

Storage of Milk: Importance and Methods of Cooling



Source of milk Pakistan

- Annual milk production Buffaloes and cows are the major milk producing animals, with
 - 62 percent of milk produced by buffaloes
 - 34 percent of milk produced by cows
- Approximately milk is produced accounting
 - 80 percent in rural areas
 - 15 percent peri-urban areas
 - 5 percent urban areas
- Punjab and Sindh are the major milk producing provinces, with annual production of 25.62 million and 9.35 million litres respectively.
- KPK produces an estimated 4.88 million litres per year, and Balochistan 0.81 million litres (PDDC, 2006).

Storage of Milk: Importance

- Milk drawn from a healthy cow is sterile but it contains bacteria that have entered the teat canal through the teat opening.
- They are pushed out during milking process.
- The number of bacteria varies from animal to animal.
- For milk contains greater number of bacteria than stripping

Storage of Milk: Importance

- Milk gets easily contaminated with dirt, bacteria and odours. Milk furnishes an excellent medium for the growth of bacteria, particularly when not properly cooled. They produce chemical changes rendering it unpalatable.
- Pathogenic bacteria can also very well multiply in milk. Therefore, milk may serve as a medium for dissemination of infectious diseases. Hence the quality and conditions of production of milk can be judged on the basis of microbial contents.

Standards for the bacteriological quality of raw milk:

Therefore great care in production and handling of milk is necessary to put it in the hands of consumers in a satisfactory condition

SPC./ml.

Not exceeding 2,00,000

Between 2,00,000 and 1,00,000

Between 1,00,000 and 5,00,000

Over 5,00,000

Grade of raw milk

Very good

Good

Fair

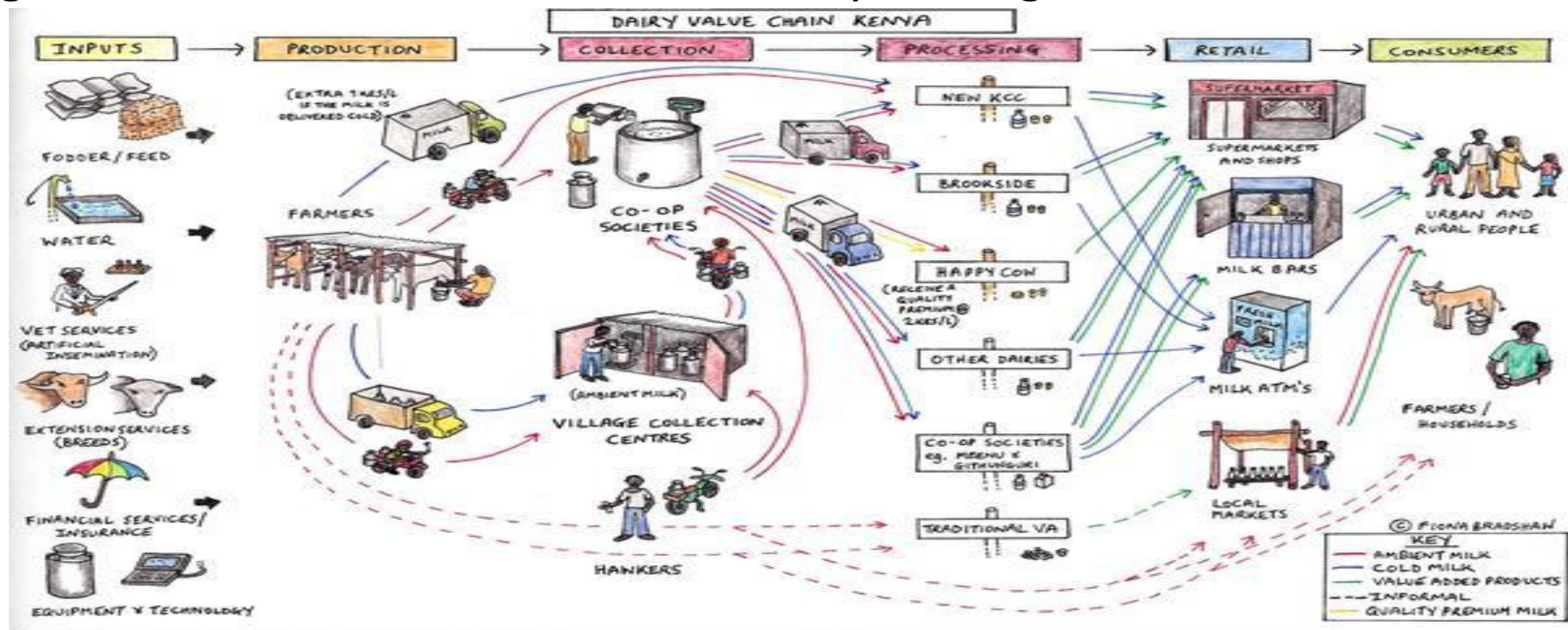
Poor

Handling the Milk Prior To Storage:

- Milk should be removed to the milk house immediately after it is drawn because the contamination may also take place if it is left in the barn, the milk should then be strained into cans. If the cows are carefully milked, straining may not be necessary.
- It is impossible to strain bacteria out of milk. However, it is desirable to filter the milk to remove hairs, particles of feed or bedding or dirt, etc. that may have into milk during the production. A single service pad type strainer may be used for this purpose.

Necessity of Cooling Milk before Storage:

- It is impossible to produce milk without some bacteria. Therefore efforts should be to prevent multiplication of the bacteria that have gained access.- This can be achieved by cooling the raw milk.



Principles and Practices of Dairy Farm Management:

- This is of utmost importance specially when considerable time lapses between production and pasteurization.
- Even before it is transported to long distances the rails is cooled.
- The influence of temperature of storage on the bacterial density in fresh milk as reported

Table 1 Bacterial Count in Fresh Milk of Storage (Average of 20 Samples from Cows Clean & Bedded, Small Top Pails, Sterile Utensils):

<i>Storage temp.</i>	<i>Fresh milk</i>	<i>24 hrs.</i>	<i>Bacterial 48 hrs.</i>	<i>Number per ml. After 72 hrs.</i>
4.4°C(40°F)	4,295	4,138	4,566	8,427
10°C(50°F)	4,295	13,961	127,727	5,725,277
15.6°C(60°F)	4,295	1,587,333	33,011,111	326,500,000

Indigenous method:

Milk should be stored at 4.5°C to arrest the growth of bacteria and milk will not become sour.

Cooling to milk has a special significance in the tropical climate specially in summer.

Therefore milk should be cooled to below 10°C.

Freshly drawn milk is at about 38°C which is highly suited for bacterial growth.

Methods of Cooling:

- **Indigenous method:**
- Milk venders who collect milk from villages are issued licence on the agreement that they will put the wet cloth around the can of milk to keep milk cool during the period of transportation by bicycle or cart, etc.

Indigenous method:

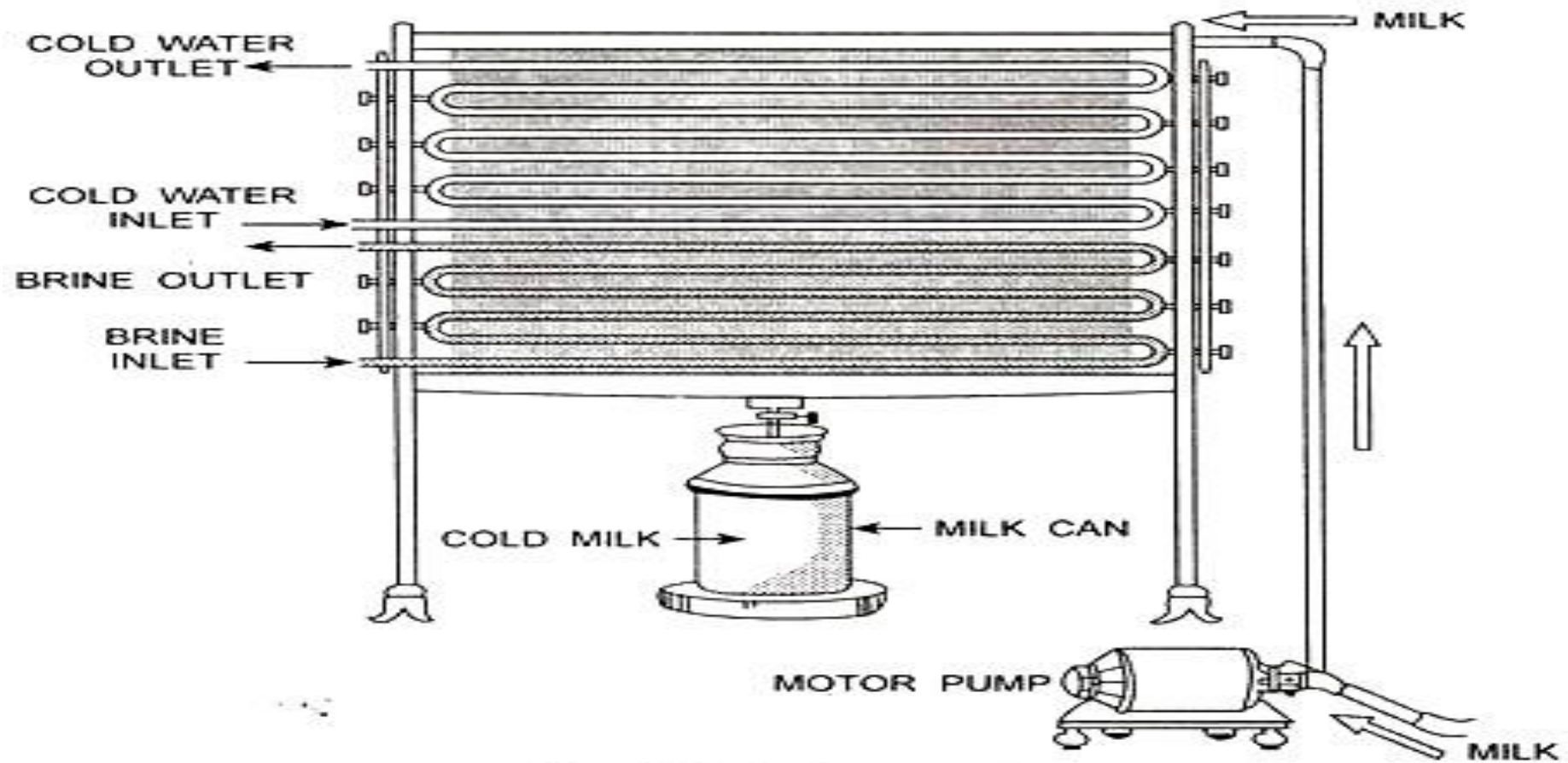


Fig. 18.1. Surface cooler.

2. Scientific method:

There are four methods used under this
These are as follows:

- (i) Use of surface coolers/surface tubular coolers.
- (ii) Cabinet coolers in vertical position.
- (iii) Plate type chillers,
- (iv) Double tube coolers.



The different cooling media used are as follows:

- (a) Cold water to cool down pasteurized milk up to 15.5° to 21.1°C.
- (b) Ammonia refrigerant to cool down milk up to 3.3°C to 4.3°C (35° to 40°F).
- (c) Brine solution is effective in bringing temperature of milk to 3.3°C (35°F).

Storage of Milk in Tanks:

- Modern storage tanks for milk are of two type's viz. horizontal and vertical cylindrical shape of 10,000 litre capacity.
- In countries of temperate climate where milk is not stored for more than 24 hrs. the insulation of tanks is not necessary.
- In tropical regions of warmer climate 7 to 10 cm cork insulation is desirable to maintain minimum temperature 4°C.
- Milk kept at low temperature will have longer keeping quality suitable for processing in dairy plant.