Bangl. J. Vet. Med. (2020). 18 (2): 47–52 ISSN: 1729-7893 (Print), 2308-0922 (Online)

Received: 30-11-2020; Accepted: 30-12-2020 DOI: https://doi.org/10.33109/bjvmjd2020rm3

ORIGINAL ARTICLE

Assessment of milking hygiene awareness and practices among the dairy farmers in Baghabarighat milk shed areas of Bangladesh

S. A. Shanta, R. A. Lima, M. Mahamudunnabi, A. K. M. A. Rahman, M. A. Islam*

Animal Welfare Research House, Department of Medicine, Faculty of Veterinary Science
Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

Abstract

Background: Many milk-borne epidemics of human diseases have been reported due to contamination of milk by dairy workers' spoiled hands, unsanitary utensils, flies and polluted water supplies. In addition, most milk-borne zoonoses are mostly acquired through consumption of infected milk and milk products. Information on milking hygiene practices and knowledge of farmers' remains scarce in Bangladesh. We aimed to evaluate the milk hygiene awareness and practices among the dairy farmers in Baghabarighat milk shed areas of Sirajgonj and Pabna district in Bangladesh.

Methods: A cross-sectional study was carried out including 270 randomly selected small holder dairy farmers during October 2018 to March 2019. Data on milk hygiene practices and general handling of milk were collected by face to face interview and direct observation using a questionnaire.

Results: We observed that all respondents practiced manual milking with a frequency of twice per day. About 60% respondents did not wash their hands before milking and others wash their hands only with water. Mostly tube well water was used for washing utensils. About 67.0% respondents didn't wash udder before milking and all of them used oil as lubricant. Around 67% and 33.3% dairy farmers had access to pipe water and tube well water supply to their barn, respectively. None of the farmers practiced post milking teat dipping and used towel for wiping udder after washing. Most of the farmers (97%) provided feed to animal before, during and after milking. None of the farmers stored milk in cool room and 78.2% farmers delivered milk within 1-2 hours to milk collector. About 89% respondents delivered drug treated milk to collector.

Conclusion: The hygienic practices are far below standard level among the dairy farmers in the study areas. Thus, there are risk of bovine mastitis and milk-borne zoonoses by consuming contaminated milk. Farmers' education on milking hygiene practices and handling of milk to create awareness is needed.

Keywords: Dairy farmers; Hand wash; Milking hygiene; Awareness; Zoonoses; Milk delivery system

*Correspondence: maislam77@bau.edu.bd

Introduction

In Bangladesh, livestock and poultry rearing are being considered as means of alleviating poverty and improving the livelihoods of landless farmers and smallholders. Dairy industry of Bangladesh is facing the challenge of ensuring the quality of milk and milk products due to traditional knowledge based livestock systems. Undoubtedly, 60-70% families in Bangladesh are engaged in milk production either as main or subsidiary occupation. Mostly they are landless labourers, small and marginal farmers keeping 2-3 animals under mixed farming system in rural areas and having inadequate facilities/infrastructure at their disposal and access to services and markets.

Milk is an important dietary component of vast population on earth, due to its high nutritional value for human beings (Chatterjee et al., 2006). Milk is a natural food that has no protection from external contamination and can be contaminated easily, when it is separated from the cow (Rosenthal, 1991). During its production, microorganisms may contaminate milk at various stages of milking, processing and distribution. A large number of bacteria and bacterial spores are present in the surroundings, on the cow's skin, on the udder, and in certain conditions also in milk utensils and in persons handling milk, and these are easily transmitted to the milk at the point of milking or later handling (Chambers et. al, 2005). Contamination of milk and milk products with pathogenic bacteria is largely due to handling, processing and unhygienic conditions (Maity *et al*., 2010). Lack of refrigeration facilities at farm and household level in developing countries of tropical regions, with high ambient temperature implies that raw milk will easily be spoiled during storage and transportation (Godefay and Molla, 2000). Once microorganisms enter into milk, they can multiply and cause changes to its quality. Milking management practices and quality of milk production plays an immense role in the improvement of marketing of milk and milk products in a particular area. Profitability of dairy industry and end product quality is closely related to the hygienic and chemical property of incoming raw milk. Hygienic milking management practices will ensure that milking is carried out under hygienic conditions and that the milk is handled properly after milking (FAO and IDF, 2011). A good milking routine means removing milk efficiently from the cow with minimal risk to udder health (Blowey and Edmondson, 2010). Milking hygiene has an impact on the hygienic quality and shelf-life of the milk, but also on the occurrence of infections and risk of spreading infections. Farmers need to be updated on new technologies and scientific management practices of livestock production on regular basis. The productivity enhancement can be met by increasing the adoption of improved dairy management practices. Proper cleaning and sanitizing procedures, hygienic milking routines and proper preservation after milking are therefore essential to control the quality of milk.

Currently, a large number of smallholder urban dairy productions are operating in the present study area using improved dairy breeds. However, information about milking hygiene practices and farmers' awareness on cattle remains scarce. Hence, an understanding of farmers' knowledge on milking hygiene is very important to reduce the risk of milk-borne zoonoses in humans. The aim of this study was to assess milking hygiene awareness and practices among small holder dairy farmers in Baghabarighat milk pocket areas of Sirajgonj and Pabna district in Bangladesh.

Methods

Study design

A cross-sectional study was conducted during the period from October 2018 to March 2019 in Baghabarighat Milk Shed Areas (BMSA). A total number of 270 dairy farmers were randomly selected from two Sirajgonj and Pabna district (Table 1). The farmers having at least 2 lactating cows have been selected for the study.

Table 1. Study areas and sample size in Sirajgonj and Pabna district

District (n=2)	Upazilla (n=4)	Village (n=8)	No of farmers (n=270)
Sirajgonj	Shahzadpur	Potazia	40
		Reshombari	80
	Ullapara	Mahammadpur	35
		Ballopara	25
Pabna	Sathia	Selunda	30
		Khidirgram	20
	Bera	Salnia	25
		Boronarinda	15

Data collection

Data on milking hygiene and the general handling practices was collected by direct observation of milking practices and face to face interview using two sets of questionnaire. The data was collected after taking consent from all of the farmers involved in the study.

Data analysis

Descriptive statistics such as frequencies, distribution and percentages were used to summarize the data.

Results

Milking hygiene practices

Results of this study showed that 100% manual milking is done with milking frequency of twice a day (morning and afternoon) in open barn area. In this study, 66.7% and 33.3% dairy farmers had access to pipe water and tube well water supply to their dairy barn respectively. In this study, most of the farmers (59.5%) reported that they don't wash their hands and 41.5% wash their hands with only water. About 67.0% respondents don't wash udder before milking and 32.9% use normal water for udder and teat washing. None of the respondent's use towels or any cloths for wiping cows udder after washing or milking. All milkers used mustard oil as teat lubricant during milking without practicing teat dipping (Table 2).

Table 2. General milking management practices followed by dairy farmers

Parameter	Category	Respondents (n=270)	
		Frequency	%
Milking area	In barn	270	100
Milking type	Manual	270	100
Milking frequency	Twice a day	270	100
Source water	Pipe water	180	66.7
	Tube well water	90	33.3
Hand wash before milking	Yes	112	48.5
	No	158	59.5
Hand wash	With water	112	100
	With water and Soap	0	0
Washing udder and teats	Yes	89	32.9
	No	181	67.0
Wash udder and teats	Normal water	89	100
	Warm water	0	0
	Cold water with soap	0	0
	Warm water with soap	0	0
Hind limb and tail tie during milking	Yes	270	100
	No	0	0
Udder wipe	Yes	0	0
	No	270	100
Teat dipping after milking	Yes	0	0
	No	270	100

Milking equipment and milk handling practice

In this study, most of the respondents (98.5%) used aluminum containers for milk collection. For milk transport, 56.67% respondents used plastic container and the remaining used aluminum containers.

Table 3. Milking equipments and milk handling practices of dairy farmers in study areas

Parameter	Category	Respondents (n=270)	
		Frequency	%
Milk container during milking	Plastic	4	1.5
	Aluminum	266	98.5
Milk container during transport	Aluminum	153	56.7
	Plastic	117	43.3
Milk utensils cleaning	Normal water	0	0
	Soap and normal water	270	100
Calf used for stimulation	Yes	259	95.9
	No	11	4.1
Removing foremilk	Yes	72	26.7
	No	198	73.3
Provide feed before /during/after milking	Yes	262	97.0
	No	8	2.9
Remain milk in udder for calf	Yes	270	100
	No	0	0
Filtering milk by farmers	Yes	0	0
	No	270	100
Milk storage	Yes	0	0
	No	270	100
Delivery time to collector	Within 1-2 hour	211	78.2
	Within 3-4 hour	59	21.9
Record keeping	Yes	0	0
	No	270	100

All respondents cleaned milk handling containers with detergent water. Majority of the respondents (73.3%) did not remove foremilk during milking and 26.7% of the respondents removed foremilk. None of the respondents (100%) practiced milk filtering and storing Most of the respondents (78.2%) delivered milk to collectors within 1-2 hours after milking and only 2.9% of respondent's delivered milk within 3-4 hours after milking (Table 3).

Discussion

This study aimed to evaluate the milking hygiene awareness and practices among the dairy farmers in Baghabarighat milk shed areas of Sirajgonj and Pabna district in Bangladesh.

Results of this study showed that all farmers practiced manual milking. Manual milking is still the most frequently used milk removing method from dairy animals in developing country including Bangladesh. Due to small herd size (2-3 milch animals) it is not feasible to use milking machines. This is in agreement with the findings of Singh (2007) who reported that majority of respondents were milking their animals by themselves. Milligo *et al*. (2008) also reported that all smallholder farmers in peri urban areas in Burkina Faso practiced hand milking. Similarly, Patabandha *et al*. (2014) in south Saurashtra region of Gujarat reported that none of the farmer practiced machine milking.

All respondents followed two times milking at morning and evening. Recently Islam et al. (2020) also reported that hundred percent dairy farmers practiced twice a day manual milking in Sirajgonj district of Bangladesh. Zelalem (2003) reported that more than 83% of crossbred cows were milked twice a day.

The production of hygienic quality requires good hygienic practices, such as clean milking utensils, washing of milker's hands, cleaning udder and use of individual towels during milking and handling (Getachew, 2003). In this study, 41.5% respondents washed their hands and used only water. This may be due to large hard size and lack of awareness of the workers about this.

Above 67.0% of the respondents did not wash udder and teat. Many of them washed udder when dirty particles were visible in udder or quarter. Some farmers said that calf cleaned the teat during sucking. In contrast, Chowdhury et al. (2018) reported that 86.9% of the farmers in Suburban areas of Bangladesh practiced udder wash before milking. Duguma and Geert (2015) reported that 96.3% of the farmers in Jimma practiced hygienic milking, such as washing of hand, milk containers and udder before milking.

It was revealed from this study that none of the farmer used towel or any type cloth for wiping udder after washing with water. In contrast with present findings, Zelalem and Faye (2006) who reported that in the central highlands of Ethiopia, small and large scale dairy producers used common towel for drying udder. Duguma and Geert (2015) reported that only 13% of the farmers in Jimma town, southwestern Ethiopia, used individual towel. The use of common towel may result in transmission of diseases, particularly mastitis. The high percent of individual towel usage might be due to more awareness and modern dairy farms being in this study area. Almost all respondents (98%) used oil in their fingers as teat lubricant. A very few farmers used milk to wet their fingers. This finding indicated that farmers were practicing traditional method of milking as having poor knowledge of scientific milking which may affects the healthy udder.

None of the respondents followed teat dipping after milking, though it is a good post milking practice to reduce the infection. Similarly, Chowdhury et al. (2018) also reported that none of the respondents practiced post milking teat dipping. 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. Other authors also reported similar findings (Jacob and Anu, 2013; Patabandha et al., 2014). The udder should be wiped with a cloth dipped and squeezed in some weak antiseptic solution before milking. Apart from the cows and udders, the milkers, their hands and the milking pails and cans should be clean. Notable, the nails of the milkers should be periodically trimmed and hands cleaned and disinfected between each milking by dipping in an antiseptic solution.

We observed that98.5% respondents used aluminum containers for milk collection and 56.7% respondents used plastic container for milk transportation. In contrast, Duguma and Geert (2015) reported that about 92.6% and 3.7% of the farmers in Jimma used plastic buckets and stainless steel cans for milk collection and transportation, respectively.

More than 95% of the respondents practiced sucking by calf to induce milk letdown and provided feeds during milking time. Natural stimulation of milk letdown is good and traditional practice in Bangladesh. Surprisingly, more than 70 percent farmers did not remove foremilk before milking which may contaminate the whole milk. Farmer's education on the scientific milk production practice is needed to increase their awareness. It was also noticed that none of the farmers practiced milk cooling system after milking which is a serious problem to hygienic milk production. But, most of the farmers transfer the milk to processing unit immediately or to middleman dealers after milking within 2 to 3 hours. This might be due to lack of cold storage facilities for milk in study areas. Quinn et al. (2002) reported that cooling milk after milking reduces risk of the growth of both pathogenic and spoilage bacteria.

Conclusion

The hygienic practices are far below standard level among the dairy farmers in the study areas. Thus, there are risk of bovine mastitis and milk-borne zoonoses by consuming contaminated milk. Farmers' education on milking hygiene practices and handling of milk to create awareness is needed.

Acknowledgements

The authors are grateful to the dairy farmers for agreeing to participate in this study. We also appreciate the animal health assistant of Milk Vita,

Baghabarighat for selection of the dairy farmers in the study area. We gratefully acknowledge the Ministry of Science and Technology (MoST), People's Republic of Bangladesh for providing the fellowship to conduct the Master of Science research work.

Conflict of interest

The authors declared that there is no conflicts of research interest exist.

References

1. Blowey R and Edmondson P. Mastitis Control in Dairy Herds. 2nd Edition, CAB International, Cambridge, 2010, 55.
2. Chambers J. The microbiology of raw milk. In: Robinson RK, editor. Dairy microbiology handbook: the microbiology of milk and milk products. 3rd ed. New York (NY): Wiley; 2005. p. 39–90.
3. Chatterjee SN, Bhattacharjee I, Chatterjee SK, Chandra G. Microbiological examination of milk in Tarakeswar, India with special reference to coliforms. African Journal of Biotechnology. 2006; 5: 1383-5.
4. Chowdhury T A, Marufatuzzahan P and Shanzana F, N Zahan. Knowledge, awareness and risks of zoonotic diseases among the smallholder livestock farmers in suburban areas of Sylhet, Bangladesh. Advances in Biology and Earth Sciences. 2018; 3 (1): 69-84.
5. Duguma B E and Geert PJJ. Assessment of Dairy Farmers' Hygienic Milking Practices and Awareness of Cattle and Milk-Borne Zoonoses in Jimma, Ethiopia. Food Science and Quality Management. 2015; 45: 114-121.
6. FAO & IDF. Guide to good dairy farming practice, Animal Production and Health Guidelines, 2011; No. 8. Rome. SBN 978-92-5-106957-8.
7. Getachew F. A review of small scale dairy sector in Ethiopia. FAO prevention of food losses programme. Food Sci. Quality Manag. 45. Milk and milk products. Post-harvest losses and food safety in Sub-Saharan Africa and Near East, 2003.
8. Godefay B and Molla B. Bacteriological quality of raw milk from four dairy farms and milk collection center in and around Addis Ababa. Berliner und Munchener Tierarztliche Wochenschrift. 2000; 113(7-8): 276-278.
9. Jacob S K and Anu G. Analysis of the clean milk production practices of dairy farmers of Kerala, Indian Journal of Applied Research. 2013; 3(7): 604-606.
10. Maity TK, Kumar R and Misra AK. Prevalence of enteropathogenic *Escherichia coli* isolated from chhana based Indian sweets in relation to public health. Indian Journal of Microbiology. 2010; 50: 463-467.
11. Milligo V, Ouedraogo GA, Agenas S, Svennersten-Sijaunja K. Survey on dairy cattle milk production and milk quality problems in peri-urban areas in Burkina Faso. African Journal of Agricultural Research. 2008; 3: 215-224.
12. Patbandha TK, Marandi S, Pathak R, Ahlawat AR. A study on milking management practices opted by dairy farmers for clean milk production in south saurashtra agroclimatic region of Gujarat. Journal of Interacademicia. 2014; 18(4): 589-596.
13. Quinn PJ, Carter ME, Markey B, Carter GR. *Actinobacillus* species. In Veterinary Microbiology and Microbial Disease. 2002; 2nd edn.
14. Rosenthal I. Milk and dairy products properties and processing. 1991; New York: Balaban Publishers VCH.
15. Singh RP. An In-depth study of status of khatals in and around Ranchi city. Thesis, M.V.Sc., Birsa Agricultural University, Ranchi; 2007.
16. Zelalem Y, Faye B. Handling and microbial load of cow's milk and irgo-fermented milk collected from different shops and producers in central highlands of Ethiopia. Ethiopian Journal Animal Production. 2006; 6(2): 67-82.
17. Islam MA, Sharma A, Ahsan S, Mazumdar S, Rudra KC and Phillips CJC. Welfare assessment of dairy cows in small farms in Bangladesh. Animals. 2020; 10 (3): 394.