



Process of Milk Production



171009CH03

Milking is the process of drawing milk from the teats (mammary glands) of a dairy animal either manually or mechanically. During milking, dairy animals need to be handled gently and milked carefully at regular intervals. It must be ensured that milking is a pleasant experience for the animal so that it is able to eject all milk.

SESSION 1: PRE- AND POST-MILKING ACTIVITIES

Milk is highly perishable in nature. It is, usually, harvested under unhygienic conditions, without following the practice of cleaning and sterilising the containers used for its storage and transportation, which may lead to its spoilage. This Unit throws an insight into different pre- and post-milking activities that need to be performed to check spoilage.

Pre-milking activities

The milking schedule must be followed strictly. Pre-milking activities include preparation of the milking area or parlour and preparation of an animal for milking. Before the actual process begins, the shed must be cleaned and the animal brushed or bathed so that all dirt is removed from its body [Fig. 3.1 (a and b)]. The milking equipment must be cleaned and dried before use.

The udder and teats of the animal must be washed with lukewarm water (Fig 3.2) and dried with a paper towel or cotton cloth (Fig. 3.3). Offer concentrate feed to the animal at the time of milking. Kicking of the animal at the time of milking can be prevented by using a milkman's knot or rope (Fig. 3.4). Ensure that the nails of the person, who is to milk is the animal, i. e., the milker, are trimmed and hands cleaned with an antiseptic soap and water before performing milking. Incorrect milking and unhygienic conditions lead to low quality milk.



(a)



(b)

Fig. 3.1 (a and b): Wash the animals before milking.



Fig. 3.2: Wash the animal's udder and teats with lukewarm water before milking.



Fig. 3.3: Dry the animal's udder and teats with a cotton cloth or paper towel.



Fig. 3.4: Use a milkman's knot or rope to tie the hind legs of the animal at the time of milking.



Fig. 3.5: A milk chilling tank of 1000 litre capacity

After the pre-milking steps are completed, the 'milking procedure' is followed. The steps which are followed subsequently come under post-milking activities.

Post-milking

Teat dipping

One of the most effective ways of controlling mastitis in a dairy animals is by dipping the teats of an animal in a germicide solution after milking. The purpose of post-milking teat dipping is to remove milk residue and prevent the entry of organisms through the teat ends. Teat dipping does not reduce the existing infections. However, the rate of occurrence of new infections can be reduced by up to 50 per cent. Chemicals like iodine and chlorine are used for teat dipping.

Storage and transportation of milk

Milk is stored in clean steel or aluminum containers covered with a lid and kept in a cool (4° C) and shady place. The milking area and utensils are cleaned to avoid contamination of milk.

Methods of milking

Milking can be done manually with hands or with the help of a milking machine. Milking by hands is the traditional way of drawing milk from lactating dairy animals for human consumption. Hand milking is suitable for low to medium yielding animals. In hand milking, two methods are, generally, practised — full hand milking (Fig. 3.6) and stripping (Fig. 3.7).

Hand Milking

Full hand milking

It is the best method of milking and most suited for animals having large teats. It starts with holding the animal's teats in the hand and fingers encircling them. The base of the teat is blocked by the fore finger and thumb, forming a ring. Alternate compression and relaxation of two teats (using both the hands) is done in quick succession to draw milk at a fast pace so that it comes out in the form of a continuous stream.

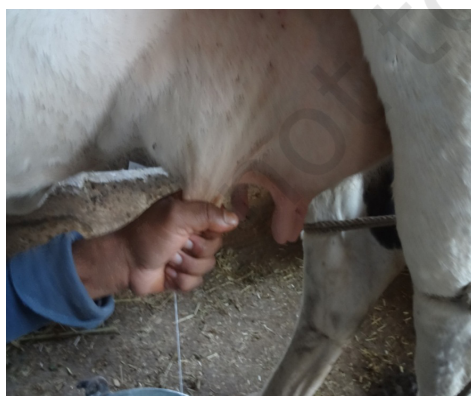


Fig. 3.6: Full hand milking



Stripping

This method is preferred, where the teats of an animal are small in size. In this method, a teat is squeezed firmly at the base with the thumb and fore finger. Then, the teat is pulled down the entire length and pressed simultaneously to cause the milk to flow down in a stream. Both the hands are used to milk two teats at the same time but they, usually, strip alternate ways. The process is repeated in quick succession.

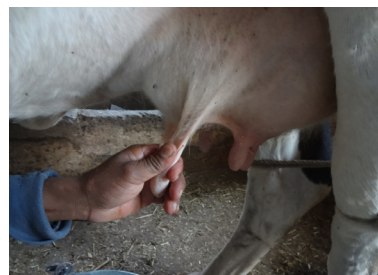


Fig. 3.7: Stripping

Knuckling

There is another method of milking called 'knuckling' (Fig. 3.8), which is not advisable. It is a faulty method of milking, and hence, considered inappropriate. It must not be practised as it may cause injury to the animal's teats.



Fig. 3.8: Knuckling

Machine milking

It is the process of harvesting milk from the udder of dairy animals using a milking machine (Fig. 3.9). Machine milking is faster than hand milking and requires less labour (Fig. 3.10). The underlying principle of machine milking is drawing milk from the teats through the application of negative pressure at the teat ends and applying periodic massage to the teats, which prevents congestion of blood and lymph in the teats. The major parts of a milking machine are vacuum pump, pulsator, teat cups and connecting tubes.



Fig. 3.9: Milking machine is suitable for medium size dairy farms.



Fig. 3.10: Cattle being milked by a milking machine

Practical Exercise

Activity

Visit a nearby dairy farm and record the milking methods being followed there. Also, observe the milking process.

Material required: notebook and writing material

Procedure

- Visit a nearby dairy farm.
- Talk to the caretaker and find out the milking methods being followed there.
- Observe the milking process and record your observations.
- Now, give a presentation before the class.

Check Your Progress

A. Multiple Choice Questions

1. In machine milking, what kind of pressure is applied at the teat end?
 - (a) Positive pressure
 - (b) Negative pressure
 - (c) Both (a) and (b)
 - (d) None of the above
2. Milk must be stored in a clean container with its lid on. It must be kept at a temperature of _____.
 - (a) -4°C
 - (b) 0°C
 - (c) 4°C
 - (d) 10°C
3. Which of the following stimuli initiate milk let down reflex?
 - (a) Washing of the udder
 - (b) Sight of a calf
 - (c) Smell of a calf
 - (d) All of the above
4. An efficient milking method must ensure _____.
 - (a) removal of maximum milk
 - (b) production of dirt-free milk
 - (c) efficient use of labour and equipment
 - (d) All of the above
5. Which of the following statement(s) about knuckling is false?
 - (a) Fast milking method
 - (b) Milker bends one's hand against the teat
 - (c) Chances of injury to the teats are high
 - (d) Faulty method of milking



B. Fill in the Blanks

1. Dairy animals need to be milked at _____ intervals.
2. A milch animal is washed or brushed to remove _____ stuck to its body.
3. The udder of a dairy animal is washed with _____ water before milking.
4. A milkman's rope is used to _____ kicking by a dairy animal.
5. After milking, the teats of a dairy animal are dipped in a germicide solution to prevent _____.

C. Mark True (T) or False (F)

1. Kicking by an animal at the time of milking can be prevented by using a milkman's rope.
2. Iodine and chlorine are commonly used for teat dipping after milking a dairy animal.
3. The basic principle of machine milking is to draw milk from an animal's teats by the application of positive pressure at the teat end.
4. Knuckling is an advisable method of milking.
5. Teat dipping does not reduce an existing infection.

SESSION 2: CLEAN MILK PRODUCTION

Milk is considered to be the most nutritious food but it is highly perishable in nature. It remains in sterile condition while in the udder of a healthy animal. It becomes contaminated only during milking, cooling, storage, transportation and processing. Clean milk production implies milking healthy animals in hygienic conditions. Therefore, it is free from dust, dirt, flies, manure, etc. Clean milk has a normal composition, possesses a natural flavour, contains only a small amount of harmless bacteria, is free from hazardous chemical residues, and therefore, fit for consumption. Utmost caution is observed to prevent contamination of milk during various stages of handling and processing.

Essential components of clean milk production

The animal itself is one of the most important sources of milk contamination. Therefore, a healthy animal



Clean animal shed and surroundings

Healthy and clean animals

Clean udder and teats

Healthy and clean milker

Clean utensils

Correct milking practices

Straining and prompt cooling of the milk

Fig. 3.11: Essential components for clean milk production

is a must to ensure clean milk production. Following appropriate hygiene and sanitation practices in the milking area help keep the animal free from infections, and hence, aids clean milk production. It is important to keep animals clean and maintain hygiene in their sheds. Their dung must be disposed immediately, and arrangements for the drainage of dung, urine and wastewater be made. Besides, the udder and teats of the animals must be checked for swelling, lumps, tenderness or cracks before milking. It is advisable to test the foremilk at each milking with a strip cup to identify cows with mastitis.

Milkers and milk handlers need to be healthy. Their hands must be clean, and free from cuts and sores. Their nails should be cut as long nails can injure the teats of the animals.

Sick animals must always be milked towards the end. Then, the milking system (consisting of a milking machine, bucket or container used for storing milk) must be washed and sterilised.

Milking pails having a dome-shaped top instead of open buckets or vessels must be used for milking (Fig. 3.12). It must be ensured that after milking, the utensils used in the process are washed with detergent and water.

The milk must be strained with the help of a strainer (Fig. 3.13) and stored in a container with its lid on (Fig. 3.14). A clean aluminum container is commonly used for this purpose. The milk must always be stored at 4° C soon after milking to suppress bacterial growth and kept at this temperature till transported or processed. So, the milk needs to be transported at the earliest in clean containers in minimum transport time.

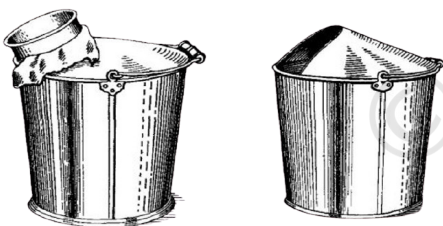


Fig. 3.12: Dome-shaped milking pail



Fig. 3.13: Strainer



Fig. 3.14: Aluminum containers for storing milk



Advantages of clean milk production

Some of the advantages of clean milk production are as follows (Fig. 3.15).

- The milk is free from disease causing organisms.
- Better quality of processed milk products can be made with clean milk.
- Raw milk can be stored unprocessed for three to four hours at room temperature.
- The milk is safe for long distance transportation.
- It is suitable for human consumption.
- It provides protection against diseases, such as typhoid, dysentery, septic, sore throat, etc., in humans.

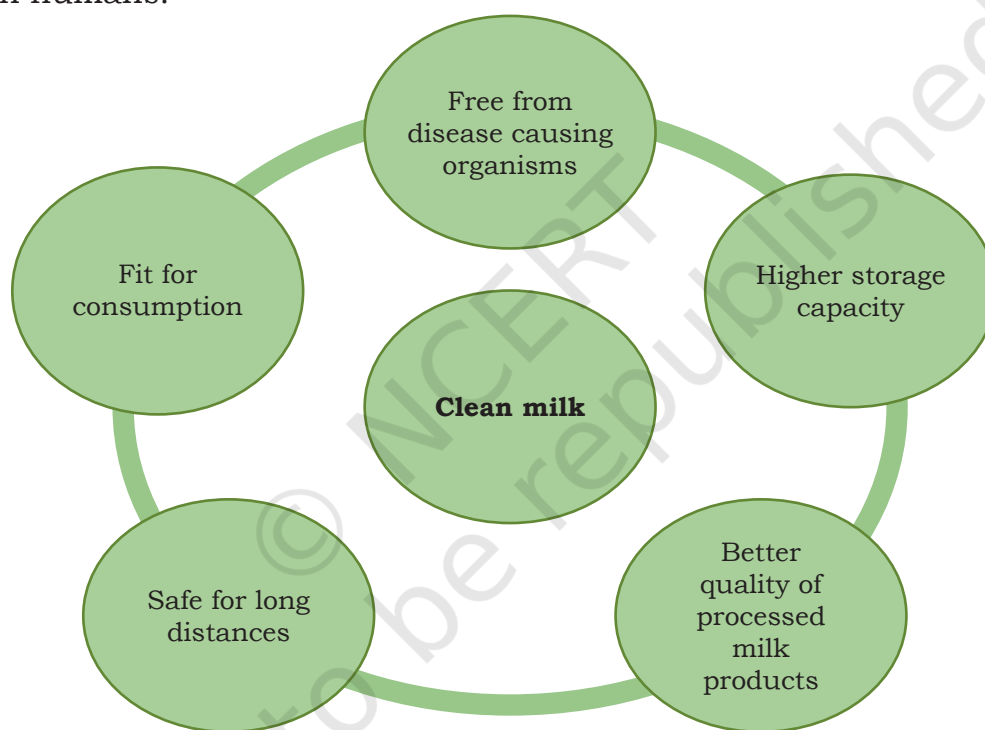


Fig. 3.15: Advantages of clean milk

Practical Exercise

Activity

Visit a nearby dairy farm and observe the process of milk production being followed there. Point out if clean milk production practices are being followed or not.

Material required: notebook and writing material

NOTES

Procedure

- Visit a nearby dairy farm.
- Observe the milk production practices being followed there.
- Identify if the farm is practising clean milk production method. If not, point out the loopholes that you observe.
- Also, mention how can one overcome such drawbacks.
- Prepare a note based on your observations.
- Present it before the class.

Check Your Progress

A. Multiple Choice Questions

1. Milk is not contaminated during the _____ stage.
(a) milking
(b) transportation and processing
(c) cooling
(d) None of the above
2. Which of the following about clean milk is true?
(a) Normal composition
(b) Possesses a natural flavour
(c) Contains only a small amount of harmless bacteria
(d) All of the above
3. Clean milk is _____.
(a) safe for long distance transportation
(b) fit for consumption
(c) Both (a) and (b)
(d) None of the above
4. The essential components for clean milk production are _____.
(a) clean utensils
(b) clean animal shed
(c) Both (a) and (b)
(d) None of the above
5. _____ is an advantage of clean milk production.
(a) Free from disease causing organisms
(b) Suitable for human consumption
(c) Both (a) and (b)
(d) None of the above

B. Fill in the Blanks

1. _____ cows must be milked towards the end.
2. Clean milk is fit for _____ consumption.
3. After milking, the utensils used for the purpose must be washed with _____ and _____.



4. Better quality of milk products can be manufactured with _____.
5. The foremost requirement for clean milk production is a _____ animal.

C. Mark True (T) or False (F)

1. A milking pail should have a dome-shaped top.
2. Milk is in sterile condition while in the udder of a healthy animal.
3. Clean milk is free from dust, dirt, flies, manure, etc.
4. It is advisable to test the foremilk at each milking with a strip cup to identify cows suffering from mastitis.
5. Raw milk can be stored unprocessed up to 10 hours at room temperature.

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