



## Strategies to Improve Quality Milk Production in India

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### Abstract

Millions of people's livelihoods and the country's economy in India are greatly influenced by the dairy business. As the population grows and the need for milk increases, it is imperative to ensure the production of high-quality milk. Nowadays, milk quality is equally important as milk quantity to maximize profit in the fiercely competitive local and international milk market. Consumers' growing concerns about their health make it imperative to maintain high-quality milk output. To support smallholders in producing safe milk of satisfactory quality, relevant experiences, techniques, and other efficient or sustainable methods must be considered. These strategies include education, emphasizing clean milk production practices, Safer practices like regular screening for contagious and general illnesses of milk workers and animals, infrastructure strengthening, and innovative approaches that need to be implemented at every production stage to ensure high-quality milk output.

**Keywords:** Clean milk, screening, safe milk, hygiene, quality of milk, clean milk production, mastitis, nutrient-rich fodder, full-hand milking.

### Introduction:

The dairy sector in India holds an incomparable space in the country with the highest milk production in the world. Dairy activities form an essential part of the rural Indian economy, serving as an important source of employment and income but quality concerns have always been a challenge in the dairy industry. India is ranked 1st in milk production contributing 24 % of global milk production followed by the United States of America, China, Pakistan, and Brazil. Milk production in the country has grown at a compound annual growth rate of about 3.8 % to reach 239.30 MT (DAHD, 2024) in 2024-25 from 146.31 million tonnes in 2014-15 due to the advancement of technology, proper nutrition, and proper management practices. The per-capita availability of milk has also increased from 176 grams per day in the 1990s to 471 grams per day in 2023-24. The safety of milk has drawn a lot of attention recently

in both developed and developing cultures. However, maintaining high-quality milk production from farm to market is challenging. According to FAO good-quality raw milk has to be free of debris and sediment; free of off-flavors and abnormal colour and odor; low in the bacterial count; free of chemicals (e.g., antibiotics, detergents); and of normal composition and acidity. Clean milk production ensures safe, nutritious milk for consumers. Ensuring the quality of milk requires interventions at multiple stages of the milk production process, including having healthy cows, a clean and sanitary environment for the cows, improving grazing management and ensuring access to nutrient-rich fodder and high-quality feed supplements, Maintaining proper hygiene practices throughout the entire milk production process, Farmers should prioritize cleanliness by regularly cleaning milking area, milking equipment, and storage tanks, use of clean

water sources for washing cows' udders before milking plays a vital role in reducing bacterial load and a suitable milking method. An appropriate milk storage or chilling system and hygiene of those who work in milking are equally vital that's why regular inspection of workers for hygiene and screening of workers for disease are necessary for quality milk production. If an animal is diagnosed with an illness, such as mastitis, it quickly gets veterinary care from a qualified practitioner and any defect in the entire system will lead to lower milk quality and health problems.

### Strategies for Quality Milk Production:

- **Selection of animals:** Breeding plays a vital role in determining milk yield and quality. Promoting cross-breeding programs that focus on high-yielding indigenous breeds with exotic ones can lead to increased productivity without compromising on breed characteristics important from a local perspective. Additionally, encouraging artificial insemination techniques using superior semen can aid in achieving genetic improvement within existing herds.
  - **Better Feed and water Management:** One of the key factors influencing milk quality is animal nutrition. Dairy farmers should focus on providing balanced diets that meet all nutritional requirements for their cattle. This can be achieved by improving grazing management and ensuring access to nutrient-rich fodder and high-quality feed supplements. Additionally, optimizing feed conversion efficiency can help maximize nutrient absorption and more readily available portable drinking water for animals' results in healthier cows and higher-quality milk.
  - **Enhancing Animal Health:** One of the primary factors affecting milk quality is animal health. Promoting good animal husbandry practices, including regular vaccinations, proper nutrition, and hygiene measures, can significantly reduce instances of diseases affecting milch animals. This can be achieved by implementing training programs for farmers on livestock management techniques and Educate farmers about common diseases affecting dairy cows such as mastitis and how to prevent them through vaccinations, regular health check-
- ups by veterinarians, proper hygiene during the milking process, etc., and ensuring access to veterinary services across rural areas.
  - **Improving ambient conditions of the barn and the milking area:** A dirty, muddy, unmaintained environment, badly kept free stalls or bedded pack, and insufficient ventilation all either directly or indirectly increase the unpredictable bacterial count and the contamination of milk quality. To lower the chance of contamination and the unpredictable bacterial count, the complete milking centre and the milking system should be cleaned and sanitized (the sanitizing solution should be kept between 95°F and 110°F) within an hour of milking time.
  - **Quality control measures:** Implement quality control measures at the farm level to ensure that milk is sourced from healthy cows and meets the required standards. This includes regular testing for bacteria, somatic cell count, antibiotics, and other contaminants, and for detection of any potential mastitis infection at the early stages, the fore and rare teat milk should be checked at regular intervals using a strip cup or the California Mastitis Test (CMT).
  - **Good Milking Practices:** Adopting proper milking techniques is crucial for maintaining hygienic conditions during milking sessions which directly impact both the quantity and quality of produced milk. Without effectively implementing these practices like, proper nail trimming of workers and head covered during milking, clean hands washing before milking or sanitizing milkers' hands, milking machines, using sanitized equipment, and washing of teats before and after milking. Wipe each teat with a clean, separate towel to prevent the spread of any undetected infections from one teat to another. Udder disinfectants include iodophor solution with 0.1 to 1.0% accessible iodine, 4% sodium hypochlorite solution, 0.3% aqueous solution of chlorhexidine, and 0.5 or 1% chlorhexidine in polyvinyl pyrrolidone solution. To maximize the efficiency of the disinfectant, it is crucial to thoroughly cleanse the teats to get rid of all organic debris before administering the solution. On the other hand, the milking

equipment needs to be thoroughly cleaned both before and after use.

- **Proper milking method:** Diverse individuals utilize varying techniques for milking. Small farmers with fewer animals typically milk their cows by hand, although machine milking is generally preferred for cows kept in herds. Rapid and full-hand milking ensures the harvesting of more milk and also prevents any teat injury. Hence, it is the most desirous way of hand milking. Initial drops of milk are always discarded because they contain a higher number of microbes.
- **Improving Milk Handling & Storage Facilities:** Ensuring timely collection of raw milk from farmers' doorstep by establishing efficient cold chain infrastructure reduces bacterial contamination risks. From farm-level bulk cooling tanks to reaching the processing plant, proper storage facilities including chilling centres, milk collection centres, etc need to be established so that there will be no compromise concerning maintenance required temperature limits. Milk must be cooled quickly to 5°C or less within 60 minutes and then stored at 4-5°C.
- **Adoption of Technology:** The utilization of modern technologies like Automatic Milking Systems (AMS), sensor-based monitoring systems, cloud computing, etc has revolutionized dairy farming practices across developed nations. The adoption of such technologies will pave the way towards reducing human errors or unhygienic handling issues encountered generally.
- **Education and Awareness:** Educating and creating awareness of farmers play a crucial role in improving the quality of milk, it can be achieved through Organize training programs for farmers to educate them about best practices in dairy farming, including proper milking techniques, hygienic handling of milk, and maintaining clean and healthy cowsheds and educate farmers about the importance of maintaining cleanliness in their cowsheds, milking equipment, and storage facilities. Emphasize proper cleaning protocols to avoid contamination and bacterial growth.

- **Proper record keeping** - maintain detailed records of their daily activities related to cattle management including feeding routines, medication administration (if any), veterinary visits, etc., which can help identify potential issues affecting milk quality.

### Conclusion:

Quality milk production is essential for consumer health and the dairy industry's growth. India faces challenges in adopting clean milk production practices because of lack of awareness, infrastructure gaps, and limited resources hinder progress and for safer milk production, every component of the milk production system needs to be closely examined and assessed. However, by implementing the strategies outlined above, India can achieve maximum milk production while maintaining high standards of cleanliness and safety.

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