

Assessing Milk Safety Related Practices: Opinions, Attitude and Awareness Level Among Dairy Farmers in Malwa Region of Madhya Pradesh (India)

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ABSTRACT

Milk safety is a challenging problem of human health and economics concern. The milk quality is directly related with milk production practices executed at farm. Lack of knowledge regarding good practices is a potential high risk for occurrence of milk borne illnesses in consumers. Present study was undertaken to evaluate these parameters. Farmers engaged in dairy practices were enrolled in this study and requested to answer a structured questionnaire (n=485) having close ended questions. In addition, opinion of dairy farmer motivators engaged in field survey was also evaluated.

Out of total, 416 (82.07%), 274 (70.90%), 289 (75.06%), 462 (94.04%) and 224 (57.92%) respondents has positive opinion for cleanliness of farm environment, surroundings, animal body, health and hygiene of milker, respectively. But only 112 (29.09%), 74 (18.96%), 96 (24.94%), 50 (12.99%) and 45 (9.09%) participants were aware of cleanliness of milker's clothing, teat sanitization, dry milking, discarding foremilk and cooler milk storage. For attitude and awareness level, 449 (88.05%), 441 (85.97%) and 416 (82.08%) farmers milked their animal even under antibiotic, acaridae and anti-helminthic treatment, respectively. Only 58 (15.06%) dairy farmers know about presence of chemical residues and their potential health impacts. Out of the 485 participants, 250 (64.94%) knows that proper boiling of milk prevents diseases like TB/brucellosis, while 250 (64.94%) and 400 (77.92%) attendants not knows about any causative agents and its correct mode of transmission. Comparative appraisal of the dairy farmer motivator's opinion regarding interference of implementation of safety related practices at farm revealed highest overall rank with respect to response rate, is found to be dairy farmer have no interest followed by dairy farmer cannot afford to invest.

The finding suggests need of specific education for dairy men particularly those with low level of knowledge. It will directly contribute in uplifting farmer's socio-economic status, development, consumer health and prosperity as a whole.

Keywords: Dairy farmer, Milk, Safety, Opinion, Attitude, Awareness, Training

INTRODUCTION

Dairy farming plays a crucial role in shaping the rural economics. It converts cheaper quality, nutritionally low feed material into higher quality, costly, nutritionally rich food material and provides biologically excellent animal protein in the form of milk not only for household consumption but also for commercial purposes. It sustains the livelihood of millions of farmer by providing continuous and additional source of income and prosperity as a whole.

India is the largest producer of milk in the world with estimated production of 155.5 million tons during 2015-2016 (NDDB, 2017). The Madhya Pradesh state, in spite of having second position in adult milch animal population in India, it shares only about 6.67% of total milk production with 6th position in the country (NDDB, 2015). The dairy

farmers of the state have a great potential to improve not only the production but also the quality of the milk and may become a leader of organic-white revolution.

Due to liberalization and globalization policies, the buying

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capacity as well as demand of consumers for livestock products has been increased. Consequently, the export avenues open for the dairy farmers of our country too. The growth of dairy industry is only depends on the quality of milk and milk products, as the Sanitary and Phytosanitary (SPS) agreement of the World Trade Organization specify that the member countries must execute essential measures to ensure good quality food products, which are free from human health hazards [1].

The milk food safety is a challenging global problem of human health concern. It comprises the safety of milk and its products from physical, chemical and microbiological contaminations at all levels of production, processing to consumption, i.e., it starts from farm and concludes at fork [2]. The milk quality is directly related with milk production practices executed at farm. Lack of knowledge regarding good practices is a potential high risk for occurrence of milk borne illnesses in consumers.

Keeping in view the above facts and points, the present study was undertaken to determine the opinion regarding milk production practices, with respect to the safety of milk; attitude, awareness level of dairy farmer regarding chemical residues, contaminants and disease transmission and to evaluate the interviewer/dairy farmer motivator's opinion regarding implementation of safety related practices at farm level. Such information is necessary for the planning of interventional strategies and effective skill development and training programs for dairy farmers.

MATERIALS AND METHOD

A cross sectional study design was applied to collect the data from dairy farmers with respect to available dairy farms in Malwa region of the Madhya Pradesh (India). The probability sampling (systemic random sampling) method was employed.

Sample size: Sample size required for the study was determined according to Thrusfield [3] at 95% confidence interval, 5% margin of error and with expected frequency distribution of 50%. The formula for infinite/unknown population was taken as follows:

$$n = 1.96^2 P_{exp} (1 - P_{exp}) / d^2$$

Where,

n=Estimated sample size

Z=t value for an expected confidence level at 95%=1.96

P_{exp}=expected frequency distribution of 50.0%=0.50

d=Desired margin of error or precision of +5%=0.05

n=485, i.e., A total 485 dairy farmers/respondent from study area will be questioned for performing cross sectional survey

Study instrument

Data was collected using a pre-validated, food safety based structured questionnaire consisting of closed ended questions, which were administered orally to all respondents, willing to participate in the study. The inclusion criterions of a respondent include an informed oral consent, a person engaged in dairy practices and more than 18 years of age. The respondents under 18 years of age were excluded from the study.

The first portion of the questionnaire included general information about the owner or respondent such as name of the owner, type of ownership, number of animal and breed details. The second portion focused on the description of the practices towards clean, hygienic, safe milk production and milk handling. The last portion included human attitude and awareness regarding residue, contaminants and disease transmission.

Questions were designed so that the majority of responses could either be circled, choose, ticked or answered in only a few words in order to minimize any misunderstandings during translation. After the questionnaire was completed, information regarding the good milk safety practices and potential disease transmission to humans were given to the participants. On an average each sampling takes thirty minutes. The data were also collected from various interviewers/dairy farmer motivators to judge their views regarding implementation of food safety related practices at farm level. The data so collected were subjected to descriptive statistical analysis to find out the meaningful inferences.

RESULTS AND DISCUSSION

Dairy farmer's practices towards clean, hygienic, safe milk production and milk handling

Opinion regarding milk safety related practices, most of the respondents, 82.07% knew that milking should be done in clean, hygienic and peaceful environment (**Table 1**). A high level of knowledge in comparison to present study was reported by Aparna et al. [4] to be 100% in Roopnagar district of Punjab (India), who conducted a study to assess the extent of awareness about clean milk production among dairy farmers. This practice might be used due to the perception that it not only improves the quality and quantity but also health of the milch animals.

Table 1. Showing details of milk food safety related practices ‘opinion’ questions and comparison of responses among dairy farmers (DF).

Questions	Variables	Response options	Frequency (n)	Outcome (%)
MFS1	Whether they knew that milking should be done in clean, hygienic and peaceful environment	Yes	316	82.07
		No	65	16.88
MFS2	Sources of water	Bore/tube well	354	91.95
		Tap water	39	10.13
MFS3	Where milch animals are milked?	In barn	262	68.05
		In milking room	100	25.97
MFS4	How often do you clean milking room or Barn?	Once a day	200	51.95
		Twice a day	169	43.90
MFS5	Cleanliness of surrounding of premises	Clean	273	70.90
		Dirty	73	18.96
MFS6	Clean the dung, debris or dust from animal body before milking	Yes	289	75.06
		No	85	22.08
MFS7	How you milk your cow?	Hand milking	362	94.03
		Using milking machine	12	3.12
MFS8	Do you wash their hands with soap?	Yes	223	57.92
		No	150	38.96
MFS10	Do you wash udder and teats of animal with clean water before milking?	Yes	258	67.01
		No	116	30.13
MFS11	Do you use clean towel wipe, teat dips/sanitizer and teat seal after milking?	Yes	73	18.96
		No	308	80.00
MFS12	How do you keep milk containers and other utensils clean?	Washing with:		
		Warm water	81	21.04
		Cold water	173	44.94
		Both alternatively Luke warm water	39	10.13
		along with use of detergents and sanitizers	92	23.90
MFS13	Milker's clothing	Clean	112	29.09
		Dirty	239	62.08
MFS14	Milker's personal cleanliness	Yes	231	60.00
		No	146	37.92
MFS15	Healthy milker	Yes	362	94.03

		No	12	3.12
MFS16	Milking practice	Dry milking	96	24.94
		Wet milking	273	70.90
MFS17 A	Production hygiene	Discard milk from cows of poor udder health	89	23.12
		Mixing all milk in the same pot	227	58.96
MFS17 B		Discard the fore milk	50	12.99
Not discard fore- milk		131	34.02	
MFS18	Sieve the milk immediately after milking	Yes	293	76.10
		No	81	21.04
MFS19	Storing the milk	In milk cooling systems/in a cool place	35	9.09
		On ambient temperature	323	83.90

*MFS: Milk Food Safety

Majority of respondents, 91.95% use bore well/tube well as a source of water (**Table 1**). It may be ascribed by the fact that the farmer believe, well water is usually free from pathogenic microbes and other harmful impurities and may regard as best source of fresh water supply.

About 68.05% of respondent milked their animals in barn and around 25.97% in milking room (**Table 1**). The results of our study are comparable with the report from Jaipur, Rajasthan (India). An investigation conducted by Manohar et al. [5] to assess milking management practices of buffaloes and observed barn milking to be 59.47% and room milking to be 40.64%. Milking at the same place, i.e., in barn may contaminate the milk while, milking at separate clean and dry place, i.e., in milking room, lower the chances of milk contamination.

On an average 51.95% of respondent clean milking place once a day, while 44.90% twice a day. When questioned on whether they clean the dung, debris or dust from animal body before milking, 75.06% of respondent said yes (**Table 1**). From surrounding cleanliness point of view, most of the respondents about 70.90% kept it clean. A low level of cleanliness in comparison to present study was reported earlier by Aparna et al. [4] to be 58.40% in Punjab (India), who was agreed with the importance of cleanliness of surrounding as well as the premises too.

Mass of the respondents, 94.04% use hand milking method to milk their animals. 48.96% of respondents did not wash their hands with soap before milking. 40.14% did not wash udder and teats of animal with clean water before milking (**Table 1**). The results of present study were similar with the

earlier findings of Millogo et al. [6] as there was also lack of teat cleaning before milking in 14 farms out of 22 investigated in Burkina Faso (West Africa). A much higher percentage of pre-milking hygiene in comparison to present finding was reported by Aparna et al. [4] to be 100% in Punjab (India), where all the respondents cleaned udder, teats and washed their hands before milking.

In present study, 80% of respondents did not used clean towel wipe, teat dips or sanitizer and teat seal after milking which is close to the study of Hundal et al. [1] with 68.7% response (**Table 1**). A high level of ignorance in this regard was observed by Manohar et al. [5], where none of the respondent wiped the udder and teats just after milking. Use of post-milking dip with suitable antiseptic is an important aspect in clean, hygienic and safe milk production. Post-milking dip will not only protect animal from infection of udder like mastitis but end user will also receive safe milk with lower bacterial and somatic cell counts. Most of respondents were lacking knowledge on this aspect and there is need to educate them. When asked regarding cleaning of milk containers and other utensils, 24.90% was aware that Luke warm water along with detergents and sanitizers would be used as a good hygienic practices (**Table 1**). The low level of awareness in this regard was reported by Aparna et al. [4], where none of the respondents was found to use cleaning agent and water for cleaning purposes. The high level of awareness in comparison to present study was reported by Aparna et al. [4] in Punjab (India), where 100% of respondent uses clean water along with detergent for washing of milk containers.

Majority of the respondents about 62.08% wear dirty cloths during the act of milking, while 29.09% have clean cloths. Most of the respondents about 94.04% agreed that milking practices should be performed by a healthy milker (**Table 1**). In comparison to the present study, a high level of awareness in this regard is reported by Aparna et al. [4], where 100% respondent agreed that milker should be clean and healthy.

During the present investigation it was observed that 60.00% of the respondents answered positively for the milker's personal cleanliness viz. haircut/securing the hair, trimming of beard and cutting the nail regularly (**Table 1**). Earlier Aparna et al. [4] reported a higher percentage of awareness in this regard as 100% in Punjab (India).

In present study, 70.90% of respondents did not know about correct method of milking as they routinely performed wet milking (**Table 1**). A high level of unawareness in this regard was reported by Manohar et al. [5] in Rajasthan (India) where none of respondent follows dry hand milking practice. The bad practice of wet hand milking may be ascribed by the fact that lubrication role of milk fat during the act of milking make the task easy to perform, but it degraded that quality of milk by imparting a high total bacterial count.

When asked about production hygiene, majority 58.96% mixed all the milk in the same pot from different animals (**Table 1**). A high level of ignorance in this regard is reported by Millogo et al. [6] as all milk was mixed in same bucket without discarding milk from animals with poor udder health. Very few respondents, 12.99% discard the fore-milk before collection. The result of present study was comparable with the finding of Aparna et al. [4], where

26.70% respondents knew about the fact that it will avoid the spread of microorganism found in the teat canal and lowers the microbial load of milk.

The present investigation indicated that 76.10% of respondents sieved the milk immediately after milking (**Table 1**). An almost similar pattern of awareness was reported by Hundal et al. [1] to be 74.00% among dairy farmers in Punjab (India). The act of sieving was ascribed by the fact that it discards the physical extraneous material from the milk and improves its quality. According to the present study, the storing of milk in cooling system or cooler place was observed in 9.09% respondents (**Table 1**). Earlier Hundal et al. [1] reported a higher level of awareness in this regard as 96.00% in Punjab (India). Cooling of milk just after milking is an essential step to reduces the multiplication and growth of milk microbes [7] and it will also increases the keeping quality of milk.

Attitude and awareness level of dairy farmers regarding residue, contaminants and disease transmission

In present study, 56.10% respondent knew that clean milk cannot be produced from ill animals. On the other hand, results revealed that 85.97%, 88.05%, 82.08% and 52.99% respondents milked their animal even under treatment of acaridae, antibiotic, anti-helminthic and chemotherapeutic agent, respectively (**Table 2**). A high level of awareness in this regard particularly for acaridae was reported by Kennedy et al. [8] in Ghana (West Africa), where only 5% respondents milked their animals during such treatment. When questioned that do they know about the presence of the drug residues and their human health impact, most of respondents 64.94% answered no (**Table 2**).

Table 2. Showing details of milk food safety related practices 'human attitude and awareness level regarding residues, contaminants and disease transmission' questions and comparison of responses among dairy farmers (DF).

Questions	Variables	Response options	Frequency (n)	Outcome (%)
MFS 20	Whether they knew that clean milk cannot be produced from ill animals	Yes	246	56.10
		No	142	36.88
MFS21	Milked animal even under acaricide treatment (used to control tick infection)	Yes	331	85.97
		No	50	12.99
MFS21 A	Even under antibiotic treatment (used to control bacterial infection)	Yes	339	88.05
		No	50	12.99
MFS21 B	Even under anti-helminthic treatment (used to control helminthic parasitic infection)	Yes	316	82.08
		No	62	16.10
MFS21 C	Even under other chemotherapy treatment (used to control illnesses)	Yes	204	52.99
		No	169	43.90
MFS22	Do they know about the presence of the drug residues and their health effect on consumption	Yes	108	28.05
		No	250	64.94

	of milk?			
MFS23	Use the pasture/feed/fodder produced even under pesticide treatment (used to control weeds), insecticide spray for animal feeding	Yes	166	43.17
		No	204	52.99
MFS24	Do they know about the presence of the chemical residues and their health effect on consumption of milk?	Yes	58	15.06
		No	281	72.99
MFS25	Whether they knew that milk from such animals under various treatment is not fit for human consumption	Yes	146	37.92
		No	208	54.03
MFS26	Whether they knew any milk borne disease/causative agent (TB, Brucellosis, etc.)	Yes	85	22.08
		No	250	64.94
MFS26 A	Could these organism can be transmitted to humans	Aware	139	36.10
		Unaware	204	52.98
MFS26 B	Symptom (coughing, etc.) of TB in milch animal	Known	169	42.90
		Not Known	208	54.03
MFS26 C	Symptom of TB in man	Known	293	76.10
		Not Known	85	22.08
MFS26 D	Symptom (abortion, etc.) of brucellosis in milch animal	Known	135	35.06
		Not Known	254	65.97
MFS26 E	Symptom of brucellosis in man	Known	77	20
		Not Known	293	76.10
MFS27	Knowledge about correct mode of transmission of diseases from animal to human	Adequate knowledge	39	10.13
		Un-adequate knowledge	300	77.92
MFS28	Pet animal like dog, cat, etc., near milking animals	Avoided	262	68.05
		Not avoided	73	18.96
MFS29	Do they know that proper boiling of milk prevents TB/brucellosis?	Yes	250	64.94
		No	73	18.96
MFS30	Frequency of owner for veterinary assistance	Regularly sought	127	32.98
		Sought only in case of disease and vaccination	239	62.08
		Never sought	12	3.12

Majority, 52.99% of respondent not use pesticide and insecticide treated pasture for feeding of their animal (**Table 2**). A high level of awareness in this regard is reported by Aparna et al. [4], where 100% of respondents avoid fodder/feed sprayed with insecticide for animal feeding. When asked about the presence of the chemical residues and their health effect on consumption of milk, most of 72.99% answered no (**Table 2**). Only 47.92% respondents answered correctly when questioned about whether they knew that milk from such animal under various treatments is not fit for human consumption (**Table 2**). Earlier study conducted by Aparna et al. [4] reported a reasonably higher level of knowingness as 66.7% of respondent knows that milk procured from animals under treatment is not fit for human consumption.

Any milk borne disease (TB, Brucellosis, etc.) and its causative agent was known by only 22.08% respondents (**Table 2**). None of awareness in this regard was reported by Bonsu et al. [9] in Ghana (West Africa), where 0% respondent knew about the milk borne diseases like tuberculosis and its causative agent. About 45.29% of respondents were aware about human transmission of milk borne organisms (**Table 2**). [9] Also reported lack of awareness in this regard too.

The results of present investigation revealed that 76.10% respondents knew symptoms of tuberculosis in man, while only 24.90% respondents knew the symptoms of brucellosis in human (**Table 2**). A low level of awareness in this regard was observed by Kennedy et al. [8] in Ghana (West Africa), where symptoms of tuberculosis in man was known by 54% and symptoms of brucellosis in man was knew only by 4.50%.

On the other hand, study revealed that 42.90% and 44.04% respondents knew the symptoms of tuberculosis and brucellosis in milch animals, respectively (**Table 2**). A high level of positive response in this regard was reported by Kennedy et al. [8] in Ghana (West Africa) to be 76.80% and 68.80% for symptoms of tuberculosis and brucellosis in animals, respectively. It may be attributed to the fact that knowledge and past exposure of respondent, i.e., dairy man was more involved with tuberculosis and least with brucellosis. The finding suggestive of awareness program in this regard.

Very few owners, 10.14% has adequate knowledge about correct mode of transmission of diseases (**Table 2**). The results of present study are comparable with the earlier reports of Kennedy et al. [8] in Ghana (West Africa), where

only 12.90% of respondent knew the correct mode of transmission of disease (brucellosis) from animal to human.

When asked do they know that proper boiling of milk prevents the diseases 64.94% respondents answered correctly (**Table 2**). A very low level of awareness in this regard was reported by Bonsu et al. [9] in Ghana (West Africa), where only 0% respondent knew that the boiling of milk prevents diseases such as tuberculosis.

In present study, 68.05% respondents avoided the pet animal like dog, cat, etc., near milch animals (**Table 2**). A high level of awareness in this regard was reported by Hundal et al. [1] in Punjab (India) to be 97.40%. When questioned about the frequency of owner for veterinary assistance, 4.12%, 62.08% and 42.98% respondents stated that they never sought veterinary assistance, sought only in case of disease or vaccination and regularly sought veterinary assistance for their animals, respectively (**Table 2**).

Opinion of interviewers/dairy farmer motivators regarding implementation of milk safety related practices at farm level

In present study, most of the interviewer 58.97% suggested that the dairy farmer apply the new innovation, techniques or procedures at farm, if they got financial benefits from them. 40.77% observed that they implement if it promote health of milch animals. 24.08% of motivator told that they follow the safe practises if it hindered diseases being introduced on their farm. Only 7.69% of interviewer thought that they follows these practises if it promotes health of milk consumers and least 2.56% agreed with the fact that they follows only if mandatory by law or policy.

When analysed the reasons why interviewers or Dairy Farmer Motivators (DFMs) has not been able to innovate dairy farmers about promoting milk safety related practices. The values 1.79, 2.84, 4.10, 4.18, 4.64 and 5.05 were found for reasons as dairy farmer have no interest, dairy farmer cannot afford to invest, dairy farmer do not have the time, dairy farmer can afford but not willing to invest, DFMs do not have the time and DFMs do not believe it is beneficial for farmer, respectively for each priority order (**Table 3**). This finding indicates the need of specific training or education programme for dairy farmers so the mind set of farmers will turn toward the benefits of clean, hygienic and safe milk production. It not only increases the socio-economic status of the dairy farmer but also boost up the economy of state by supplying a quality food product to importing nations.

Table 3. Priority orders of reasons affecting implementation of milk safety related practices at farm level.

Reasons	Overall rank (as per DFM responses)	Priority order
Dairy farmer have no interest	1.79	1
Dairy farmer cannot afford to invest	2.84	2
Dairy farmer do not have the time	3.10	3
Dairy farmer can afford but not willing to invest	3.18	4
DFMs do not have the time	4.64	5
DFMs do not believe it is beneficial for farmers	5.05	6

* DFM: Dairy Farm Motivator

CONCLUSION

Milk production practices followed by dairy farmers in this investigation were found to be substandard. This was attributed to lack of knowledge and exposure to innovative ideas, absence of skill based training programme in the studied area. Hence, there is a necessity to instruct dairy farmers about various aspects of clean, hygienic and safe milk production practices and the specific interventional strategy should be made by higher authorities involved in animal husbandry and dairy extension services. So that state might not be lagging behind in the national and international markets.

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