Adoption of Clean Milk Production practices by Dairy Farm workers : A systemic review study

Sartaj Ahmad[1] , Deepak Kumar[2], Saurabh Sharma[3], Mohd Tahir Ghaji[4]

[1]Associate Professor, Medical Sociology, Swami Vivekananda Subharti University Meerut, [2]Assistant Professor, Department of Community Medicine, Subharti Medical College, [3]Associate Professor, Department of Community Medicine, Subharti Medical College Meerut, [4]Milk Dairy Owner, Ahmad Nagar Meerut UP India

Abstract

Milk being an easily perishable product, needs to be produced and handled in hygienic way right from farm till it reaches to the consumers table. The adoption of clean milk production practices has great potential for increasing the quality of milk production. The review study revealed that majority of the dairy farmers had adopted routine dairy management practices in the areas of animal house, milking area, milking utensils and feeding of milking animal management whereas non adopted practices were care of milking animals, udder management, milker's hygiene, milking techniques and post milking care practices. Public health officials should educate them and also regularly monitor their practices to maintain the quality of milk. Small initiatives in this regard can protect the society by consuming milk from various zoonotic diseases and health issues.

Keywords : *Milk Dairy Farmworkers (MDF), Clean Milk Production(CMP)Milk hygiene*

Introduction

Milk is the main product of the dairy farm industry, produced mainly for human consumption. A dairy farmer tries to maximize milk output from his/her dairy herd. At the sometime, farmers must ensure hygienic conditions of milking so that milk can be made fit for consumption. Milk, if it is not fit for human use is a financial loss to the producing farmer.Clean milk production is considered as one of the important factors in the economy of the state. The adoption of clean milk production practices has great potential for increasing the quality of milk production.

The clean milk production (CMP) involves cleanliness at different phases of handling animals, processing, and transporting of milk and milk products. There are mainly four factors to be considered in CMP practices: Animal hygiene, milking hygiene, equipment hygiene, and processing hygiene.

Clean milk can be defined as milk produced from healthy mulch animal possessing normal flavor, devoid of dirt, and filth containing permissible limit of bacteria, and essentially free from adulterants, pathogens, various toxins, abnormal residues, pollutants, and metabolites. The clean milk production (CMP) involves cleanliness at different phases of handling animals, processing, and transporting of milk and milk products. There are mainly four factors to be considered in CMP practices: Animal hygiene, milking hygiene, equipment hygiene, and processing hygiene.[1]

Contaminated milk deteriorates quickly and is a cause for health concerns.. Zoonosis is a disease and infection that are naturally transmitted between vertebrate animals and humans.[2]

Poor hygiene, poverty, malnutrition, lack of education, and close contact with animals are predisposing factors for zoonotic diseases. There are

Corresponding author:
Dr. Deepak Kumar
Flat No. 26, Ravidas Bhawan, Subharti University.
Meerut 250005, e-mail dpkbansal2007@gmail.com
Mobile No.: 9582670708

some 45 zoonotic diseases purported to be transmitted from cattle. Dairy farmers, who are in close contact with their animals, are always at risk of acquiring infections from animals. [3]

Some of the zoonotic diseases that spread through milk are Brucellosis, Tuberculosis, Salmonellosis, etc. In the absence of proper hand wash after direct contact with infected feces, accidental ingestion of bacteria can also occur. [4]

The milk quality is determined by aspects of composition and hygiene of milk, where breeding, feeding, management of healthcare, fodder production, and many such facts mainly influence the compositional quality. Dairy farmer is the key client in this process, who decides the quality of milk from feeding of the milk animal to dairy product supply chain.

Objectives

The objectives of this review study was to assess profile characteristics of the dairy farmers, adoption behaviour of dairy farmworkers about recommended dairy management practices, relationship between personal, socio-economic and psychological characteristics of dairy farmers with adoption behaviour of recommended dairy management practices, document the existing dairy management practices followed by dairy farmers, assess the training needs of the dairy farmers and suggest the strategies to improve milk production.

Adoption of Clean Milk Production (CMP) practices by Dairy Farm Workers (DFW)

Sufficient awareness is important for dairy farm workers for successful and profitable dairy farming. In clean milk production, milking is the key operation on a dairy farm. Milking is an art requiring experience and skill. Milking should be conducted gently, quietly, quickly, cleanly and completely. Cleanliness of animal sheds, cleanliness of animals, cleanliness of milkers and milking pails, milking methods, transportation of milk from dairy farm to processing units are important operations to adopt by the dairy farmers.

The CMP involves thorough cleanliness at all phases of handling and stringent quality control and hygienic measures have to be adopted at farm level. The hygienic practice of milking is the most important steps in clean milk production. Clean milk production results in milk that are safe for human consumption, free from disease-producing microorganisms, holding high keeping quality, high commercial value and high-quality base suitable for processing, resulting in high-quality finished products. Milk needs to be protected from all possible sources of microbial contamination. Potential sources of contamination of milk are dung, water, utensils, soil, feed, air, milking equipment, animal and the milkman. [5].

Considering the importance of adoption of clean milk production practices followed by dairy farmers and the quality milk production suggested by various scientific studies . Recently a study was conducted by Ahmed Ikra et al. (2020) in Najafgarh Tehsil, a typical peri-urban area in Southwest Delhi. This study revealed that that socioeconomic status had a significant relationship on practices adopted by farmworkers, whereas other factors such as age and experience did not show significant relationships. This study was also revealed that age, education, and socioeconomic status does not affect the knowledge level and awareness of farmers toward CMP practices as mean correct responses difference among different age, socioeconomic groups remained statistically non-significant. dairy farmworkers followed practices such as periodic examination with veterinary doctors (58.3%). In this study, there was low practice (i.e., <50%) of few activities such as isolation of cattle from the diseased ones (46.6%) and vaccination of cattle (45%). Most of the cattle dung disposed in the running drain (41.6%), while (24.6%) few used it for household and other purposes. A critical perusal of the data furnished portrays that farmworkers follow few practices (i.e., more than 50%) such as filtration of milk (86.6%), covering utensil with lid (95%), cleaning of utensils with water (76.6%), and 18.3% used detergents for washing utensils. Few of the farmworkers use a teat dip solution (6.6%).[6]

An another study was conducted by Surkar SH, et al. (2017) in Wardha district of Maharashtra In this study, it was observed that majority of the dairy farmworkers (82.50%) were reluctant to keep milking area clean and its disinfection. About (60.83%) of dairy farmworkers had not cleaned animal shed fifteen minutes before milking. Partially adoption of these practices was recorded in (39.17%)dairy farmworkers More than

half of respondents had partially adopted preventive measures in the group care of milking animals *viz.* not to use BHC or DDT as insecticide for control of ectoparasites in milking animal (59.17%), vaccinate milking animal regularly (56.67%), regular examination of milking animal by veterinarian (55.83%). Majority of the dairy farmworkers didn't adopted measure to prevent animals from licking paints from walls or iron bars (96.67%), clipping of hairs around the udder and hind quarter of the milking animal (88.33%). Majority of dairy farmworkers were not much aware about the risk of zoonoses and milk contamination and Majority of the dairy farmworkers (69.17%) were not much aware about fact *viz.* not to allow diseased person for milking. It was attributed to the lack of knowledge and exposure to demonstration to dairy farmers or difficulties perceived by farmers in changing their routine habits. They also didn't followed important practices *viz.* thrice milking a day of high yielder (88.33%), collection of 2-3 stripping of milk before milking in a separate pot to check subclinical mastitis (87.50%). [7]

A study conducted by Radder and Bhanj (2011) in Gadag district in northwestern part of Karnataka state, India, It was observed that dairy farmworkerslargely neglected impact of cleanliness on animals' udder and health, about milk contamination causing health hazards. [8]

A study conducted by Vikram Singh and Jancy Gupta (2015) in Rajasthan suggested that (55.84 %) of the dairy farmworkers had medium level of knowledge in various aspects of CMP, followed by 33% and 20% of them having low and high level of knowledge, respectively. They had highest knowledge in 'Housing' [Knowledge Index (KI) =85.83], followed by 'Milking' (KI=76.66). However, they had poor knowledge in 'Cleaning of animal' (KI=50.41) and 'Cooling of milk' (KI=57.91). It was observed that (71.67 %)of thedairy farmworkers had medium level of adoption in various aspects of CMP, followed by (13.33%) and (15.00 %)of them having low and high level of adoption, respectively. It was also found that they adopted recommended practices of 'Transportation' up to maximum extent with Adoption Index (AI) of 86.50, followed by 'Feeding' (AI=68.68), however, extent of adoption regarding 'Cleaning of utensil' (AI=43.40) and 'Healthy herd management' (AI=45.23) was found less. [9]

A similar study was conducted by Rayees Ahmed Bafandaet. Al. (2018) in R. S. Pura block of Jammu district to evaluate clean milk production practices adopted by the dairy farmers. The results of the study revealed that cleaning of animal house daily was adopted by majority (92.50%) of the dairy farmworkers , very few (27.50%) of dairy farmworkers had construction of the pucca floor and well drainage system in the animal shed. Only few respondents provide ventilation to animal house and collected the dung and disposed away of the animal house. Very less (17.5%) of respondents keep milking area clean, disinfested and free from flies and insects. Majority (72.50 %)of dairy farmworkers adopted the practiced of vaccination of milking animals regularly. None of the dairy farmworkers cleaned animal shed fifteen minutes before milking, adopted regular examination of milking animal by veterinary doctor and clip hairs around the udder and hind quarter of the milking animal as a preventive measure for clean milk production. A very low (22.50 %) of dairy farmworkers wash udder for removal of mud and dung.

All the dairy farmworkers (100%) washed their hands with plain water before milking and trimmed their nails regularly. About (52.5 %)of dairy farmworkers covered their head with cap or handkerchiefs at time of milking. Milking by healthy person was adopted by majority (85%) of respondents.

Majority (82.5 %)of dairy farmworkers milked milch animals randomly. Only (24.3%) of dairy farmworkers adopted the practiced of milking the healthy animals first. Very few (11.90%) of dairy farmworkers used separate utensils for milking of healthy and sick animal. Majority (77.50%) of dairy farmworkers complete milking within 6-7 minutes.

Not a single dairy farmworkers practiced post and pre-milking tip dipping in potassium permanganate solution. None of dairy farmworkers practiced washing entire animal or washing hind quarter or back of cows before milking and changed the clean dress before milking.

None of the dairy farmworkers dispose fore-milk and practiced post milking feeding to keep animal

in standing position for 15 min. after milking. Only (12.5%) had adopted the practiced of passing the milk from a sieve or muslin cloth for removal of the dirt.[10]

A study was conducted by R. N. Bhise et al. (2018) in Ratnagiri, Sindhudurg, Raigad and Thane districts of Konkan region of Maharashtra state. In this study , overall adoption behaviour of dairy farmworkers towards recommended dairy management practices was found 'medium' (71.50 %), while nearly equal number, *i.e. (*17.00 %)and (11.50 %)of the dairy farmworkers were in 'low' and 'high' of adoption behaviour, respectively. The personal, socio-economic and psychological characteristics of the dairy farmworkers namely, annual income, number of milch animals, milk production, availability of water, economic motivation and management orientation had showed positive and significant relationship, while self-education, family size, experience in dairying, land holding, social participation and training received had exhibited non-significant relationship with adoption behaviour of recommended dairy management practices. [11]

An another study was carried out by Quddus (2012) in three different agro-ecological zones and 180dairy farmworkers were interviewed. Self practiced dairy technologies were listed; adoption score for each technology and adoption index (AI) for each dairy farmworkers were studied. One-fourth farmers used artificial insemination for breeding purpose and two-fifth belonged to medium or high level of technology adoption. Only (35%)dairy farmworkers adopted crossbred cows and some others upgraded indigenous with exotic breeds. (About 17.5%) rural dairy farmworkers and (70%) semi-urban dairy farmworkers reared crossbred cows and rural dairy farmworkers were reluctant to utilized all kinds of improved technologies. Secondary and higher educated dairy farmworkers were 9.7 times more likely to be adopting improved technologies compared to illiterate dairy farmworkers. Top ranked constraints were ill equipped and negligible services at Adoption Index (AI centre), no provision for testing of animals, poor knowledge of dairy farmworkersabout health care of animals and inadequate knowledge about proper feeding and balanced ration.[12]

An another survey done by YANG Xin-ran et al. (2019) in northern China revealed that an overall adoption rate of various milk safety measures by smallholders is close to 48% with wide variations across the dairy farmworkers. The empirical result of the study indicated that dairy farmworkers adoption of raw milk safety measures was positively affected by farm size. These findings suggested that the changing dairy production structure towards larger farms and away from backyard dairy farming prompts smallholder dairy farmers to adopt more raw milk safety measures. This lends some support to the role of recent policy initiatives towards larger farms and away from backyard dairy farming on increasing the dairy farmworkers milk safety practices and reducing on-farm incidence of milk safety. [13]

Conclusion

Milk is an essential commodity, which is consumed by large number of consumers. Maintaining quality is important for both health and financial perspectives. The review study revealed that majority of the dairy farmers had adopted routine dairy management practices in the areas of animal house, milking area, milking utensils and feeding of milking animal management whereas non adopted practices were care of milking animals, udder management, milker's hygiene, milking techniques and post milking care practices. The knowledge of dairy farmworkers was found satisfactory a few factors such as personal hygiene of workers in wearing clean clothes, hand hygiene, both pre and post milk hand washing, usage of soap and towel. It is also noted that the cleaning animal house daily was adopted by majority of the dairy farmworkers. Many dairy farmworkers had pucca floor, well drainage system in the animal shed and adequate ventilation in animal house. Most of dairy farmworkers adopted the practice of vaccination milking animals regularly, whereas deworming was practiced by very less percent of respondents.

Therefore, efforts should be made to convince dairy farmers about the adoption of preventive measures for quality milk production. They should be motivated through organizing trainings and demonstrations at field levels. Public health officials should educate them and also regularly monitor their practices to maintain the quality of milk. Small initiatives in this regard can protect the society by consuming milk from various zoonotic diseases and health issues. Few dairy farm workers should adopted regular examination of milking animal by veterinary doctors. They should have a proper preventive measure for clean milk production.

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