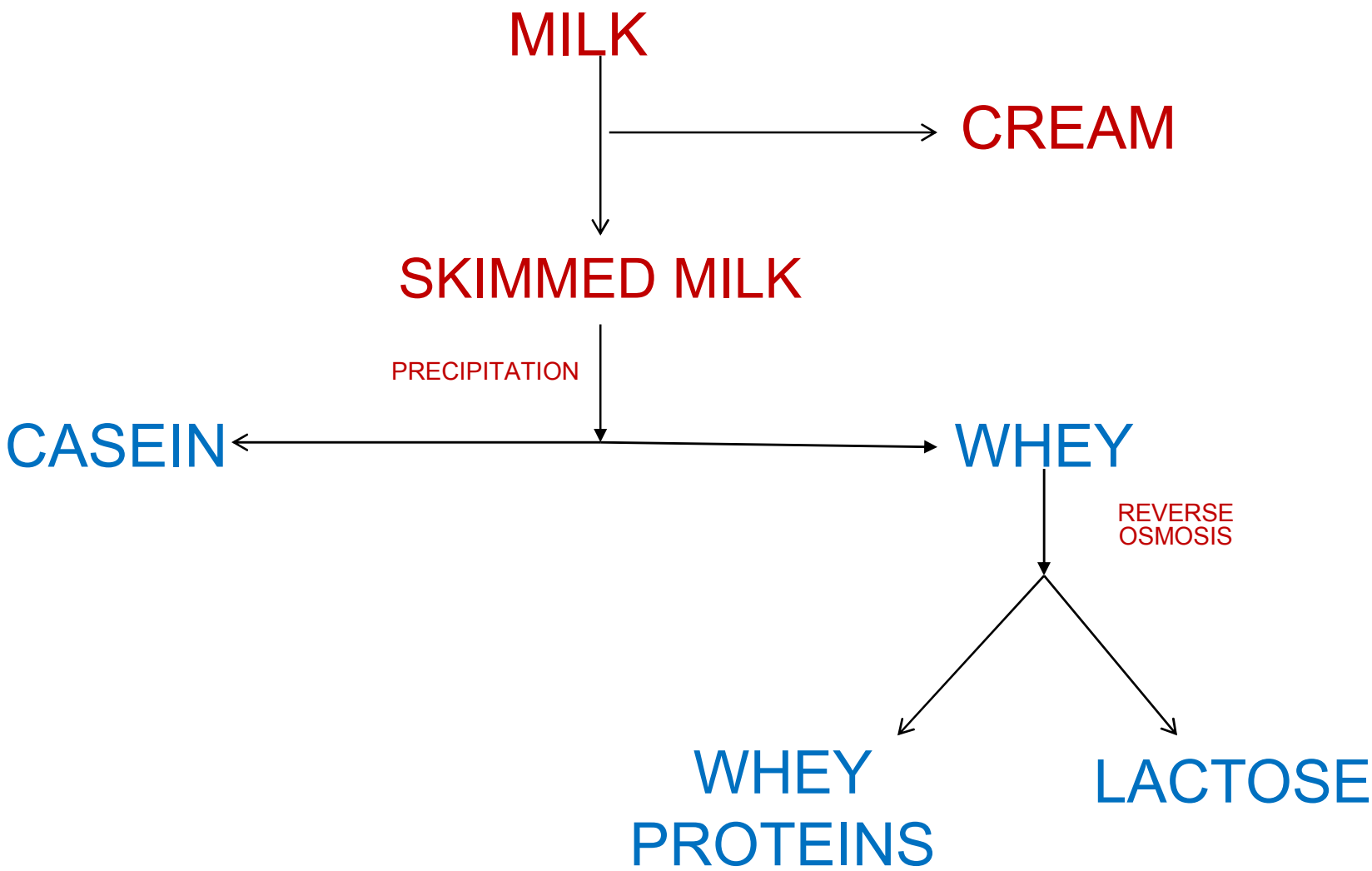
- Standardization
- Homogenization
- Heat Treatment
- Dearation

Dehydrated Products

- Skimmed Milk Powder
- Whole Milk Powder
- Dairy Whitener
- Coffee Whitener
- Nutritional Supplements
  - Protein Supplements
  - Specialized Dairy Based Food Products
  - Infant Milk Substitutes
  - Convenience Foods –Dairy Based

Process Flow

Fractionation of Milk Solids & Drying



Fermented Dairy Products

- Dahi/Curd
- Yoghurt & Flavoured Dahi
- Lassi – Sweet or Salted
- Butter Milk/Chhach Plain – Plain or Spiced
- Drinking Yoghurt
- Probiotic Drink

Process Flow

Factors affecting Quality of Fermented Milk

A) <u>Milk Quality</u>
- Protein, Fat, Inhibitors

B) <u>Milk Processing</u>
- Standardization, Homogenization, Heat Treatment, **Dearation**

C) <u>Fermentation Process</u>
- Fermentation Temp, End pH, Cooling & post Treatment

D) <u>Type of Culture</u>

Lactic Cultures

Types of Culture:

1. Mesophillic Culture: Optimum growth temperatures of < 30°C
2. Thermophillic Culture: Growth optima at > 37 ° C

Primary Function: Acid Production

Other Functions:

- Flavour, Aroma, Alcohol etc (eg Diacetyl……..)
- Inhibition of undesirable organisms
- Texture Development: Exopolysachharides (EPS),

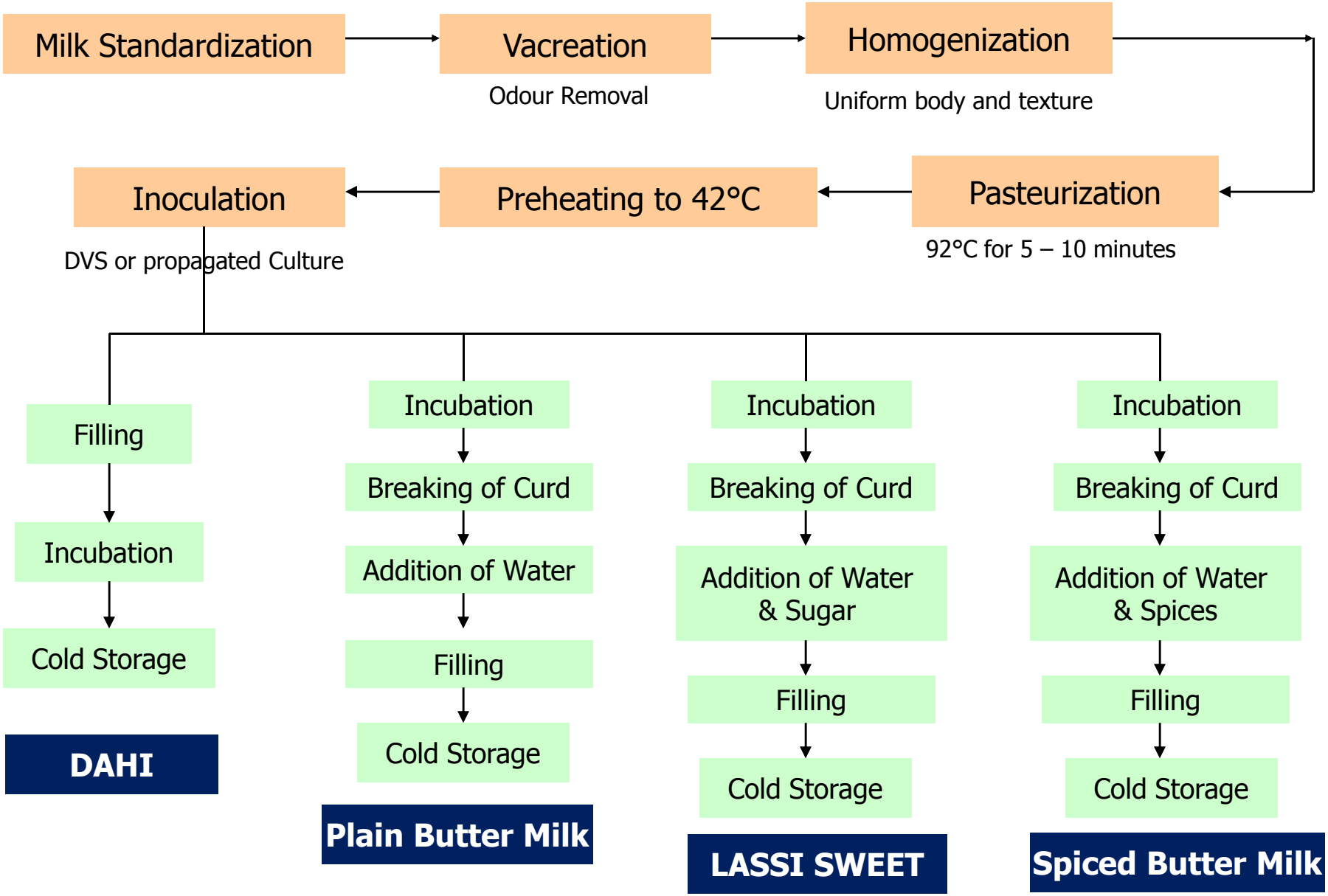
Factors in Culture Selection

- Type of Product:- Yoghurt, Lassi, Butter Milk……..
- Product Characteristics:- Flavour, Texture etc
- Regulatory Requirements
- Manufacturing Constrains :- Time, Packaging, Incubation
- Form :- Frozen or Freeze Dried or Propogation
- Phage Resistance/ Rotation

Important Parameters

- Heat Treatment:
  - 85 – 95^0 C for 5 - 10 Min
- Filling:
  - Inoculation & Filling Temp of 43 deg C
  - Immediate transfer to incubators
- Incubation:
  - Temp 42-43 degC
  - Time 4-6 hrs
- Cooling:
  - Reach 35 deg C is 30 min
  - Reach 18-20 in next 45 min
  - Further cooling to 5 deg C slowly

Process Flow Chart – Cultured Dairy Products



Difference between Dahi & Yoghurt

Dahi	Yoghurt Plain
1. Obtained by Fermentation of Milk using harmless Lactic acid bacteria 2. May contain other harmless bacteria Sweetend Dahi is also allowed	1. Obtained by Fermentation of Milk using *L. Bulgaricus* & *S. Thermophillus species* 2. May contain other harmless bacteria 3. May contain permitted Additives

Flavoured Dahi & Yoghurt Requirements
1. May add cane sugar, corn syrup, glucose 2. May add Fruits/Fruit preparations 3. Veg Oil can not be added 4. May contain permitted Additives i.e. Colours, Flavours, Stabilizer, Thickner etc

Coagulated Products:
Paneer & Cheese Process Comparison

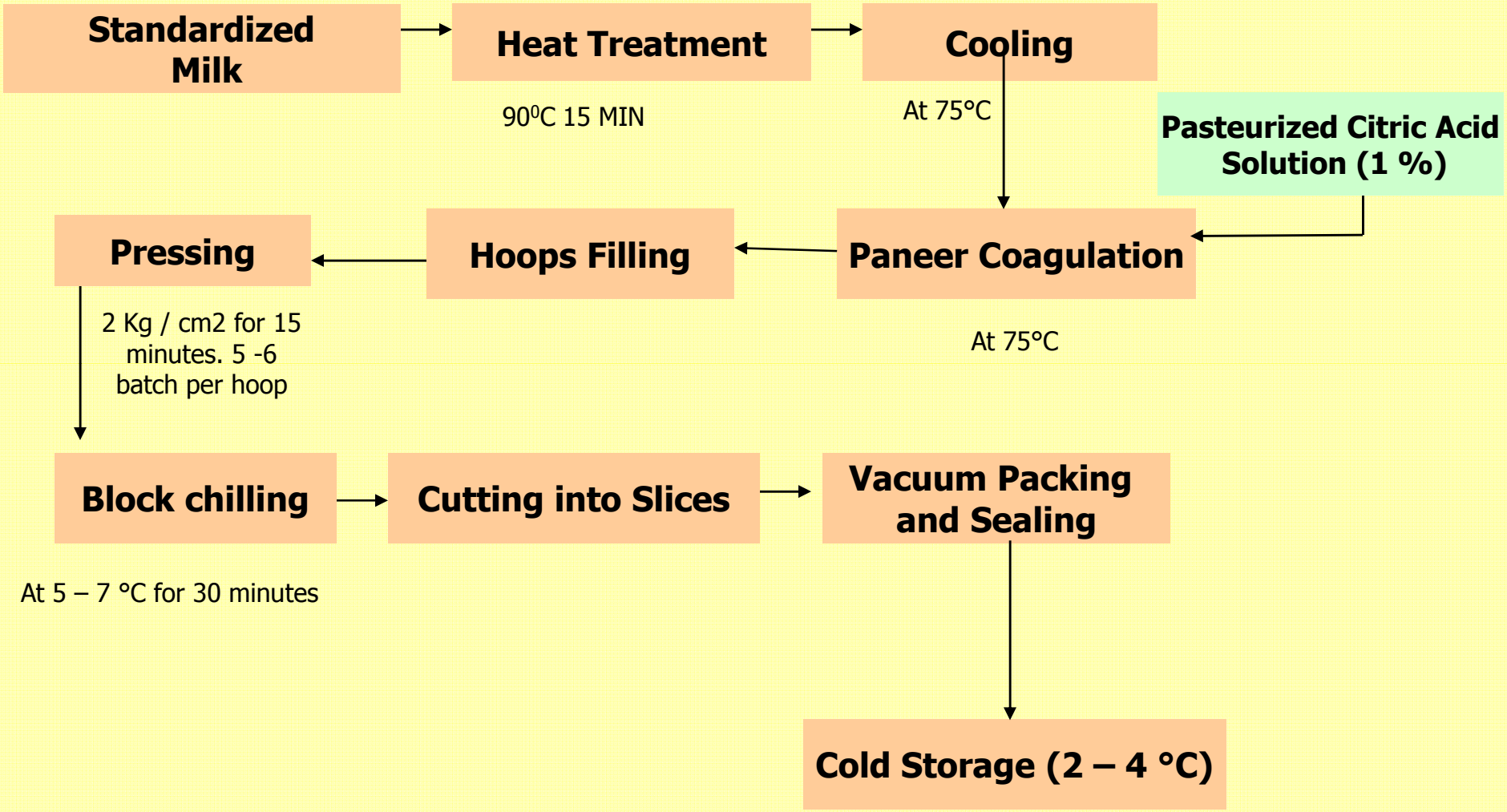
Paneer

- Coagulation is carried out by addition of Citric Acid
- No Ripening

Cheese

- Coagulation is carried out by addition of Enzyme Rennet and Starter Culture
- Ripened for few months upto years to achieve desirable taste
  - Lactose fermentation
  - Production of Carbon Dioxide
  - Decomposition of protein

Process Flow Chart – Paneer



Process Flow Chart – Cheddar Cheese

Cow milk

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Standardization (casein/fat ratio or only fat content)

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Pasteurization

↓

Cooling to 37°C

↓

Addition of starter culture
(S. thermophilus+L. bulgaricus, 1:1@ 2.0% w/v)

↓

Renneting
(1.5 g/100 kg milk)
40 min

↓

Cutting of curd

↓

Cooking of cheese curd
(37°C to 42°C in 40 min)

↓

Draining of whey

↓

Cheddaring of curd

↓

Desired acidity at which curd will stretch in hot water

↓

Plasticizing
(80–85°/2–3 min)

↓

Moulding into shapes

↓

Immersion in chilled (8–10°C) brine (~20% strength)

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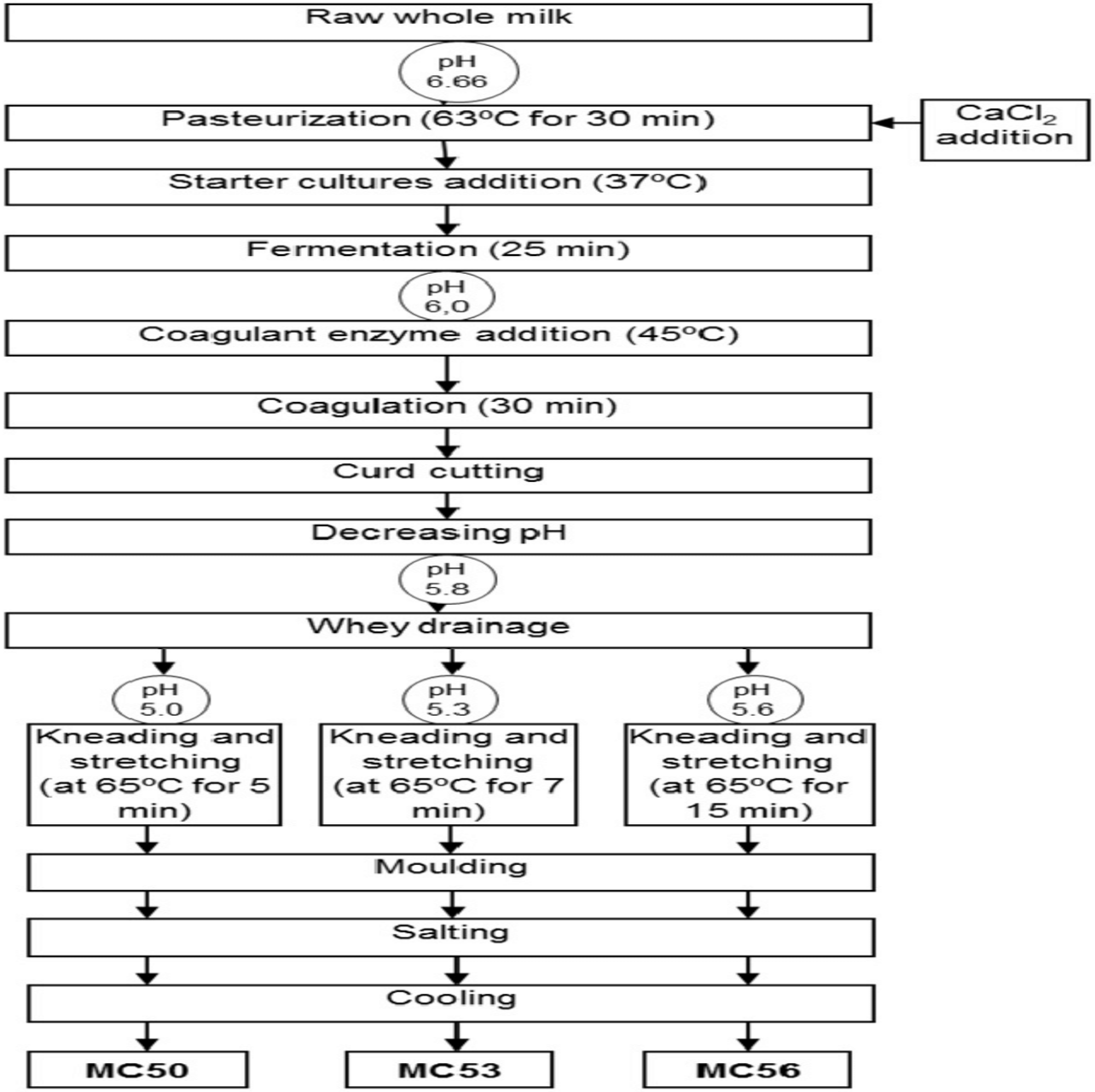
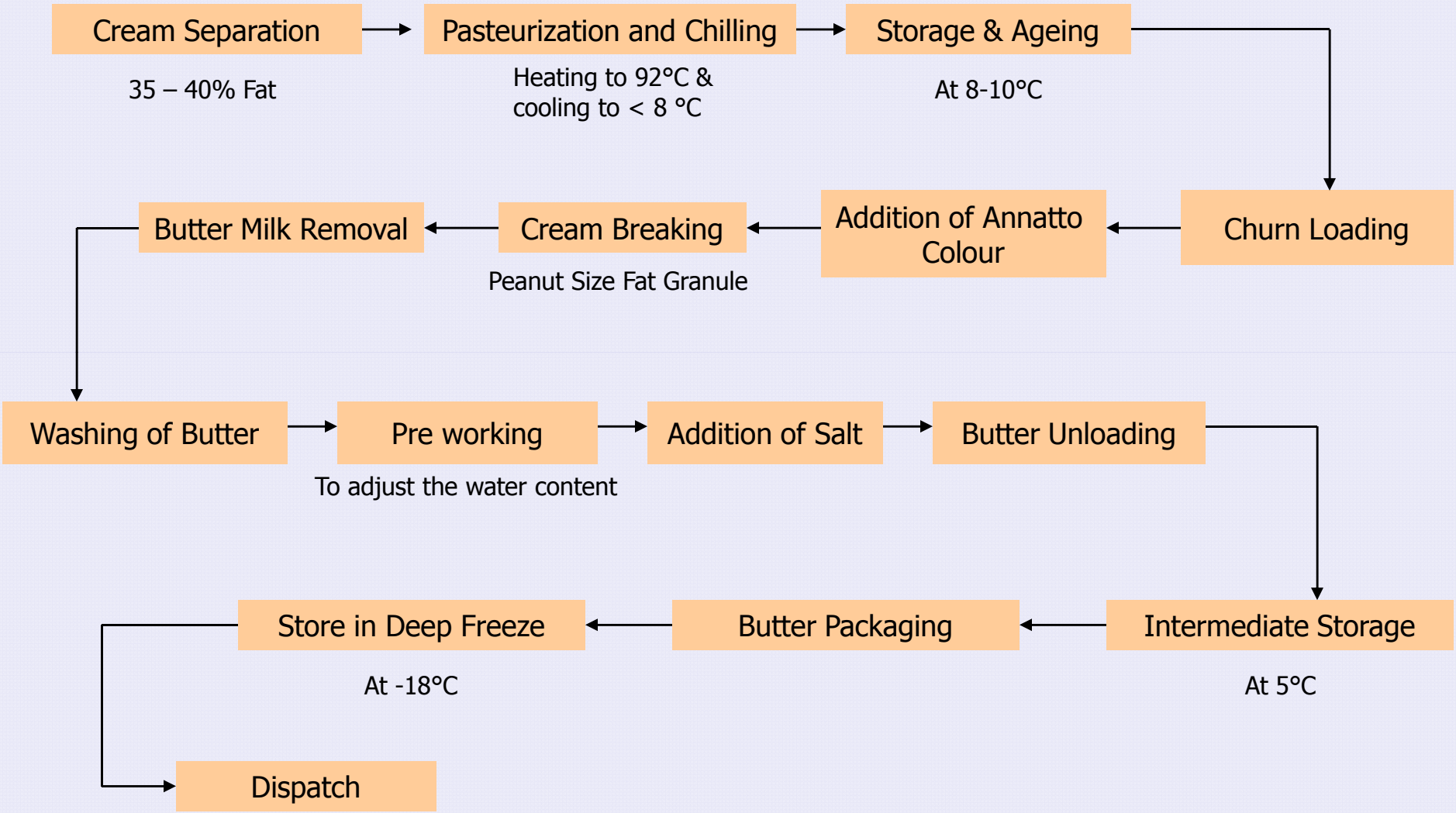
Packaging and storage

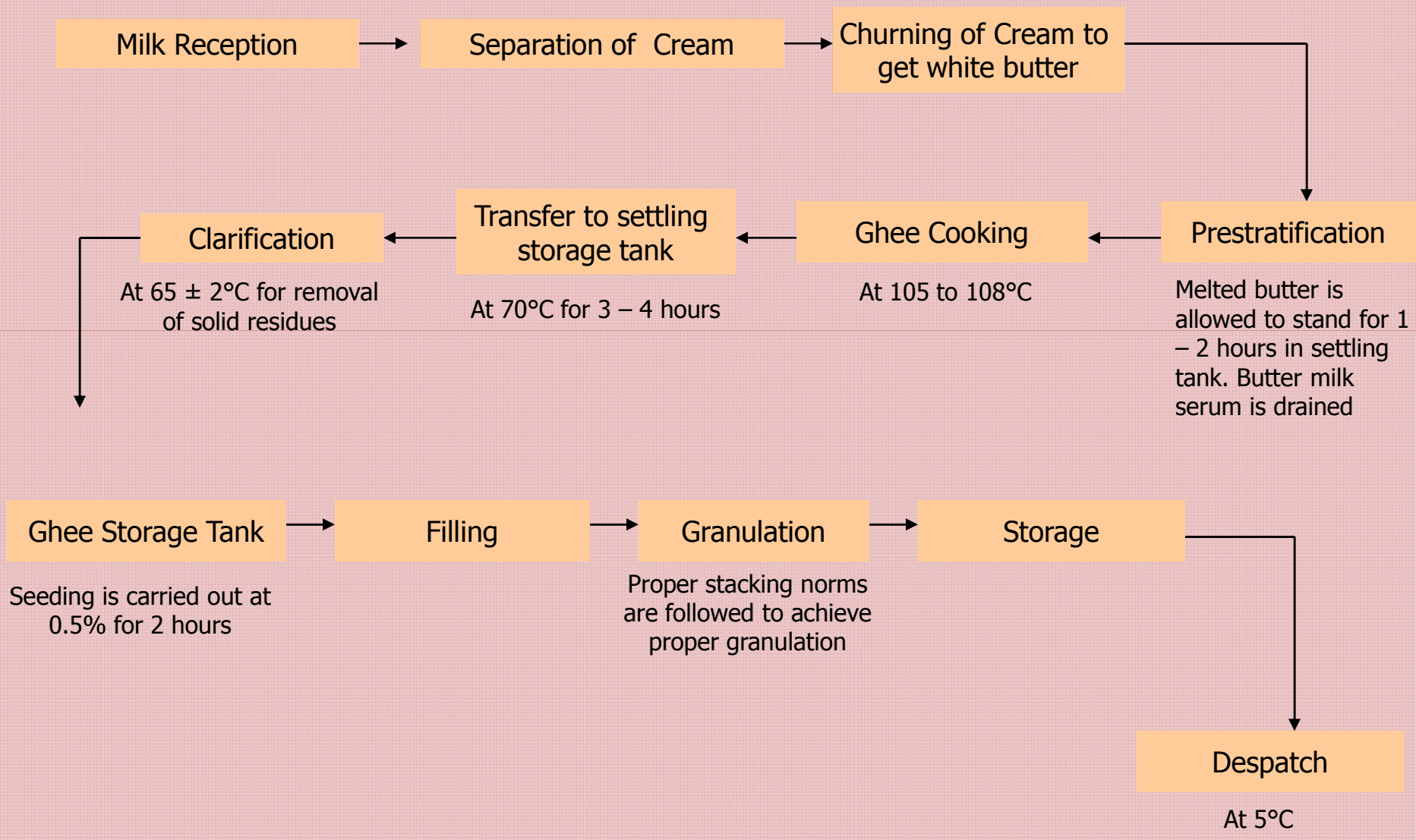
Process Flow Chart – Mozzarella Cheese



Process Flow Chart – Table Butter



Process Flow Chart – Ghee



Process Flow Chart – Ice Creams

Mixing of Ingredients → Pre Heating → Ferrous Detection & Removal → Duplex Filtration → Homogenization → Heat Treatment at 85°C → Ageing at < 7°C for 4 hours → Continuous Freezing

Air (passed through pre-filter, carbon filter & 0.3 micron filter) → Continuous Freezing

At temperature < -5°C

Filling / Extrusion / Mould

Filling / Extrusion (Cups, Cones, Bulks

Continuous Hardening → Cold Storage (< -25°C)

Stick Bar Freezing → Cold Storage (< -25°C)

Process Flow Chart – Flavoured Milk