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Popular Article

Clean Milk Production: Ensuring Quality and Safety

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Abstract

Clean milk is defined as raw milk from healthy animal that has been produced and handled in a hygienic manner, with no hazardous chemical residues and only a small number of benign bacteria. It must be of high quality without being heat treated, produced by a healthy animal, and handled by a healthy milker in a safe environment free from biological or physical risks. It must not only yield quantum milk but also be clear of particles and microorganisms till it is eaten. The objective of clean milk can be achieved by practical application of science-based system such as Hazard Analysis Critical Control Point (HACCP). 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.

KEYWORDS: Clean milk, Health, Hygiene, Quality milk, Safety

INTRODUCTION

The dairy industry is an important segment of food industry in India as it plays a significant role in the national economy and socio-economic development of the country. India is the largest milk producer in the world but it is also consumed most of the milk itself due to high population. The major challenge of the dairy sector in India is to increase the milk production in order to meet the increasing demands resulting from population explosion. Under such prevailing circumstances, the maintenance of high quality of milk production at farm under most hygienic conditions and bringing it to milk plant is a most challenging job. Ultimately, the quality of milk and milk products have to be evaluated based on the final products that are going to be utilized by the end users. Hence, the dairy industry is passing through a very critical phase of quality upgradation to place the best quality of milk and milk products in the market.

Clean milk production is a process that aimed to ensure the safety, quality, and hygiene of milk from the farm to the consumer. The production of clean milk requires a combination of practices and protocols that are designed to minimize the contamination, maintain the freshness, and the nutritional integrity of milk. Clean milk production is not only essential for ensuring the safety and quality of dairy products but also required for maintaining public health and consumer satisfaction.

"Clean Milk" is usually defined as milk drawn from the udder of healthy animals, which is collected in clean, dry milking pails and free from extraneous matters like dust, dirt, flies, hay, manure, etc. Clean milk features a normal composition, possesses a natural milk flavor with low bacterial count and is safe for human consumption" Under normal circumstances, the milk released by the udder is nearly sterile. As a result of its high nutritional content—which includes protein, fat, lactose, minerals, and vitamins—it serves as the perfect substrate for the quick growth of microbes. Raw milk needs to be protected from all possible sources of microbial contamination and various types of pathogenic organisms to make it clean and healthy milk. The employment of hygienic practices at the time of milking is therefore one of the first and foremost important step in clean milk production.

The objective of clean milk production can be achieved by application of the principles and practices of HACCP, which is a scientific based system and systemically identifies specific hazards and provides measures for their control to ensure safety of milk and milk products. It is a tool to assess hazards and establish control system that focuses on prevention rather than relying mainly on end product listing. Therefore, successful Clean Milk Production and effective implementation of HACCP system requires the use of risk-based decision-making in identifying significant hazards at different points in the food chain from producer to dairy docks and to ultimate end users as well as establishing critical limit at specify critical points.

IMPORTANCE OF CLEAN MILK PRODUCTION

Clean milk production is essential for several reasons:

- **Public Health:** Contaminated milk can harbor harmful pathogens such as bacteria, viruses, and parasites, posing serious health risks to consumers.
- **Food Safety:** Ensuring the cleanliness of milk reduces the likelihood of foodborne illnesses and ensures compliance with food safety regulations.
- **Consumer Confidence:** Consumers expect dairy products to be safe, wholesome, and free from contaminants. Clean milk production helps maintain trust and confidence in dairy brands.
- **Economic Viability:** High-quality milk fetches better prices in the market, contributing to the financial sustainability of dairy farming operations.

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FACTORS AFFECTING CLEAN MILK PRODUCTION

Milk is the most easily contaminated and perishable commodity as it is an ideal medium for bacterial growth. Hence, the employment of hygienic practices right from milking at the farm level to the factory is essential.

The factors affecting the production of clean and safe milk can be classified into two categories: internal and external factors.

i) Internal factors include:

- Udder infection – Mastitis
- Foremilk – First few streams of milk contain a large number of bacteria

ii) External factors include:

- Cow/animal's body – especially dirt and dung from hind quarters and tail
- Udder and teats
- Milker – hygiene and habits
- Milking and storage utensils
- Method of milking
- Feed and Water
- Milking environment

However, contamination of milk can be corrected at various levels as follows:

- The animal management- includes feeding, housing and health
- Hygiene of milking equipment and utensils
- Milker and milking practices
- During storage and transport
- Personal hygiene of those who are involved in production, processing and delivery activities related to milk and milk products

KEY PRACTICES FOR CLEAN MILK PRODUCTION

1. **Hygienic Farm Management**:
    - **Clean and Well-Maintained Facilities**: Dairy farms should maintain clean and well-ventilated barns or housing facilities for cows. Regular cleaning and disinfection of barns, feeding areas, and resting spaces help minimize the risk of bacterial contamination.
    - **Biosecurity Measures**: Implementing biosecurity protocols helps prevent the introduction and spread of diseases among the herd. This includes controlling access

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to the farm, quarantining new animals, and practicing strict hygiene when handling livestock.

- **Manure Management**: Proper handling and disposal of manure are essential for preventing environmental contamination and reducing the risk of microbial contamination in milk. Strategies such as composting, anaerobic digestion, and land application help manage manure effectively while minimizing environmental impact.

2. **Milking Hygiene**:
    - **Clean Milking Equipment**: Milking equipment should be thoroughly cleaned and sanitized before and after each milking session to prevent bacterial contamination. This includes milking machines, teat cups, and milk storage containers.
    - **Udder Preparation**: Proper udder preparation before milking is crucial for maintaining milk quality and minimizing bacterial contamination. This involves cleaning the udder and teats with sanitizing solutions, such as iodine or chlorhexidine, to remove dirt and bacteria.
    - **Milking Procedures**: Dairy farmers should follow standardized milking procedures to ensure consistency and minimize the risk of contamination. This includes using clean towels or disposable wipes to dry the udder, attaching milking machines properly, and monitoring milk flow during the milking process.
3. **Cow Health Management**:
    - **Veterinary Care**: Regular veterinary inspections and health checks are essential for maintaining the overall health and well-being of dairy cows. Vaccination programs, deworming, and parasite control help prevent diseases and minimize the need for antibiotics.
    - **Nutrition and Housing**: Providing cows with a balanced diet, clean water, and comfortable housing conditions supports their immune system and overall health. Proper nutrition ensures optimal milk production and quality while reducing the risk of metabolic disorders and health issues.
    - **Mastitis Prevention**: Mastitis, inflammation of the udder, is a common concern in dairy farming that can affect milk quality and cow health. Implementing mastitis prevention strategies, such as regular udder health checks, proper milking hygiene, and post-milking teat disinfection, helps reduce the incidence of mastitis and maintain milk quality.

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4. **Milk Handling and Storage**:
    - **Prompt Cooling**: After milking, milk should be promptly cooled to below 4°C (40°F) to inhibit bacterial growth and preserve freshness. Rapid cooling slows down the multiplication of bacteria and helps maintain milk quality during storage and transportation.
    - **Sanitary Storage**: Milk should be stored in clean and sanitized stainless steel tanks or containers to prevent contamination. Regular cleaning and disinfection of milk storage tanks, pipelines, and transfer equipment are essential for maintaining hygiene and milk quality.
    - **Temperature Control**: Maintaining proper temperature control throughout milk handling and storage processes is critical for preserving milk quality and safety. Refrigerated storage and transportation systems help prevent spoilage and microbial growth, ensuring that milk reaches consumers in optimal condition.
5. **Quality Assurance and Testing**:
    - **Regulatory Compliance**: Dairy farms must adhere to regulatory standards and guidelines governing milk production, quality, and safety. Compliance with regulations such as the Grade "A" Pasteurized Milk Ordinance (PMO) ensures that milk meets minimum quality and safety requirements.
    - **Quality Testing**: Regular testing of milk for quality parameters, including bacterial counts, somatic cell counts, and antibiotic residues, helps identify potential issues and ensure compliance with quality standards. Dairy farmers may conduct on-farm testing or utilize accredited laboratories for comprehensive milk analysis.
    - **Record-Keeping**: Maintaining accurate records of milk production, testing results, and any corrective actions taken is essential for traceability and quality assurance. Detailed record-keeping allows dairy farmers to track trends, identify areas for improvement, and demonstrate compliance with regulatory requirements.

SIGNIFICANCE OF QUALITY AND SAFETY IN DAIRY FARMING

Ensuring the quality and safety of milk is paramount for the sustainability and success of dairy farming operations. Consumers expect dairy products to meet high standards of quality, freshness, and safety, and any compromise in these areas can lead to loss of trust and reputational damage. By prioritizing clean milk production practices, dairy farmers can uphold industry standards, meet regulatory requirements, and meet consumer demand for safe and nutritious dairy products.

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CONCLUSION

Clean milk production is essential for maintaining the integrity and safety of dairy products while meeting the expectations of consumers and regulatory authorities. By implementing stringent hygiene practices, adopting quality assurance measures, and prioritizing the health and well-being of dairy cows, farmers can ensure that the milk they produce is of the highest quality and safety standards. Ultimately, investing in clean milk production not only benefits the dairy industry but also promotes public health and consumer confidence in dairy products.

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