CLEAN MILK PRODUCTION - FARM TO TABLE (DRINK HEALTHY - LIVE HEALTHY)

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ABSTRACT

At present dairy farming is one of the fastest growing industry in India. For successful dairy farming, farmers should recognize the value of good clean milk as well as how to produce it. Good milk and good dairy products are acknowledged to be in great demand, and each brings fair financial returns. The health requirements for milk are becoming more stringent, and it is up to the dairymen to produce milk of better quality to meet these requirements. People are being encouraged to use more dairy products. So, it is important that milk should come from clean herds and clean stables, and should be handled right all along the line. Obtaining clean milk is a significant difficulty in the early stages of the dairy industry. Hence, it is essential to implement several management practices focused on hygiene, sanitation and proper handling of milk from farm to the processing plant. This can overcome the ill effect of impure milk and superior milk quality can be produced and maintained.

KEYWORDS: Clean milk production, Milk hygiene, Milk quality, Dairy management, Somatic cell count (SCC), Total bacterial count (TBC)

INTRODUCTION

India is the highest milk producer in the *world* contributing 25 %of global milk production in the year 2023-24 (FAO), produced a record 239.30 million tones of milk, a 3.78% increase compared to the previous year. The country has maintained an impressive annual growth rate of 5.7% over the last 10 years. The per capita availability of milk in India has increased to 471gms per day. Although India ranks first in the milk production, clean milk production is a significant challenge for dairy industry in their beginning stages and the farmers due to lack of technical knowledge as well as pricing policy of milk. Dairy innovations are not adopted on mass scale by dairy farmers due to lack of extension services and due to non - adoption of hygienic milk production practices by the dairy farmers quality of milk produced is compromised . Hence, both pre and post secretory management of milk at farm level should be focused upon for the controlling of quality of milk and production of clean milk.

Clean milk refers to "Milk coming from healthy milch animal possessing normal flavour, devoid of dirt and filth, containing permissible limit of bacteria and essentially free from adulterants, pathogens, various toxins, abnormal residues, pollutants and metabolites".

Raw milk quality encompasses criteria relating to composition (fat, protein, lactose milk solids etc.) and hygiene [Somatic cell count (SCC) and total bacterial count]. SCC is an index of udder health and milk quality. An udder quarter is considered healthy if it has SCC<100,000 cells/ml and is free from mastitis pathogen. The total bacterial count should be lower than 3 million/ml or otherwise, it will lead to significant degradation of the fat, protein and lactose causing off-flavour and would significantly reduce the flexibility in processing the milk. Although pasteurization reduces the bacterial count, it cannot destroy the bacterial spores which germinates again. Moreover there are some bacteria producing toxins that survive even at pasteurization temperature and remain in the milk products too. Practically all the changes that take place in milk,

from the time it is drawn until consumed, are due to the action of microorganisms.

CAUSES OF BACTERIAL LOAD IN MILK

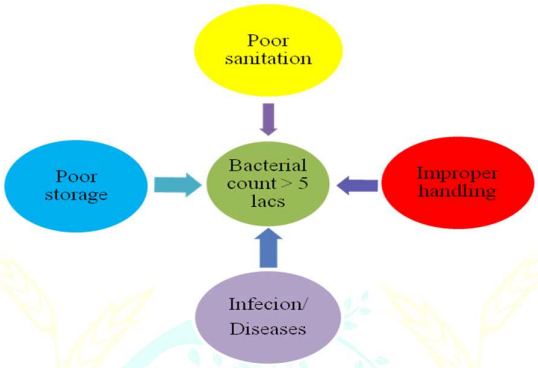

Table 2: Various pathogens responsible for undesirable changes in milk

Pathogens	Undesirable changes in milk
Streptococcus liquifaciens	Rapidly coagulates and proteolysis milk at low acid level due to rennin.
Bacillus coagulaus and *B. collidolactis*	They are heat resistant spore forming bacteria survive pasteurization, grow at high temperature and curdle milk.
E.coli	Produces objectionable flavour and ropiness.
Pseudomonas fragi, P. fluoroscens, Achro-mobacter lipolyticum, and *A. lipidus*	They are fat splitting bacteria and produce undesirable colour.
Yeast and mould	Found in milk and milk product which produces acid and gas.

ADVANTAGES OF CLEAN MILK PRODUCTION

Clean milk production is profitable for producers, manufacturer's and consumers as it renders protection against certain milk borne diseases, enables manufacturers to produce good quality dairy products and provides better keeping quality with high commercial value and make safe for human consumption.

The factors responsible for contamination of milk and the desirable farm practices for clean milk production are listed below :

Factors responsible for contamination of milk	Desirable farm practices for clean milk production

A. Internal factors (a) Mastitic udder	1.*Strip cup test 2.** California mastitis test . if positive, discard the milk The cow showing positive mastitis test should be milked separately and during treatment, the milk should be discarded.
(b) Fore milk	Remove first few streams of milk from each teat to reduce bacterial count in remaining milk.
B. External factors (a) Skin and udder of cow	Groom and brush hair coat an hour before milking to avoid dusting in environment. The udder must be washed with lukewarm KMnO4 solution and wipe with paper towel individually for each cow prior to milking. The udder should be kept dry at milking.
(b) Teat of cow	**Pre dipping** - teat should be dipped in antiseptic# solution (i.e., KMnO4) till 30 sec. prior to milking and wiped with paper towel individually to each cow.
(c) Milker	**Post dipping** – immediately after milking dip the teats in cup containing disinfectant (i.e. iodophore etc.). it helps to control mastitis.
(d) Milking equipments or utensils	The attendent engaged in milking should be healthy with clean hands. Nails should be trimmed. He should wear a clean white dress and a cap. He should wash his hands with any antiseptic solution and should not have bad habits like spitting, coughing, sneezing, talking while milking.
(e) Milking shed	It should be non corrosive preferably of stainless steel, aluminium , dome shaped. It should be cleaned and washed with any detergent or antiseptic solution before use.
(f) Milking practices	It should be well lighted, ventilated ,white washed, clean and disinfected with 1% bleaching powder sol. to arrest cross-contamination & spreading of undesirable odour. Milking should be done quickly, quietly and evenly. Milking should be completed in 6–8 min. each cow. Wet milking should be avoided. Milk should be drained till last strip as it contains more fat and SNF. "Full hand" method of milking should be practiced as knuckling method may injure teats.
(g) Feed and water	Feed should be free from mould or dust and objectionable smell at milking time.

*Strip cup test - milk of all four quarters will be stripped into a cup covered with black cloth. If the animal is suffering from mastitis, flakes of milk will be seen on black cloth.

California mastitis test

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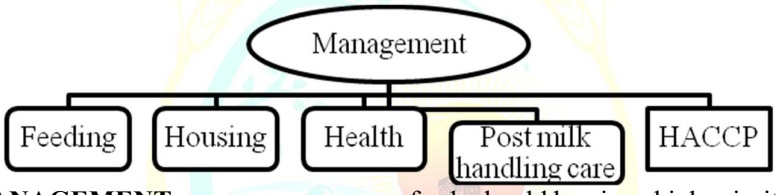
Farm practices for clean milk production can be considered as a part of the managemental strategy. Apart from this other managemental strategies for clean milk production are:



FEEDING MANAGEMENT

Feeding of milch animal should be done an hour before milking. Balanced feeding with appropriate quantities of green fodder, straw and concentrates having all essential nutrients and minerals is an important aspect required for quality milk production. At the time of milking, for the purpose of keeping cow busy only concentrate should be provided but should not be dusty. Feeds and fodder should be free from pesticides, insecticides, fungicides, herbicides, fumigants, aflatoxins as well as heavy metals. Silage and wet crop residues should not be fed at milking place as it may impart foul odour to the milk. Animal feed and fodder should be free from antinutritional factor and toxins. Feed ingradients should be stored in moisture- free conditions. Rodenticides should be carefully handled. Good quality straw and supply of adequate minerals and vitamins in feeds should be given high priority. Vitamin E and Selenium should be provided in diet, as it prevents mastitis.

HOUSING MANAGEMENT

The cattle shed should be well-roofed, sufficiently, lighted, well-ventilated, dry and comfortable with adequate elevation to avoid stagnation of water. There should be appropriate arrangement for disposal of animal waste in a manure pit .care should be taken to remove left over and fodder lying on ground. Bedding material like sand or sawdust should be provided during cold weather or in damp or marshy floor. Cracks and crevices in animal house should be filled up. Animal should be tied at such a distance that they cannot lick each other. Each animal should be provided adequate space to move around. Animal house should be cleaned daily.

Traditional shed

Modern shed

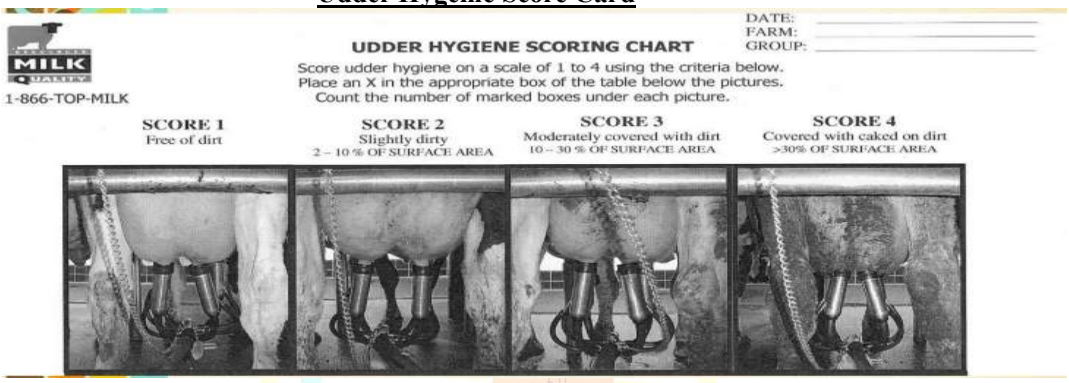
HEALTH MANAGEMENT

Routine examination of milch animals against diseases like; tuberculosis and brucellosis should be done regularly by veterinarian. Vaccination of milking animals should be done regularly against FMD, HS and brucellosis. The animals suffering from contagious disease must be kept separate from healthy herd. The inappropriate or prophylactic use of antimicrobial agents must be minimized. Coliform counts on bulk tank milk should be routinely performed as an indicator of faecal contamination. Well defined culling strategies should be followed based on udder confirmation and teat lesions. Udder scoring card ensures the cleanliness of udder of the animal and denotes the prospect of mastitis in animal. Appropriate dry cow therapy should be should be promoted at dairy farm.

Dual objective of dry cow therapy

1. Prevention of new Intra Mammary Infection (IMI) during the dry period
2. Cure of existing of IMI

Udder Hygeine Score Card



POST-MILK HANDLING CARE

Advantage of producing clean milk is lost if post milking handling is not carefully done. It includes three steps:

1. Filtering	2. Cooling and Storage	3. Marketing
Milk should be filtered with the use of white muslin cloth immediately after milking. Then the filter cloth should be disinfected, washed and dried after use.	Milk should be cooled as soon as possible to a temp. <5°C in a refrigerator and stored at the place which is free from chemicals.	Milk should be delivered to the market as soon as possible. It is advisable to delivery milk early in the morning and evening to avoid hot periods of the day

Milk pH gives an indication of milk hygiene and it should be between 6.6-6.8, when milk temperature is 20^0 C.

HAZARD ANALYSIS AND CRITICAL CONTROL POINTS (HACCP)

HACCP system is scientific and systematic approach which identifies a specific hazard throughout the food chain, *i.e.* from primary production of milk till it reaches the consumer. HACCP is management standard, providing a basic framework on which an organization builds up its quality management system leading towards achievement of total quality. The most important reason for adopting HACCP approach is that, no other quality assurance system has gained acceptance throughout the world level, especially in claiming ISO 9000 certification. Now a days HACCP system in dairy unit is very essential.

CONCLUSION

Milk is a food commodity that can have adverse effect if proper management is not done in the farm during its production and handling. Therefore, it is critically important for the dairy farmers to follow various strategies to ensure clean

milk production from healthy animals under hygienic conditions. Clean milk production improves economic benefit to the producer and health safety perspective in the consumers. It also improves value of the production through which farmers can get aided benefit.

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