



Clean Milk Production Practices Adopted by the Dairy Farmers of R. S. Pura in Jammu District

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Authors' contributions

This work was carried out in collaboration between all authors. Author RAB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author RN guided the author RAB during whole research period and edited the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2018/39985

Editor(s):

(1) Ian McFarlane, School of Agriculture Policy and Development, University of Reading, UK.

Reviewers:

(1) Olivier B. Kashongwe, Egerton University, Kenya.

(2) Ismet Boz, Ondokuz Mayıs University, Turkey.

(3) Raquel Baracat Tosi Rodrigues da Silva, University Paulista of São Paulo, Brazil.

Complete Peer review History: <http://www.sciencedomain.org/review-history/25726>

Original Research Article

Received 4th January 2018

Accepted 5th March 2018

Published 31st July 2018

ABSTRACT

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. Considering the importance of adoption of clean milk production practices followed by dairy farmers and the quality milk production the present study was conducted in R. S. Pura block of Jammu district to evaluate clean milk production practices adopted by the dairy farmers. Multistage random sampling technique was used to select the respondents. R. S. Pura block was purposively selected for the study. From the selected block, a list of villages with maximum populations of milch animals was identified. Out of the list of identified villages, two villages were randomly selected for

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the study. From each selected villages 20 dairy farmers were selected randomly, thus making a total of 40 farmers. The data were collected by personal interview method using structured interview schedules. The data were coded, classified, tabulated and analyzed using the software; Statistical Package for the Social Science (SPSS 16.0). The presentation of data was done to give pertinent, valid and reliable answer to the specific objectives. Frequencies, percentage, mean and mean percent score (MPS) were worked out for meaningful interpretation. The results of the study revealed that cleaning of animal house daily was adopted by majority (92.50) of the respondents, very few (27.50) percent of respondents have construction of the pucca floor and well drainage system in the animal shed. Only few respondents provide ventilation to animal house and collect the dung and dispose away of the animal house. Very less (17.5) percent of respondents keep milking area clean, disinfested and free from flies and insects. Majority 72.50 percent of respondents adopted the practice of vaccination milking animals regularly. None of the respondents' 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 percentage of respondents wash udder for removal of mud and dung. Not a single respondent practice post and pre-milking tip dipping in potassium permanganate solution. All the respondents (100%) washed their hands with plain water before milking and trimmed their nails regularly. Only 52.5 percent of respondents covered their head with cap or handkerchiefs at time of milking. Milking by healthy person is adopted by majority (85%) of respondents. None of respondents practiced washing entire animal or washing hind quarter or back of cows before milking and changed the clean dress before milking. Majority 82.5 percent of respondents milked milch animals randomly. Only 24.3 percent of adopted the practiced of milking the healthy animals first. Very few 11.90 percentages of respondents uses separate utensils for milking of healthy and sick animal. Majority 77.50 percent of respondents complete milking within 6-7 minutes. None of the respondents dispose fore-milk and practiced post-milking feeding to keep animal in standing position for 15 min. after milking. Only 12.5 percent had adopted the practiced of passing the milk from a sieve or muslin cloth for removal of the dirt.

Keywords: Adoption; clean milk production practices; hygiene; milking; udder; teat dip.

1. INTRODUCTION

In India dairying occupies a special niche and plays an important role in national economy as well as in socio-economic development of millions of rural and urban households India, the current leader in dairy world with annual milk production of 155.50 million tonnes, ranks first in the world and contributes about 16% to the world milk production [1]. India's milk production continuously increased right from 1950-51, when the total milk production was 17 million tones. Growth in milk production accelerated during the last three decades, coinciding with the implementation of the national dairy development programmes through producer-owned cooperative structure. However, in spite of large volume of milk produced, the quality aspects of milk production has not received adequate attention [2]. The domestic production could be increased in terms of quantity and quality with adoption of good dairy farming practices [3]. Although, India ranks first in milk production, quality of milk produced is not satisfactory due to lack of technical knowledge to the farmer [4]. Dairy innovations are not adopted on mass scale by dairy farmers due to lack of extension

services [5]. This undoubtedly requires a technological breakthrough in the areas of animal sciences, veterinary and dairying and much depends upon the rate and speed of dissemination of such information to dairy entrepreneurs. Milk quality is utmost important factor in dairying today due to consumer's awareness regarding "Quality". Thus quality milk production and adoption of hygiene and sanitation of farmers is crucial in food chain. Quality is a result of totally integrated approach from farm dairy environment to the consumer's door. To achieve quality standards it is need of time to be taken into consideration of strictly follow the clean milk production (CMP) practices at the household level.

Clean milk can be defined as 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 [4]. For improving the quality and clean milk production government of India had started new scheme strengthening infrastructure for quality and clean milk production. The funding pattern implemented on

100 percent grants-in-aid basis to the state government/union territories by the centre government. Also scheme is run by under guidance of animal husbandry, dairying and fisheries since the year 2003. The aim of scheme is to create necessary infrastructure for production of quality milk at the farmers level up to the points of consumption, improve milking procedure at the farmers level, training and strengthen infrastructure to create mass awareness about importance of clean milk production. This scheme is implemented through the state government by district co-operative milk union/ state level milk federation. Farmers or members of primary dairy co-operative Societies are eligible for the scheme. 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 micro-organisms, 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 milker. Contamination of milk can occur during storage and transport [5].

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. Clean milk production is considered as one of the important factors in economy of state. The adoption of clean milk production practices has great potential for increasing the quality of milk production. Keeping this in view a study was carried out to evaluate clean milk production practices adopted by the dairy farmers of R. S. Pura block in Jammu district.

2 MATERIALS AND METHODS

The present study was conducted in R. S. Pura block of Jammu district to evaluate clean milk

production practices adopted by the dairy farmers. Ex-post-facto research design was used in the present investigation; Karlinger (1973) opined that the ex-post-facto research design is worthy to be used, when the independent variables have already acted upon. Multistage random sampling technique was used to select the respondents. R. S. Pura block was purposively selected for the study. From the selected block, lists of villages with maximum populations of milch animals were identified. Out of the list of identified villages, two villages were randomly selected for the study. From each selected villages 20 dairy farmers were selected randomly, making a sample size of 40farmers. The data were collected by personal interview method using structured interview schedules. The schedule was developed using different types of questions i.e. true/false and multiple choice. The data was coded, classified, tabulated and analyzed using the software; Statistical Package for the Social Science (SPSS 16.0). The presentation of data was done to give pertinent, valid and reliable answer to the specific objectives. Frequencies, percentage, mean and mean percent score (MPS) were worked out for meaningful interpretation. Mean percent score (MPS) was calculated by using formula:

$$\text{Mean Percent Score (MPS)} = \frac{\text{Obtained score}}{\text{Maximum score}} \times 100$$

3 RESULTS AND DISCUSSION

A critical perusal of the data furnished in Table 1 portrays the practice wise adoption of clean milk production practices by dairy farmers, under the subheadings such as animal house, milking area, care of milking animal, feeding of milking animal, udder management, personal hygiene of dairy farmers, milking utensils/care of milking utensils, cleaning of animals before milking, pattern of milking the animals, milking techniques and post-milking care.

3.1 Hygiene of Animal House

Hygiene of animal house is an important component of clean milk production practices because most of respondents used traditional cattle shed even though they took enough care of health of their animals and hygienic practices for clean milk production practices. Result from Table 1 revealed that cleaning animal house daily was adopted by majority 92.50 of the respondents, followed by washing of floor, manager, gutter regularly (72.5%) and providing

bedding material like sand or sawdust during cold weather or in damp or marshy floor (67.5%). Very few 27.50 percent of respondents have construction of the pucca floor and well drainage system in the animal shed. Only 22.5 percent of respondents provide ventilation to animal house. Very few 32.5 percent of respondents collect the dung and dispose away from the animal house with. None of the respondents have facilities for collection of urine in a pit outside the animal house by providing sloppy drainage system in shed production practices. The probable reason behind not adoption of hygiene of the animal shed might be due to used traditional cattle shed and lack of awareness about importance of hygiene of animal house for clean milk production practices. The findings are in agreement with the findings of Yogesh et al. [6]

and Surkar et al. [7] who reported that very few dairy farmers have proper drainage pucca floor and adequate ventillation.

3.2 Hygiene of Milking Area

An analysis of Table 1 shows that only 17.5 percent of respondents keep milking area clean, disinfested and free from flies and insects while majority of the respondents were reluctant to keep milking area clean and its disinfection, which may be because of lack of time and awareness about the importance of keeping milking area clean for quality milk production. None of the respondents' cleaned animal shed fifteen minutes before milking. The findings get support from the Mohankumar et al. [8].



Traditional animal house without drainage system



Dirty Hindquarter of Milch Buffalo which hampers CPM



Animal house without Ventilation



Unclean Floor and walls of animal house

Fig. 1

Table 1. Distribution of dairy farmers according to their practice wise adoption of clean milk production practices

Area of adoption about clean milk production	Number of respondents	Percentage	Score obtained	MPS
A. Animal house				
1. Provide ventilation to animal house	9	22.5	11	13.75
2. Provide bedding material like sand or sawdust during cold weather or in damp or marshy floor	27	67.5	42	52.50
3. Fill up cracks and crevices in animal house	9	22.5	15	18.75
4. Tie animal at such a distance that they cannot lick each other	7	17.5	9	11.25
5. Provide adequate space for each animal to move around	6	15.0	11	13.75
6. Collection of urine in a pit outside the animal house by providing sloppy drainage system in shed	0	0	0	0
7. Collect the dung and dispose away from the animal house	13	32.5	23	28.75
8. Clean animal house daily	37	92.50	45	56.25
9. Washing of floor, manger, gutter with regularly	29	72.5	33	41.25
10. Regularly observation of the milking barn, water tank and feeding manger	19	47.50	23	28.75
11. Construction of the pucca floor and well drainage system in the animal shed	11	27.50	17	21.25
B. Milking area				
1. Clean animal shed 15 min. before milking	0	0	0	0
2. Keep milking area clean, disinfested and free from flies and insects	7	17.5	9	11.25
C. Care of milking animal				
1. Wash and clean animal every day	13	32.50	23	28.75
2. Clip hairs around the udder and hind quarter of the milking animal	0		0	0
3. Not to use BHC or DDT as insecticide for control of ectoparasites in milking animal	7	17.5	7	8.75
5. Vaccinate milking animals regularly	29	72.50	37	46.25
6. Deworming of milking animals regularly	5	12.5	7	8.75
6. Regular examination of milking animal by veterinary doctor.	0		0	0
D. Feeding of milking animal				
1. Not to feed cabbage, turnip tops and onions couples of hours before milking	37	92.50	54	67.50
2. Not to feed pesticides sprayed fodder to milking animal	40	100	73	91.25
3. Provide 5-6 kg dry fodder (straws) and 1 kg concentrate mixture and 1 kg additional concentrate per 2-2.5 litres milk.	6	15	9	11.25
4. Provide clean and fresh water to milking animal for drinking	40	100	63	78.75

Area of adoption about clean milk production	Number of respondents	Percentage	Score obtained	MPS
E. Udder management				
1.wash udder for removal of mud and dung	21	22.50	29	36.25
2.Use of kmno4 in water for cleaning of udder and teats	0		0	0
3. Wipe udder with dry cloth after udder washing	0		0	0
4. Use different cloth for cleaning of udder of diseased animal	0		0	0
5. Dip teats in potassium permanganate solution before and after milking	0		0	0
6. Not to inject hormonal preparations solution before and after milking	0		0	0
7. Examine udder, teat or milk regularly by veterinary doctor	0		0	0
F. Milking utensils/care of milking utensils				
1.Using clean, dry and hygienic utensils for milking purpose	34	85.0	43	53.75
2.Using separate utensils for milking of healthy and sick animal	5	11.90	7	8.75
3. Use milking utensils made up of stainless steel or aluminum	33	82.5	47	58.75
4. Not to use rusted cans for milk collection	0	0	0	0
5. Use dome-shaped milking pots for milking	0	0	0	0
6. Cleaning of utensils before milking with plain water	32	80	44	55
G. Personal hygiene of dairy farmers				
1.Milking by healthy person	34	85.0	43	53.75
2 Always stop milk handling while showing disease symptoms	13	32.50	17	21.25
3.Trimming of nails regularly	40	100	67	83.75
4. Changing/Wearing the clean dress before milking	0	0	0	0
5.Cover head with cap or handkerchiefs at time of milking	21	52.5		
6.Washing hands with plain water before milking	40	100	72	90
7.Care for the hairs of milking person not to fall in the milk	23	57.5	37	46.25
8.Protect milk from being exposed to coughing & sneezing	7	17.5	9	11.25
H. Cleaning of animals before milking				
1. Washing entire animal	0	0	0	0
2. Washing hind qr. or back of cows before milking	0	0	0	0
3. Cleaning udder and teats of cows before milking	21	52.5	32	40
4. Splashing of Water on Teat/ Udder before Milking	13	32.50	18	22.50

Area of adoption about clean milk production	Number of respondents	Percentage	Score obtained	MPS
I. Pattern of milking the animals				
1. Milking the sick animals first	0	0	0	0
2. Milking the healthy animals first	17	24.3	27	71.25
3. Randomly	33	82.5	57	33.75
J. Milking techniques				
1. Apply full hand milking techniques	22	55.00	44	55.00
2. Before starting milking drop out few strips of milk from each teat	0		0	0
3. Collect 2-3 stripping of milk before milking in a separate pot	0		0	0
4. Milk high yielding animal three times a day	0		0	0
5. Complete milking within 6-7 minutes	31	77.50	43	53.75
K. Post milking care				
1. Keep animal in standing position for 15 min. after milking	0		0	0
2. Passing the milk from a sieve or muslin cloth for removal of the dirt	5	12.5	7	8.75
3. Transfer the milk to processing unit immediately after milking	34	82.5	53	66.25

3.3 Care and Feeding of milking animal

A careful look at Table 1 shows that majority 72.50 percent of respondents adopted the practice of vaccination milking animals regularly with MPS of 46.25, whereas very 12.5 percent respondents adopted deworming of milking animals regularly. The high vaccination practices of milking animal were probably due to fact that state animal husbandry department itself followed the regular vaccination schedule of animal to prevent outbreak of any contiguous diseases, whereas neither government nor farmers adopted the practices of deworming regularly. Not a single respondent 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 percentage 32.50 of respondents adopted the hygienic practices of washing and cleaning animal every day. Data of Table 1 also reveals that all of respondents adopted practices i.e. avoids pesticide sprayed fodder to animal, providing clean and fresh water to milking animal for drinking followed by not to feed cabbage, turnip tops and onions couples of hours before milking (92.50%) with MPS of 91.25, 78.75 and 67.50, respectively. Only 15 percent of respondents adopted the practices of providing 5-6 kg dry fodder (straws) and 1 kg concentrate

mixture and 1 kg additional concentrate per 2-2.5 liters milk as most of the respondents were feeding seasonally available fodder to the animals.

3.4 Udder Management

An analysis of Table 1 revealed that overall udder management for CPM was very poor except for practices viz., not to inject hormonal preparations solution before and after milking. A very low 22.50 percentage of respondents wash udder for removal of mud and dung. Not a single respondent practice post and pre-milking tip dipping in potassium permanganate solution. Use of kmno_4 in water for cleaning of udder and teats were not also being practiced by single respondents. This might be due to the lack of awareness of the respondents about teat dipping in relation to maintenance of good udder health in milking animals. The findings are in agreement with the findings of Yogesh et al. [6] and Surkar et al. [7]. Who observed that none of the respondents practiced pre and post-milking tip dipping which is important for udder health management and to prevent infection.

3.5 Care of Milking Utensils

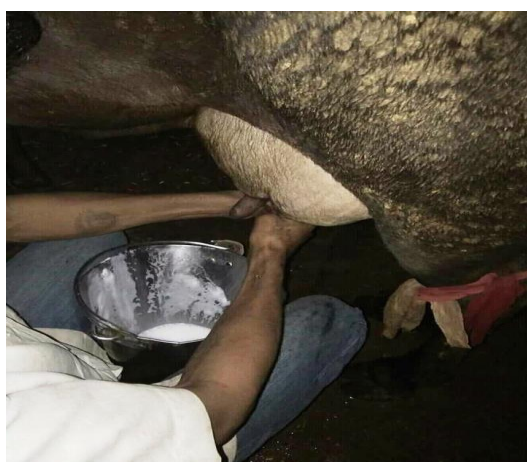
A perusal of Table 1 revealed that 82.5 percent of respondents preferred utensils made up of

stainless steel for milking. Majority 85 of respondents followed the practices of using clean, dry and hygienic utensils for milking purpose and most of them (80%) adopted hygienic practices cleaning of utensils before milking with plain water. Very few 11.90 percentages of respondents use separate utensils for milking of healthy and sick animal whereas none of the respondents uses dome-shaped milking pots for milking and rusted cans for milk collection. Similarly Surkar et al. [7] carried a study on adoption of quality milk production practices by dairy farmers in Wardha district of Maharashtra and observed that 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 in the areas of care of milking animals, udder management, milker's hygiene, milking techniques and post-milking care practices.

3.6 Personal Hygiene of Dairy Farmers

Regarding personal hygiene of dairy farmers Table 1 reveals that all the respondents (100%) washed their hands with plain water before milking and trimmed their nails regularly. Only 52.5 percent of respondents covered their head with cap or handkerchiefs at time of milking. Milking by healthy person is adopted by majority (85%) of respondents. A very less 32.50 percentage of respondents stopped milk handling while showing disease symptoms. Only 17.5 protect milk from being exposed to coughing



Full hand milking method



Unlearned Udder and hindquarter during milking



Unhygienic Milking areas

Fig. 2

& sneezing. None of the respondents changed/wore the clean dress before milking. Similarly findings were also observed by Mohankumar et al. [8] who reported that in case personnel under CMS of study areas washed the hands before milking but none of them used the antiseptic solutions.

3.7 Cleaning of Animals before Milking

A careful look at Table 1 shows that not a single respondent practiced washing entire animal or washing hind quarter or back of cows before milking. Only 52.5 percent of respondents practiced cleaning udder and teats of cows before milking followed by splashing of water on teat/ udder before milking (32.50). Due to busy schedule in farming and traditional culture they paid less attention to quality milk production. Deshmukh and Pagar [9] studied practice wise knowledge and adoption of clean milk production by dairy farm women in Junagadh and observed that very few respondents wash the udder of animal before milking.

3.8 Pattern and Techniques of Milking the Animals

Majority 82.5 percent of respondents milked randomly milch animals. Only 24.3 percent of adopted the practiced of milking the healthy animals first. A scrutiny of Table 1 shows that majority 77.50 percent of respondents complete milking within 6-7 minutes with MPS of 53.75. Only 55 percent of respondents practiced full hand milking techniques. None of the respondents drop out few strips of milk from each teat starting milking which may contain high numbers of bacteria. Due to lack of awareness among farmers not a single respondents discards few strips of few milk which is must for clean milk production. The findings are in agreements with the findings of Sabapara et al. [10] and Surkar et al. [7].

3.9 Post Milking Care

After milking the teat canal of milch animals remains open for few minutes and there is more chance of entry of bacteria if animal sits soon after milking. To prevent this animal must be feed after milking so as to keep animal in standing position. Result of Table 1 reveals that none of the respondents practiced post-milking feeding to keep animal in standing position for 15 min. after milking. Very few percent of respondents had adopted the practiced of passing the milk from a sieve or muslin cloth for removal of the dirt. Due

to lack of cold storage facilities majority of respondents transfer the milk to processing unit immediately or to middleman dealers after milking. Surkar et al. [7] carried a study on adoption of quality milk production practices by dairy farmers in Wardha district of Maharashtra and observed that 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 in the areas of care of milking animals, udder management, milker's hygiene, milking techniques and post-milking care practices.

4. CONCLUSION

The study indicated that the cleaning animal house daily was adopted by majority of the respondents. Very respondents have construction of the pucca floor, well drainage system in the animal shed and adequate ventilation in animal house. Only few respondents keep milking area clean, disinfested and free from flies and insects. None of the respondents' cleaned animal shed fifteen minutes before milking. Most of respondents adopted the practice of vaccination milking animals regularly, whereas deworming was practised by very less percent of respondents. Not a single respondent 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. All respondents adopted practices i.e. avoids pesticide sprayed fodder to animal, providing clean and fresh water to milking animal for drinking followed by not to feed cabbage, turnip tops and onions couples of hours before milking. None of the respondent practiced post and pre-milking tip dipping in potassium permanganate solution. Majority of respondents preferred utensils made up of stainless steel for milking. All the respondents washed their hands with plain water before milking and trimmed their nails regularly. Milking by healthy person is adopted by majority of respondents. Not a single of respondents wash entire animal or washing hind quarter or back of cows before milking. Majority percent of respondents milked randomly milch animals whereas few percent of adopted the practiced of milking the healthy animals first. Most of the respondents complete milking within 6-7 minutes. None of the respondents dispose fore-milk and practiced post-milking feeding to keep animal in standing position for 15 min. after milking. Very less percent of respondents

adopted the practiced of passing the milk from a sieve or muslin cloth for removal of the dirt.

5. RECOMMENDATIONS

- A very low percentage of respondents wash udder for removal of mud and dung. Much of the dirt and dust that get into the milk comes from the cow's udder or abdomen during milking time. For this reason the cows should be cleaned before they are milked. Wash udder, teats and flank of the animal with clean water preferably add a disinfectant. Wipe with a clean cloth. Farmers must be aware about udder washing for clean and quality milk production.
- Majority of respondents milked randomly both healthy and sick milch animals. Farmers must be trained and educated that isolate sick animals and milk them last (Their milk should not be mixed with good milk).
- Framers must be aware that dispose fore-milk as it is rich in microbial content.
- For healthy udder teat tip is must. As evident from study none of the respondents adopted teat dip practiced and farmers must educate about its important for health udder and clean milk production.
- As it was evident from the study majority of respondents followed traditional milk production practices. Extent of training efforts needs to be enhanced significantly. Efforts should be made Intensive training programmes, group discussions, demonstrations, tours, field visits, awareness programme etc., for quality milk production.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:

The peer review history for this paper can be accessed here:
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