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Opinion

Clean Milk Production (CMP)

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Clean milk is raw milk obtained from healthy animals that has been produced and handled under sanitary circumstances, having only a limited number of harmless microorganisms and being devoid of harmful chemical residues. It must be produced by a healthy animal and treated by a healthy milker in a safe atmosphere free of physical or biological hazards, and it must be of good quality without being heat treated. Clean milk production entails a set of preventive techniques that aid in keeping the animal healthy and free of diseases such as mastitis, as well as proper care management of individual animals in order to obtain the highest quality milk without affecting the animal's output.

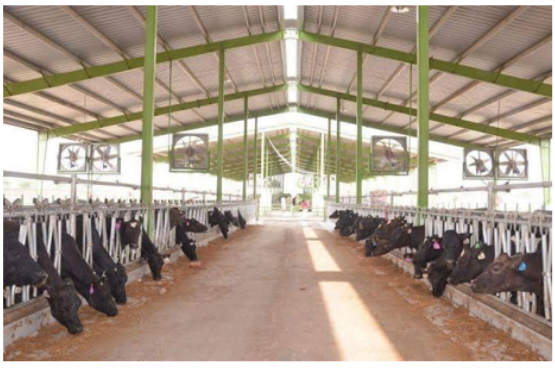

Figure 1

Nature of milk

Milk fat (4%), lactose (4.8%), proteins (3.5%), minerals (0.7%), vitamins, and other minor elements such as enzymes and hormones are all present in a healthy proportion in standard whole milk. The pH of normal raw milk is about neutral (pH 6.7) with a corresponding titratable acidity of 0.16-0.17 per cent due to the natural buffering capacity of milk proteins and salts. Whole milk should only include a few germs and no foreign things if it has been produced in a sanitary manner.

CMP in India

Village entrepreneurship is the driving force behind India's position as the world's leading milk producer. As a result, there is little scope for mechanising milking methods; yet this does not rule out the possibility of producing clean milk in India. Clean milk may be generated via good animal husbandry techniques in villages and small farms with the support of Dairy Development Boards, different Cooperative Dairy Federations, and other organisations by conducting an active campaign.

Sources of contamination of milk

Milk can be contaminated at any step during the production process. The food business operator (milk producer) is responsible for identifying these locations and implementing control measures to safeguard milk from contamination. The most common sources of contamination are

- Faeces from soiled animals, particularly teats, udders, and tails.
- Poor milking techniques, contaminated hands, soiled equipment, and failure to clean and disinfect teats prior to milking all contribute to bacterial infection.
- Contamination as a result of the inability to detect abnormal milk (mastitis pathogens, blood and clots).
- Physical pollution, such as dust, bedding materials, faeces, insects, and animal hair in milking machines and bulk tanks.
- Bacterial contamination of milking equipment and bulk milk tanks due to improper cleaning and disinfection.
- Veterinary product residues, cleaning chemicals, and the use of non-food-grade equipment can all contribute to chemical contamination.

For the production of clean milk, the following precautions should be taken

Farm-level animal management

- Feeding
- Housing
- Animal Health

Cleanliness of Milking equipment

Practices of hygienic milking

Cooling

Farm level animal management

- A high bacterial count affects the keeping quality of milk
- Milk from a healthy udder is typically devoid of harmful microorganisms
- Animal management includes feeding, housing, and health

Feeding

- It is essential to give a balanced diet that includes adequate amounts of green forage straw and concentrates rich in crucial nutrients and minerals.
- Feed ingredients should be stored in moisture free environment. Pesticides, insecticides, fungicides, fumigants, pathogenic agents, aflatoxins, and heavy metals should all be avoided in animal feed and fodder.
- Good quality straw and supply of adequate minerals and vitamins must be there.
- Feeding should be made one hour before milking. During milking, non-dusty concentrate can be provided to keep animals busy.
- Silage and wet crop leftovers should not be supplied at the milking station since they may cause the milk to stink.

Figure 2

Housing

- Animal sheds are the main sources of contamination.
- Mud, urine, faeces, and feed residues should all be removed from the shed on a regular basis. The shed should have enough drainage, ventilation, and lighting. There should be enough water accessible for drinking as well as cleaning the shed and animals.
- Shed: adequately elevated, well-roofed, well-ventilated, dry, and comfortable.
- Appropriate arrangements for animal waste disposal (manure pit or biogas plant) as well as leftover feed and fodder.
- Protection against flies and insects, which are possible contamination sources.
- Pig and poultry husbandry should be avoided in close proximity to animal facilities.

Animal health

- CMP requires a healthy herd as a prerequisite.
- Routine examination of cattle for illnesses such as tuberculosis, Brucellosis, and others. Animals that are ill should be kept apart.

- Sanitary precautions should be taken to prevent and control illnesses.
- Examine the udder for sores and mastitis.
- Animals should be vaccinated against FMD, Anthrax, and other diseases on a regular basis.

Cleanliness of milking equipment

- Milking utensils includes milking pails, milk cans, milking machine, bulk tank, etc.
- Utensils having the left over milk leads to growth of micro-organisms.
- The milk vessels should be cleaned thoroughly before and after each milking to ensure that they are bacteria-free.
- Cleaning detergents and chemicals should be non-harmful and non-toxic to the human body.
- Buckets that are left open should not be utilised.

Practices of hygienic milking

- Hygienic condition of storage and transport equipments and storage temperature are the key factors.
- During human milking and machine milking, certain organisms may enter the milk.
- Furthermore, the worker's personal cleanliness is crucial.
- Hygienic milking procedures lead to the production of safe and suitable milk.
- Sweeping the floor right before milking should be avoided.
- Milker's Hygiene
  - Free of infectious illnesses
  - Must wear clean clothing and have their nails cut
- Before milking, the milker should wash his hands with soap and running water, then wipe them clean with a clean cloth or towel.
- Wipe the udder and teats clean with a clean cloth or towel after cleaning them with lukewarm water.
- To avoid flies and insects, the forestripping should be collected in a different utensil/cup.
- To reduce the danger of infection, the teat should be immersed in antiseptic solution after milking.
- Wet milking (immersion of the hand in milk, water, or oil) is not advised.
- Milking should take no more than 6-8 minutes. Using a clean cloth or a strainer, drain the milk. The cloth should be washed and dried on daily basis.

Cooling

- If post-milking handling is not done appropriately, the advantage of generating clean milk is lost.
- Milk should be chilled as quickly as possible in a refrigerator to a temperature below 5°C to retain its keeping quality.
- The development of bacteria is slowed by chilling the milk within two hours of milking.
- Milk should be delivered as frequently as feasible to the plant or customers.