

Milk Curdling Technology

A brief rundown of the various methods



Content

1. What is curdling?
2. Why does milk curdle?
3. Ways to curdle milk
4. Industrial milk curdling
5. Few clever applications of curdled milk
6. Reference



1. What is curdling?

- Through the physio-chemical processes of flocculation, creaming, and coalescence, curdling is the separation of an emulsion or colloid into substantial portions with differing compositions.



Milk curdling into curd or Dahi

2. Why does milk curdle?

Milk is made predominantly of fat, protein, and lactose sugar.

Milk fat is suspended in the water as fine droplets, which makes it an emulsion.

Milk proteins, are mostly whey and casein.

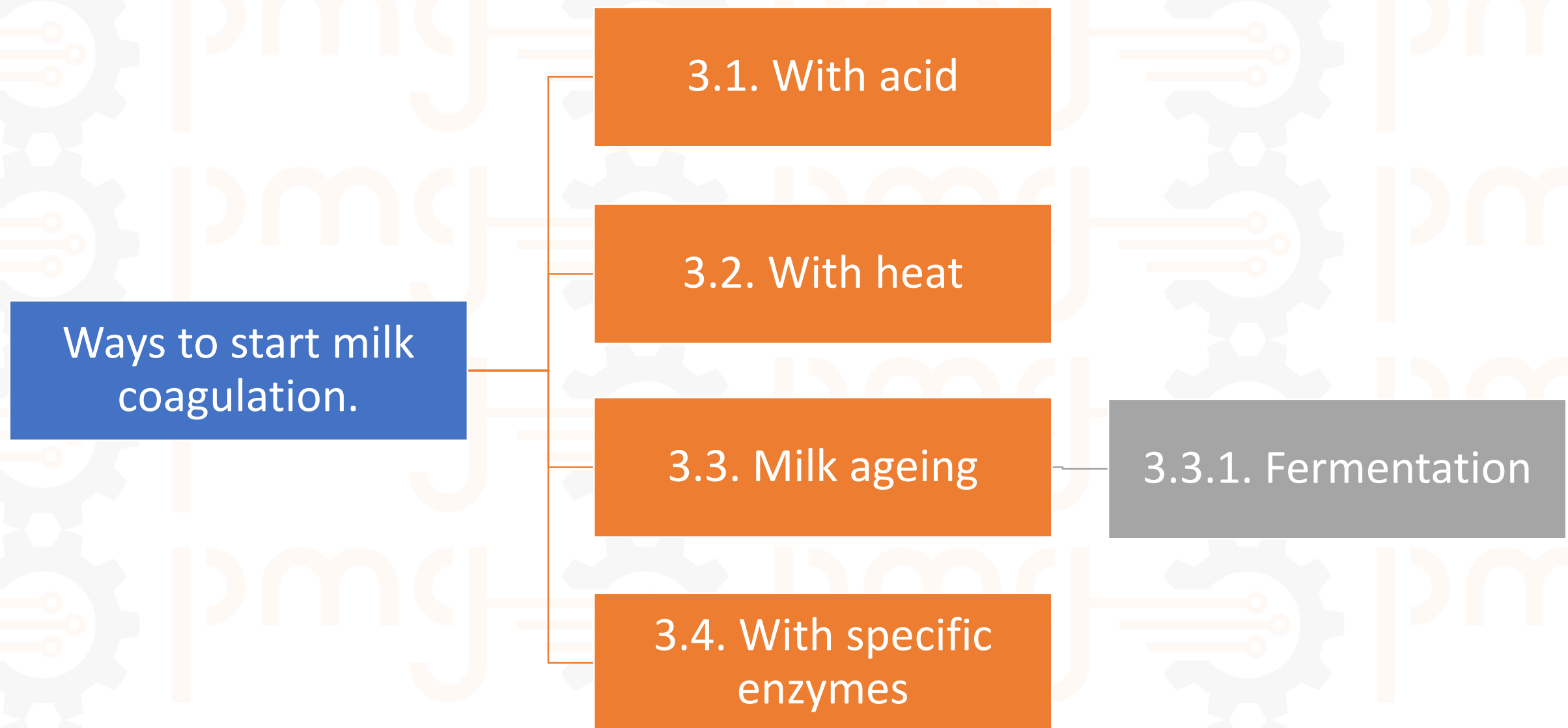
Micelles - spherical structures that allow milk proteins to stay in suspension.

Without it the casein will leak out of the solution because the micelle keeps the casein protein in suspension.

The result of this process of milk is curdling.

3. Ways to curdle milk

Cottage cheese, ricotta, paneer, and cream cheese start with milk curdling.



3.1 With acid

Warming the
milk

Heat substantially speeds up the process, causing the milk to curdle more quickly.

Addition
of acid

In acidic milk, the negative charge that keeps the groupings apart is neutralized. Casein proteins cluster together as a result, causing the milk to separate and become curdled.

3.2 With heat

- Milk will not begin to curdle until it reaches a temperature of 82°C. To maximize and speed up the curdling effect, the temperature should be left to climb even higher.
- Butterfat, proteins, and water are combined to form milk, referred to as an emulsion.
- The three components of the emulsion separate when milk is heated.

3.3 Milk aging

The words "spoiled" and "sour" are sometimes used interchangeably in reference to milk; nevertheless, there is a slight distinction.

Spoiled milk is the pasteurized milk that has developed an odd taste and odour as a result of microorganisms that managed to survive the pasteurization process.

On the other hand, unpasteurized, raw milk that has started to naturally ferment is frequently specifically referred to as sour milk.

3.3.1 Fermentation

1. Yoghurt or curd are products of the fermentation of milk.



2. LAB and casein undergo a chemical process that results in the curd.



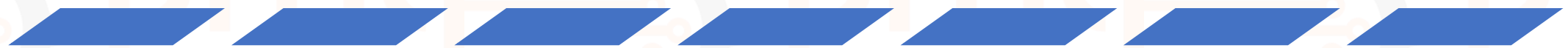
3. Enzymes are used by bacteria to convert lactose into ATP -producing lactic acid as a byproduct.



4. Denaturation causes the globular proteins to be transformed into fibrous proteins, giving thick texture.

3.4 With enzyme

Chymosin, for example, is an enzyme that alters the casein micelle structure to make milk curdle.



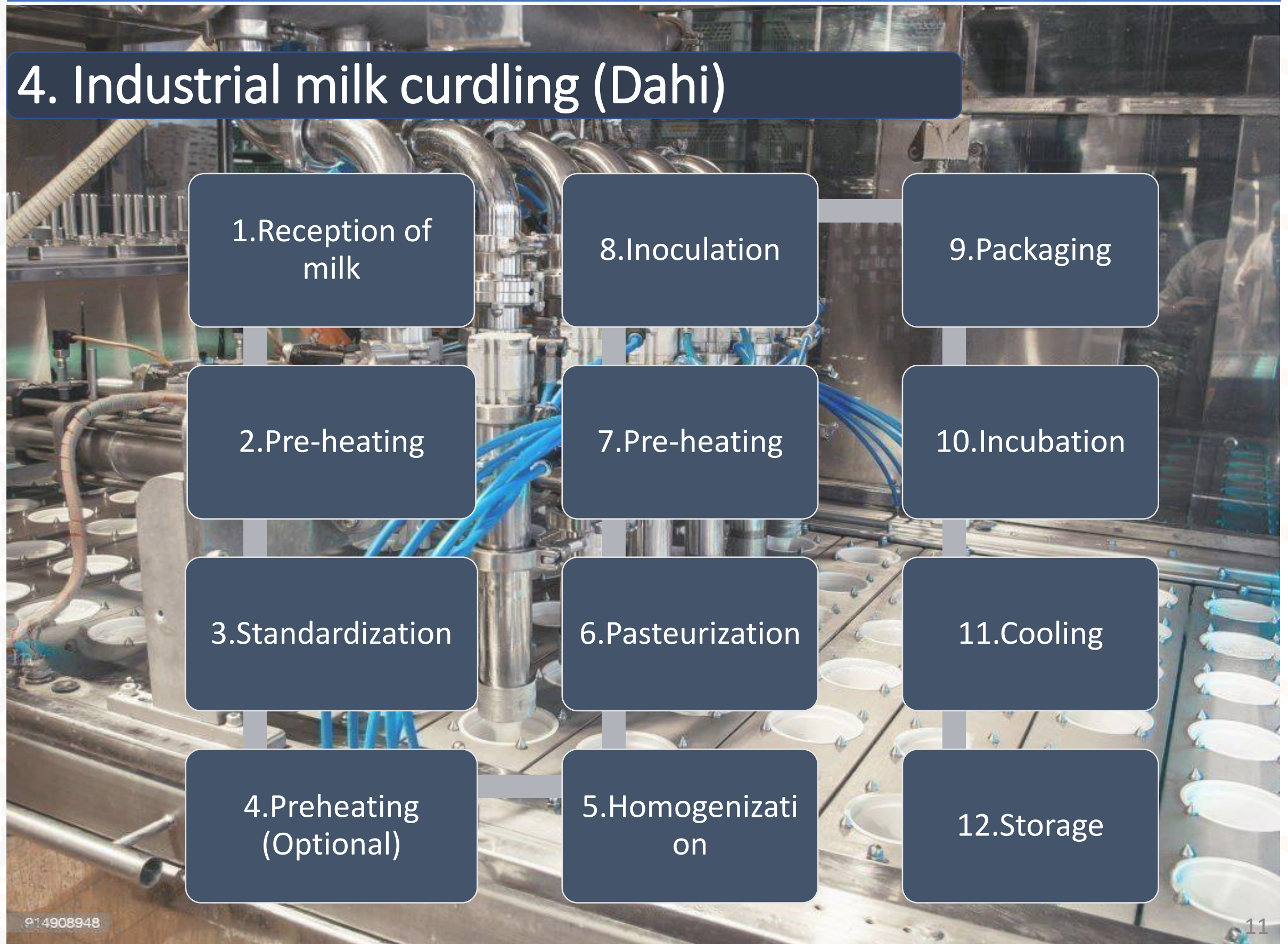
Proteases are enzymes that disrupt the casein micelle structure by chopping up proteins, causing milk to curdle.



Chemical reaction between bacteria and casein denatures and converts globular proteins into fibrous proteins, causing milk to curdle.



4. Industrial milk curdling (Dahi)



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4. Industrial milk curdling



1. Reception of milk - Fresh, high-quality milk is received and tested for SNF and fat percentage.



2. Preheating:
Done at 30–40°C.



3. Standardization

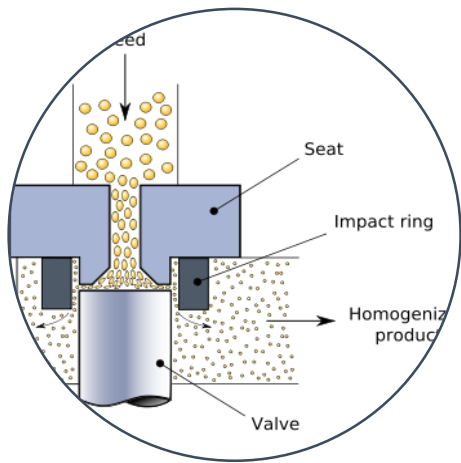
–
5% to 3.0% fat and
10% solid-not-fat is
maintained.



4. Preheating
(Optional) -
Heating up to 60°C.



4. Industrial milk curdling



5. Homogenization
- The uniform distribution of fat globules by applying pressure via a very small opening.



6. Pasteurization –
Heated up to 85–90°C for 15–30 minutes.
Temperature is lowered to 3–4°C for pasteurization.



7. Pre-heating -
Pasteurized milk is preheated to 40–45°C



8. Inoculation –
Done at a temp of 37°C with 1–2% of a starting culture.
Tanks are monitored for acidity (4.2–4.5 pH)

4. Industrial milk curdling



9. Packaging - Plastic cups, polyethylene, polypropylene, and other packing materials.



10. Incubation - Carried out at 30-42°C for approximately 4-5 hours.



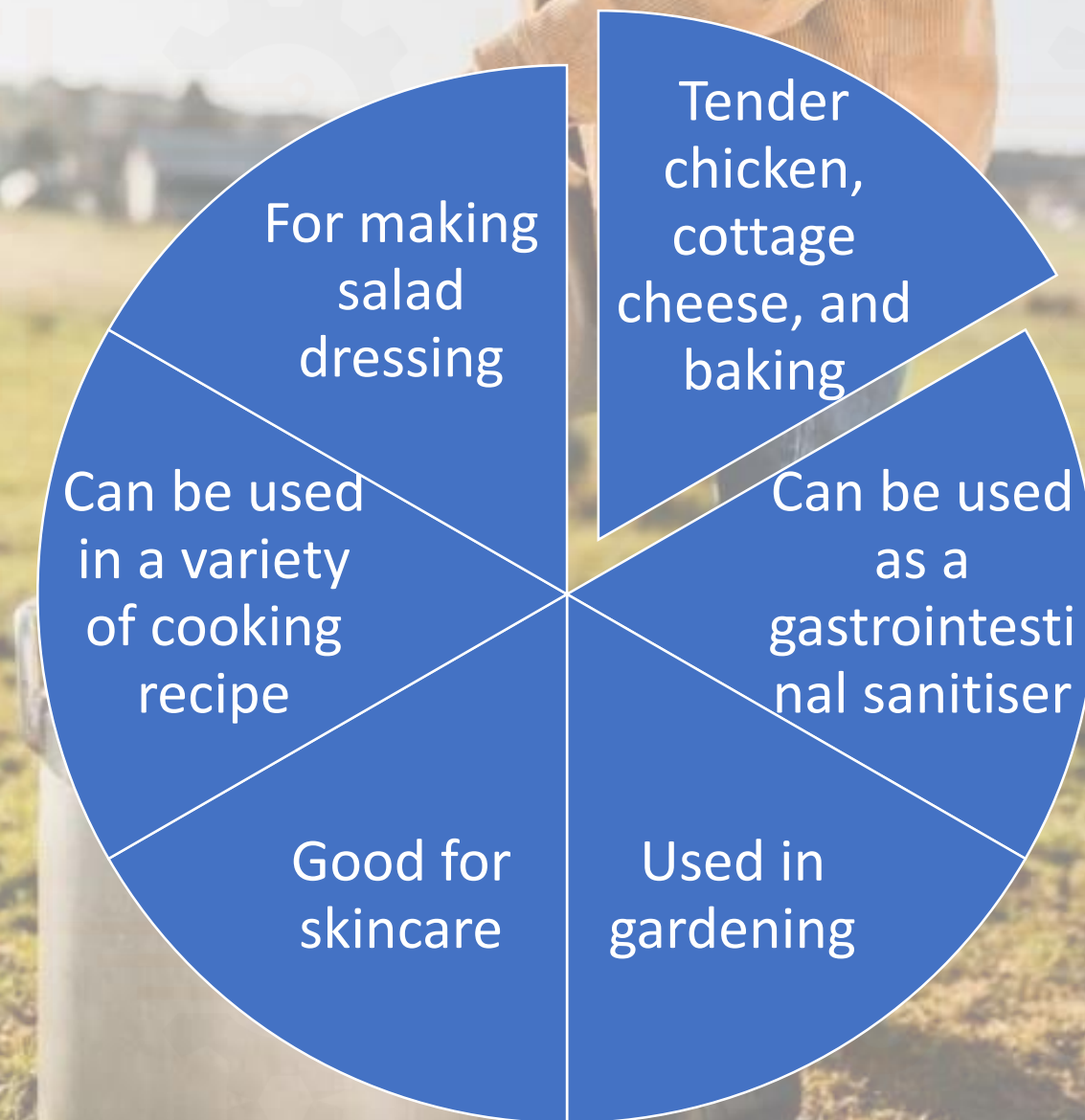
11. Cooling - To ensure proper setup, crates are moved into a room with a temperature of 3-4°C.



12. Storage - Kept below 6°C in the cold store.



5. Few clever applications of curdled milk



6. Reference

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