Journal of Agricultural Engineering and Food Technology
p-ISSN: 2350-0085; e-ISSN: 2350-0263; Volume 4, Issue 1; January-March, 2017 pp. 13-16

http://www.krishisanskriti.org/Publication.html

Factors Affecting Hygienic Milk Production for Farmers of Nadia Dist.

Champak Bhakat*, Ajoy Mandal, Asif Mohammad and Saroj Rai

ICAR-NDRI, ERS, Kalyani-741235, W.B.
*E-mail: *bhakat56@gmail.com*

Abstract—*In Nadia dist, sub clinical mastitis in crossbred cows is a big and silent problem which leads to huge economic losses to farmers. Therefore, it is very essential to study influence of hygienic milk production on subclinical mastitis (SCM). Present study was conducted at villages Nadia dist, WB. A total of 110 milk samples were collected and analysed. The SCM were determined by milk somatic cell count (SCC), milk pH and Modified California Mastitis Test (MCMT). The observations, information of milking management were collected by pretested questionnaire. Analysis of data revealed that Log $_{10}$ SCC (cells / ml) were significantly ($P<0.01$) higher in SCM cows (6.15 ± 0.05) as compared to no-SCM cows (4.23 ± 0.04). The SCC X 10^5 (cells / ml) were found to be higher in SCM animals (29.91 ± 3.85) as compared to no-SCM animals (1.12 ± 0.88). The Range of Log SCC (cells / ml) greatly varied between SCM cows (5.01 to 7.56) and no-SCM cows (3.79 to 5.22). The MCMT grade was lowered in no- SCM animals (1.03 ± 0.15) as compared to SCM animals (3.87 ± 0.07). The milk pH were higher in SCM cows (6.92 ± 0.02) as compared to no- SCM cows (6.34 ± 0.03). The fat (%) content was estimated to be lower in SCM animal (2.99 ± 0.07) as compared to no-SCM animal (3.64 ± 0.15) whereas SNF (%) were higher in no- SCM cows (7.63 ± 0.08) as compared to SCM cows (6.99 ± 0.06). All dairy farmers of present study area use to carry out their daily milking by hand and generally it was done by Gowala, a professional milker. All most all cows were Jersey cross-bred. All the lactating cows were fed with additional concentrates according to their milk yield. The association between animal keeping pattern and hygiene status, cleanliness in animals, shed and milkers at farmer's house revealed that farmer having single cow, most of them (78.57%) maintaining good hygiene status, cleanliness but farmer having >3 cows, most of them (50%) maintaining poor hygiene status, cleanliness where as farmer having 2-3 cows most of them (54.55%) maintaining medium type hygiene status, cleanliness in their milking cows, housing of animal and milkers who were using their hand for milking everyday at farmer's house. The Chi-squre test value found to be significant ($P<0.05$). The study can be concluded that there is a significant association between animal keeping pattern and hygiene status, cleanliness at study area and efforts towards increased cleanliness and hygiene status in all aspects of milking management towards higher clean milk production and lowering incidence of sub-clinical mastitis in Nadia district.*

1. INTRODUCTION

A major part of milk produced this area is used to prepare sweets and other dairy products. The quality dairy products with long duration keeping quality can be made from fresh milk, but never from visibly clean but otherwise unsafe milk. Freshly and aseptically drawn milk from a healthy cow has a very few microorganisms, which may vary from few hundred to thousands. There is an immediate need for hygienic milk production in the present dairy scenario and to achieve this prevention of initial microbial contamination of milk at base level is an essential requirement. So the emphasis is to be given on health status of milch animals, condition of dairy animal housing, status of udder, hygiene of milkers, milking practices, milking containers, feed, fodder and feeding practices, grazing area and storage system for milk. Milk provides an ideal medium for growth of all kinds of microbes. Thus becomes highly perishable and a potential source of contamination. For this, milk might be sometimes harmful for man especially if contaminated by various micro-organisms which may appear in milk directly, from the mammary gland (secretional contamination) or from the environment (post secretional contamination).

2. MATERIALS AND METHODS

Present study was conducted at Villages of Nadia dist (Madanpur, Rawatri) WB. A total of 110 milk samples were collected and analysed. One paged questionnaire was developed and tested for it's suitability of data collection. Information regarding management practices, cleaning and hygiene status followed in changing scenario of village conditions by the farmers were determined by means of a questionnaire. Under different socio-economic conditions the questionnaires were filled after interviewing the farmer and then by personally recording the management conditions practiced under each household of Nadia dist of WB. All most all the cows were Jersey cross-bred. Repeated visits were made to follow up the each and every animals and rapport was also build with dairy farmers. The quantitative and qualitative data were collected through interaction and discussion with farmers, key informants, housewives and secondary sources. To meet objectives of the study both primary and secondary observations were recorded meticulously. Collected data were classified under different categories for interpretation. Milk samples and data were collected at monthly intervals. The SCC, Fat, and SNF, pH and MCMT were determined for

each milk samples of farmer's field animals. The Chi-square test (Snedecor and Cochran, 1994) was applied. The knowledge level of respondents regarding milking management was also assessed through knowledge index (Bhaskaran and Praveena,1982).

3. RESULT AND DISCUSSION:

Somatic Cell count in milk:

Analysis of data revealed that Log $_{10}$ SCC (cells / ml) were significantly (P<0.01) higher in SCM cows (6.15 ± 0.05) as compared to no-SCM cows (4.23 ± 0.04). The SCC X 10^5 (cells / ml) were found to be higher in SCM animals (29.91 ± 3.85) as compared to no-SCM animals (1.12 ± 0.98). The Range of Log SCC (cells / ml) greatly varied between SCM cows (5.01 to 7.56) and on-SCM cows (3.79 to 5.22). Farm experimentation revealed that SCC and MCMT were significantly (P<0.01) higher in hand milking as compared to machine milking management (Bhakat et al, 2017). Following factors in animal housing should be followed to get hygienic milk commercially.

- Shed as well as surroundings must be kept clean and dry, especially the floors, mangers and drains, swept every morning and evening, must be thoroughly scrubbed and washed every morning and dried.
- It is desirable to sprinkle 1-2% solution of phenyl or other disinfectants on the floor every day. This will prevent multiplication of flies, which are a serious source of infection. Moreover, the disinfection measures have a great role as a most significant form of medical sanitation which doubtlessly influences the hygienic quality of milk.
- Fresh water should be provided in the water trough as well as for cleaning and sanitation.
- Comfortable micro-climatic environment should prevail inside the dairy animal housing system. Good ventilation helps to keep the floor dry and enable to maintain hygienic housing system.
- Dung heaps, rubbish and filth should not be allowed to accumulate near the sheds / milking place.

A major part of milk produced at lower Gangetic area is used to prepare sweets and other dairy products. The quality dairy products with long duration keeping quality can be made from fresh milk, but never from visibly clean but otherwise unsafe milk. Freshly and aseptically drawn milk from a healthy cow has a very few microorganisms, which may vary from few hundred to thousands. The milk products meant for export must meet world standards in respect of microbial count and pesticide residue.

Udder conformation and health status :

The MCMT grade was lowered in no- SCM animals (1.03 ± 0.15) as compared to SCM animals (3.87 ± 0.07). Following factors should be kept in mind to get clean milk commercially.

- Animals to be milked must be healthy and as clean as possible.
- Routine checking of animals for diseases like mastitis, diarrhoea, brucellosis and tuberculosis should be carried out.
- The udder requires special attention. It must be washed well, cleaned and wiped with a piece of clean wet cloth soaked in iodine solution (Ranocid 15 ppm i.e. 10 ml Ranocid-1416 in 10 litres of water) before each milking.
- Cows having regular udder shape i.e., proportional udder with regular teats is beneficial on clean milk production point of view as compared to the cows having pendulous udder shape with improper cleanliness. Cows with pendulous udders usually have higher somatic cell count and a more frequent mastitis occurrence.
- If any abnormality is observed in udder or in milk (blocked milk channel, blood in milk, curdled milk, tenderness in the udder, etc.) then proper veterinary help should be sought immediately.
- It is not advisable to sell or consume milk from animal suffering from TB and Mastitis, as these diseases can be communicated to humans through milk.

Hygiene of milk man

The milk pH were higher in SCM cows (6.92 ± 0.02) as compared to no- SCM cows (6.34 ± 0.03). Following factors should be followed to get hygienic milk commercially.

- The milker should wash his hands thoroughly with clean water before milking.
- He should keep nails pared to prevent injuries to the animal.
- He should wear clean clothes and cover the head while milking.
- Persons with injury, skin and infectious diseases should not handle the milk.

Milking Technique

The fat (%) content was estimated to be lower in SCM animal (2.99 ± 0.07) as compared to no-SCM animal (3.64 ± 0.15). Following points regarding milking practices should be kept in mind to get hygienic milk commercially.

- Before actual milking, milker should put first few drops of milk from each quarter on a strip cup to detect any abnormality in milk. This physical examination of milk helps to detect early stages of mastitis as well as preventing poor quality milk to be mixed with bulk. It is

beneficial to discard fore milk as it has more bacterial count.

- Animal should be milked completely with full hand method. Incomplete milking may leads to mastitis.
- Wet hand milking with oils, milk, etc. should be discouraged.
- Sneezing, coughing and blowing of the nose during milking are highly objectionable.
- Sweat dripping from the elbows should not find entry into the milking bucket during milking.
- Nervous animal should be milked carefully preferably inside the shed. So that milk let down will not be affected.
- Brooming should not be done in the shed and its surroundings at the time of milking, the dirt and dust may enter into the milk.
- After completion milking, milk should be strained through clean cloth, so that safety of milk can be increased.
- After milking, the teats are to be dipped into teat dip containing bactericidal solution with the aim to minimize the chances of infection.
- Animals should not be allowed to sit immediately after milking as the teat canal remains open for sometime. Animals should be in standing position preferably for 15-30 minutes after milking so that incidence of mastitis can be reduced.

Collecting vessel for milk

The SNF (%) were higher in no- SCM cows (7.63 ± 0.08) as compared to SCM cows (6.99 ± 0.06). Following management practices regarding milking utensils should be followed to get clean milk commercially.

- Milking vessel with a dome shaped top and fitted with filter cloth is preferable.
- Open buckets are not hygienic to use. Dust and dirt may easily enter into the bucket.
- Milking utensils should be made of aluminium or galvanized iron. Plastic should not be used.
- Milking pails should be scrubbed thoroughly first in hot water containing some soda and scaled out in boiling water. Sanitizer (Ranocid-1416, 30 ppm i.e.. 20 ml of Ranocid in 10 litres of water) can also be used for such cleaning. After cleaning, they should be sun dried or turned upside down until needed again.

Feeding practices and animal hygiene

Analysis of observations on management practices (%) indicated that the washing of animal (4-11%) before milking and the washing of udder and teats (3-19%) before milking were higher in farmers having single cow but it was reduced when animal number were increasing. Following points regarding animal feeding should be kept in mind to get hygienic milk commercially.

- Dry and dusty hay or other similar foodstuffs should not be fed immediately prior to milking.
- Composition of feed influences the quality of milk. Therefore, balanced ration should be given to the animal.
- Feed or kitchen materials possessing off-flavours should not be kept near milking place, as milk is a powerful absorbent of odours.
- Vegetables such as cabbage, turnip tops and onions cause off-flavours in milk. Such types of feed should not be given to the milch animal within a couple of hours before milking.

The practice of washing of hands before each milking varied between 25% to 32% of cases of farmer. The practice of washing of udder after milking was very little only in farmers (2%) having single animal and it was not found when animal number was increased. Important management practices like teat dipping and screening of udder for mastitis were never found in any cases at any farmer's house.

Following points regarding pesticides should be kept in mind to get clean milk commercially.

1. All the pesticides are fat soluble.
2. The use of deoiled ingredients in cattle feed mix would eliminate the risk of pesticide.

Pastureland for milking cows

The grazing land for milking cows should be protected against harmful weeds, polluted water, slush and unsanitary conditions. The association between animal keeping pattern and hygiene status, cleanliness in animals, shed and milkers at farmer's house revealed that farmer having single cow, most of them (78.57%) maintaining good hygiene status, cleanliness but farmer having >3 cows, most of them (50%) maintaining poor hygiene status, cleanliness where as farmer having 2-3 cows most of them (54.55%) maintaining medium type hygiene status, cleanliness in their milking cows, housing of animal and milkers who were using their hand for milking everyday at farmer's house. The Chi-squre test value found to be significant ($P<0.05$). It was found that milking places were having not proper drainage and disposal system for both dung, urine and all most all cases floor were of mud type and there was lack of drainage system.

Storage system for milk

Bellow mentioned factors for milk storage system should be followed to get clean milk commercially.

- Milk discharged from udder of healthy cows has low bacterial count. The time immediately after milking and before bacterial multiplication is generally regarded as around 3 – 4 hours.
- In ideal milking system, milk is cooled immediately to 4^{o}c after milking. In the villages ice may be used for this purpose.

It is well known that Nadia dist belong to the "milk shadow" zone in the country. It contributes only 11% of total milk of India with an asset of 34% of cattle and 11% of buffalo population of this country. Recent milk production in West Bengal is 4961 thousand tonnes in the year 2014-15. The present per capita availability of milk in West Bengal is 145 gm/ day in the 2014-15 (DAHD web-site 2015). The per capita availability of milk may varies from person to person, growing children and pregnant women need more milk, but average milk requirement should be 290 gm/day/person which is just double of the current per capita availability of milk in West Bengal. The per capita availability of milk in this region is much less than the national average. At lower Gangetic region small, marginal and landless dairy house holders rear 1 – 2 milch cows mainly on crop residues, agricultural by products and few on grazing land. As compared to the other regions of India, the dairy development at lower Gangetic region is not up to the mark.

Shelter for milking animal

At Nadia dist, the effect of hot and humid climate is more pronounced than the hot and winter season. Dairy farmers do not pay much attention to animal keeping place / shelter /housing. This may be due to less resources, rational decision making ability and knowledge**.** The macro and micro-climate has profound effect on metabolic reactions, growth, milk production and reproduction of dairy animals. Therefore necessary modification of animal shelter for suitable management of macro and micro climate is required during different season round the year.

The shelter design and materials used in construction play a critical role in determination of microenvironment of a shed. The thermal comfort improves to a greater extent in sheds whose roof is covered with bedding of paddy straw, in comparison to provision of shower or fan during summer. Thus modification of the animal keeping place / shelter /housing can alleviate summer stress to a great extent even by using cheaper material like paddy straw as a result feed and water intake and milk production of the animals can be maintained. In hot-dry climate of summer, use of shower or fan alone significantly reduces the physiological responses like respiration rate, pulse rate and rectal temperature leading to improved milk production.

To cope up these constraints during Summer, Rainy and Winter some economic measures should be taken. During winter shed without having any wall is being covered by polythene sheet to protect the animal from cold stress. However materials like gunny bags, plastic sheet, bamboo mat, straw panels etc are also used. This type of shed having no wall are airy, allows air to pass through the shed and keeps floor dry as a result animal gets better comfort during summer. Selection of higher heat resistance materials for the roof and increased height of cowshed reduces the shed temperature and minimizes effect of summer on milk yield. Brick floor helps better cleaning and also safe for animal movement.

It is recommended to sprinkle 1-2% solution of phenyl or other disinfectants on the floor every day. This will prevent multiplication of flies, which are a serious source of infection. Moreover, the disinfection measures have a great role as a most significant form of medical sanitation which doubtlessly influences the hygienic quality of milk. Dung heaps, rubbish and filth should not be allowed to accumulate near the dairy animal housing / milking place.

4. CONCLUSION

The study can be concluded that there is a significant association between animal keeping pattern and hygiene status, cleanliness at study area and efforts towards increased cleanliness and hygiene status in all aspects of milking management can produce higher hygienic milk and to reduce incidence of sub-clinical mastitis at Nadia.

5. ACKNOWLEDGEMENTS

The authors are highly thankful to the ICAR-NDRI for funding and equally indebted to all dairy farmers who co-operated during data collection and who helped direct / indirect ways.

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