

Fermented Milk



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Fermented milk

One of the oldest methods of preserving & improving nutritive value of milk

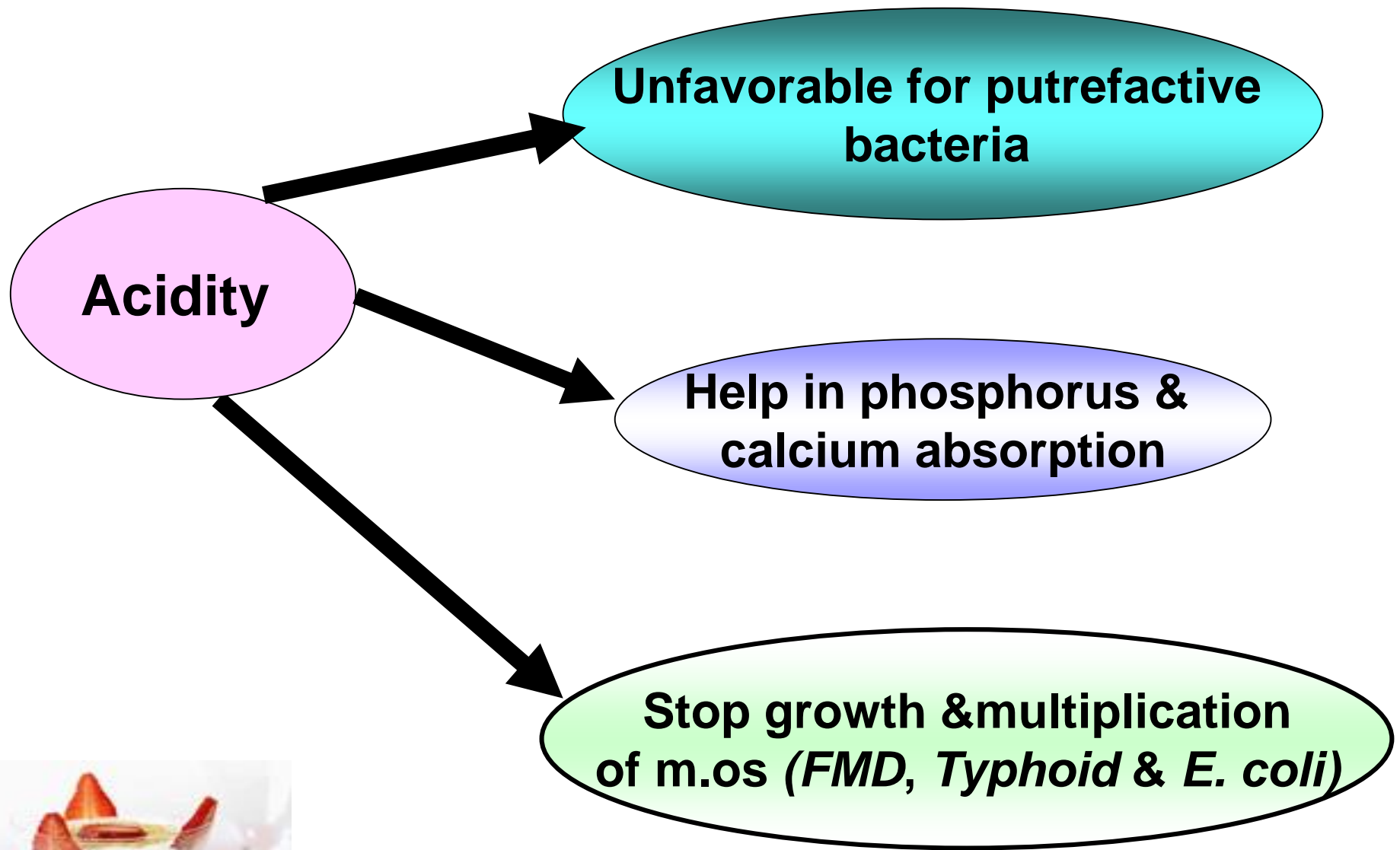
Lactose $\xrightarrow[\text{Bacteria / yeasts}]{\text{Fermentation}}$ **Lactic acid**



Nutritive value of fermented milk

- ❑ Easy digested than plain milk
- ❑ Have therapeutic value as in stomach & intestinal disorder
- ❑ Protect from putrefactive bacteria
- ❑ Lactose-intolerant users can digest yoghurt much better than plain milk
- ❑ Help in phosphorus & calcium absorption
- ❑ Acidity stop growth & multiplication of m.os
- ❑ Excellent source of probiotics





Types of fermented milk

1) Cultured Butter milk	2) Acidophilus milk
3) Fermented skim milk	4) Kumiss
5) Kefir	6) Bulgaricus milk
7) Yoghurt (Zabadi)	

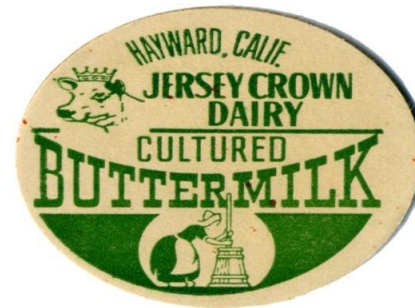


1) Cultured Butter milk

Made by addition of

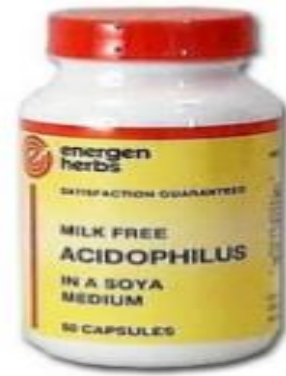
acid producing Streptococci to skim milk

1. skim milk heated to 95°C & cooled to 20-25°C
2. Starter 1-2% of *S. lactis* & *S. cremoris*
3. Fermentation process 16-20 hours
4. Acidity of 0.9% lactic acid
5. used in the baking industry



2) Acidophilus milk

- Traditional milk fermented with *Lactobacillus acidophilus*
- Therapeutic benefits in the GIT disorder
- Milk heated to 95°C for 1 h
- Starter 2% of *Lactobacillus acidophilus* (weak competitor = multiply slowly)
- Acidity of 0.8 - 1% lactic acid



6) Bulgaricus milk

As acidophilus milk &

Lactobacillus bulgaricus used as a starter



3) Fermented skim milk

Results from manufacture of cream by gravity method
(natural fermentation)

Gravity separation method

Raw milk, skim
milk or rec.
skim milk

Heat treatment
90-95°C/30-45 min

Cooling
22-24 °C

Incubation
20 hrs

Cooling
10 °C

a. Shallow pan



b. Deep-setting

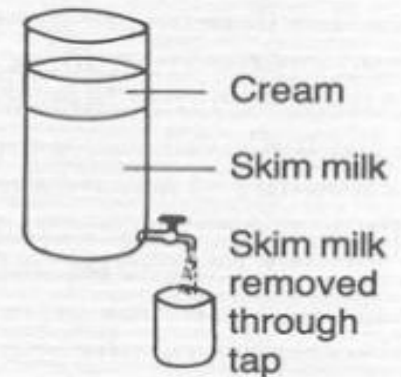


Figure 1. Batch separation of milk by gravity: (a) Shallow pan method, (b) deep-setting method

Preparation of the pouch holding
the culture

1. Wiping the top with 70 % alcohol
2. Cutting the top

Incubation of traditionally treated
milk intended for kefir production

4) Kumiss

- * In Russia & western Asia
- * Made from **Mare's milk**
- * High lactose contents of Mare's milk (7%) favor
alcoholic fermentation



• Lactic acid 1%

* Alcohol 3%

- Prepared from **cow's milk** after addition of 5% sugar & yields kumiss of 1% alcohol
- Starters used are lactose fermenting yeasts & lactic acid bacteria (*S. lactis* & *Lactobacillus bulgaricus*)



5) Kefir

It is fermented prepared from whole or skim milk after homogenization, pasteurization & addition of starters **Kefir grains** (irregular gelatinous granules in which bacteria & yeasts grow) consists of:

Strept. casei

Lactobacillus bulgaricus

Saccharomyces kefir



Milk subjected for both acid & alcoholic fermentation

Lactic acid 1%

Alcohol 1%



7) Yoghurt (Zabadi)

- Prepared from whole milk or skim milk (cow or buffaloes)

Composition of yoghurt:

Fat	2 - 3.5%
Protein	4%
Lactose	5%
Acidity	0.85 - 0.95%
PH	4.4 - 4.5



Manufacture of yoghurt



- The milk is clarified & standardized then pasteurized at 85°C for 30 min
95°C for 10 min
 - * **Decrease water content & TBC**
 - * **Coagulate whey proteins & enhance viscosity**
- Cool to 40°C & added (2-3%) of mixed starter culture of *Streptococcus thermophilus* & *Lactobacillus bulgaricus* (1:1)
- Milk filled in containers (bottles or cartons) & held at 43°C for 4-6 h till coagulation occurs
- Direct cooling to 5°C



Yoghurt production

Milk products

mixing

Heat treatment at 90°C

1. Removes oxygen
2. Kills harmful bacteria
3. Changes milk proteins

Yoghurt bacteria added

Cooled to 40°C

Best temperature for growing yoghurt bacteria

1. Ferment milk sugar (lactose) into lactic acid.
2. Give yoghurt its acid taste

Fermentation for 6 hours

Storage tank at 4.5°C

Slows down further bacterial fermentation





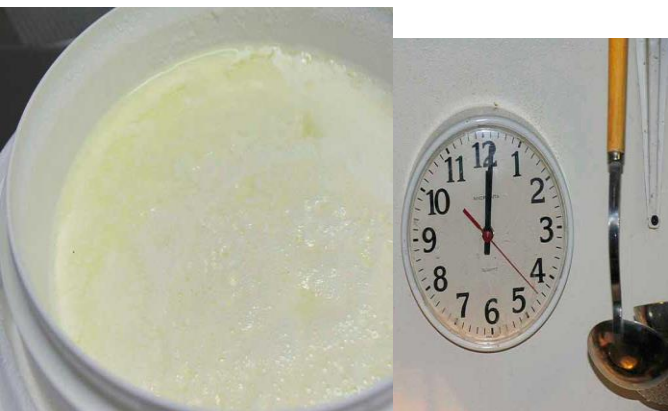
heat the milk



cool the milk



inoculation



time of incubation



incubate the cultured milk

Draing & packing



Manufacture of Zabadi

The same as for yoghurt **but** the starter used is **old zabady prepared a day before** mixed with the boiled milk & left till coagulation occurs



Shelf life of different types of fermented milk

Product	Typical Shelf Life (4°C)*
Acidophilus Milk	2 wks
Cultured Buttermilk	10 d
Sour Cream	4 wks
Kefir	10-14 d
Koumiss	10-14 d

Defects of yoghurt

1- Excessive amount of whey: insufficient evaporation of milk due to low temperature of heating or short time during heating



2- Excessive acidity: due to

- * Excessive starter
- * Long incubation period
- Insufficient cooling
- * Storage at high temp.

3- Off taste due to

- Excessive acidity
- Insufficient heating
- Undesirable bacteria (proteolytic & coliforms)
- Contaminated starter





Defects of yoghurt





Yogurt Products



TYPES OF YOGURT



Set yogurt



Stirred yogurt



Drinking yogurt



Greek yogurt

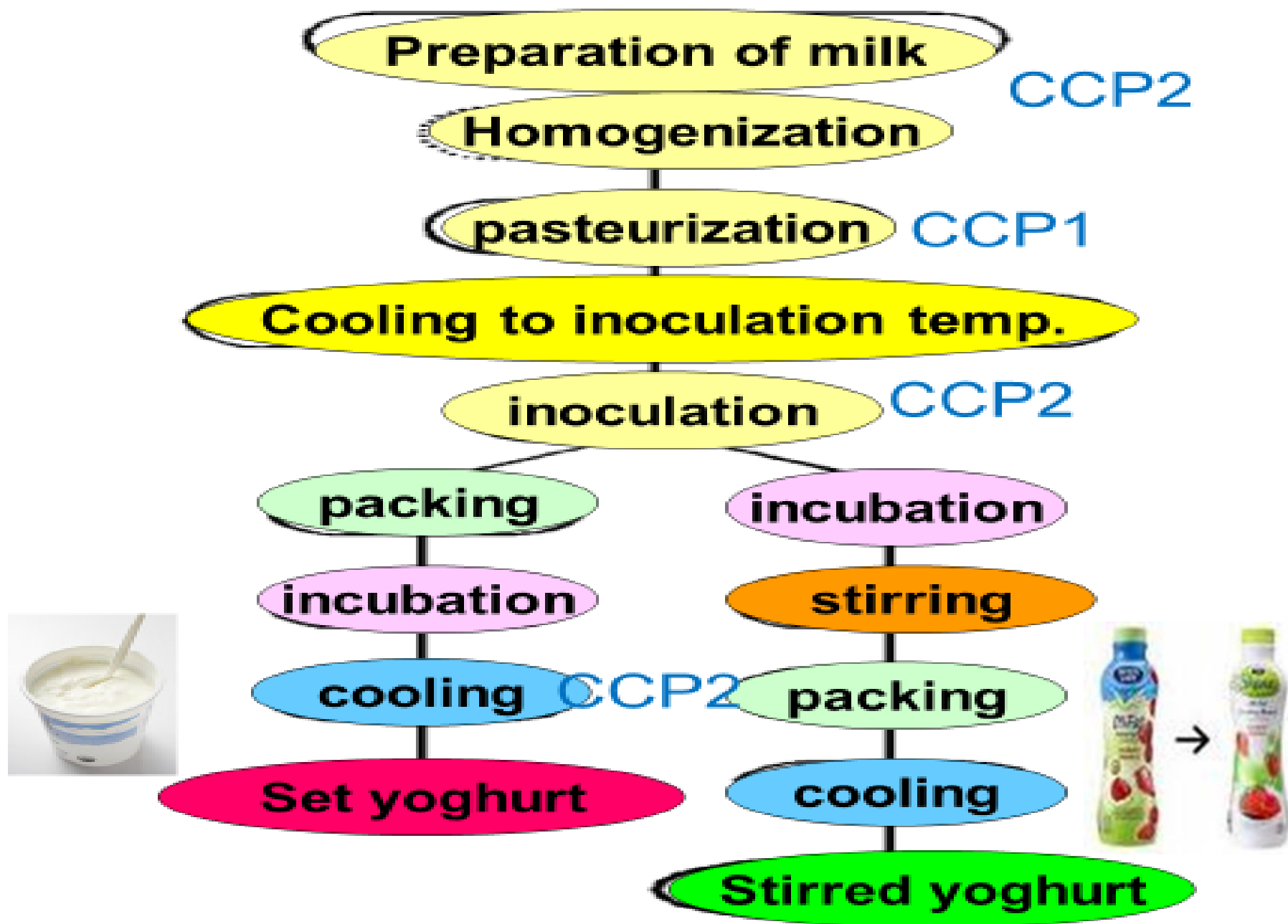


Frozen yogurt

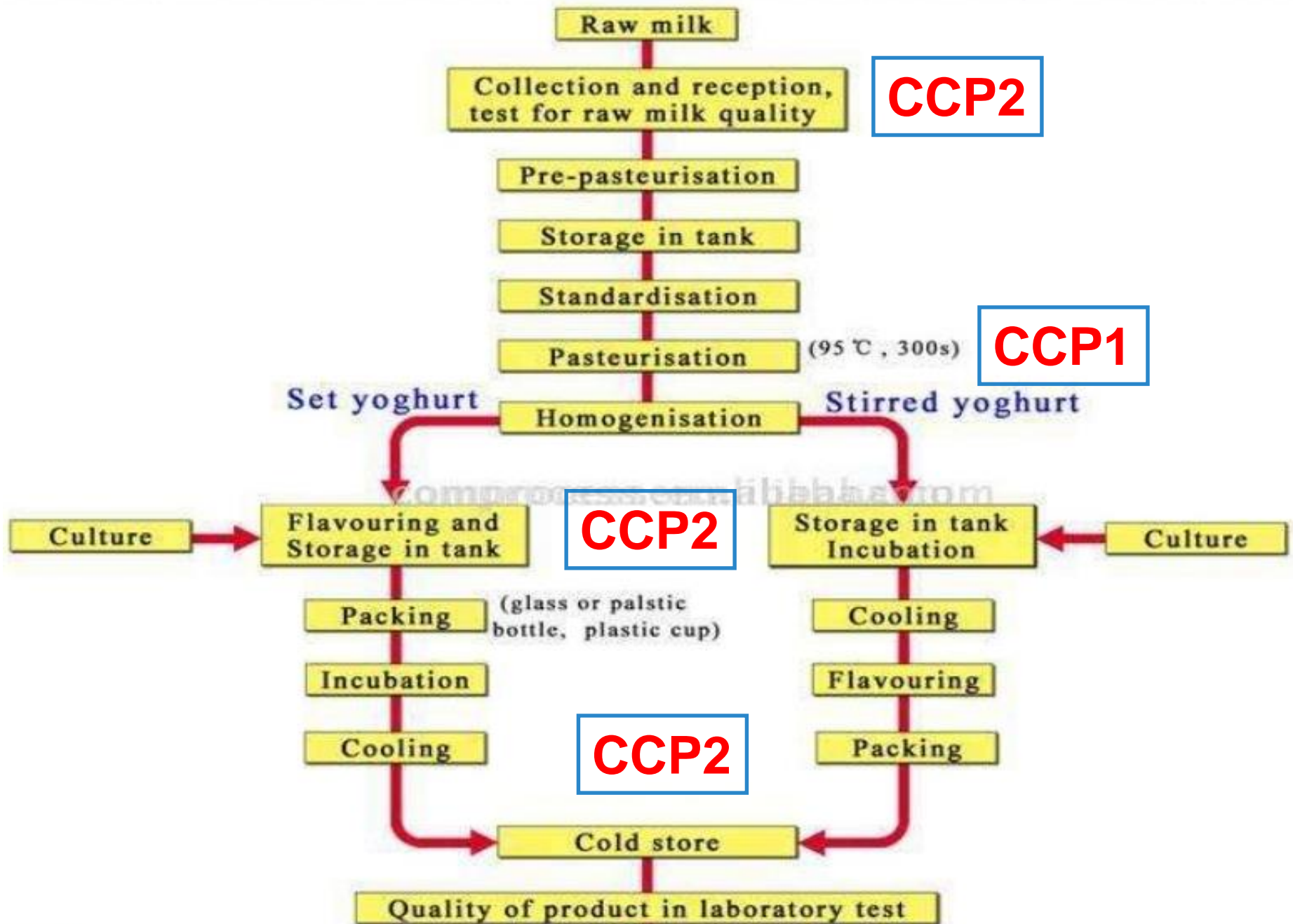


Flavoured yogurt

Basic steps of production of set & stirred yoghurt & its CCP



Manufacture of large scale yoghurt



Yogurt Products

- 1- Stirred style yogurt
- 2- Set style yogurt: the yogurt is packaged immediately after inoculation with the starter and is incubated in the packages
- 3- Fruit-on-the-bottom style: Fruit mixture is layered at the bottom followed by inoculated yogurt, incubation occurs in the sealed cups
- 4- Soft-serve & Hard Pack frozen yogurt
- 5- Continental, French, & Swiss: Stirred style yogurt with fruit preparation

Yogurt Beverages = Drinking yogurt

- is stirred yogurt with **T.S** content **11%**
- Homogenization occur to reduce viscosity
- High Temperature Short Time (HTST) pasteurization give shelf life of several weeks at 2-4°C



Microbiology of yoghurt

Presence of microorganisms depending on:

- Raw milk contamination
- Contaminated starters
- Post manufacture contamination

Yoghurt has been reported to transmit diseases of human origin as well as enterotoxins of *Staph. aureus*





Probiotics

“Probiotics are **living microorganisms** have beneficial effects on human health and available in different forms like dairy products (yogurt)

ex: **Bifidobacterium & lactobacilli**



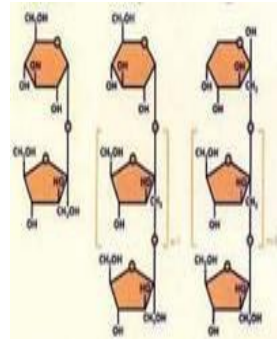


Prebiotics

“Prebiotics are **non-digestible** but fermentable oligosaccharides that are specifically designed to change the composition and activity of the intestinal microflora with prospect to promote the health of the host.”

Synbiotics

“A synbiotics is a combination of one or more probiotics and prebiotics.”



Probiotics in Treatment of disease

- **Lactose intolerance**
- **Diarrhea & Constipation**
- **Inflammatory bowel disease**
- **Respiratory disease**
- **Atherosclerosis**
- **Osteoporosis**
- **Allergy**
- **Cancer**

THANK YOU

