RESEARCH ARTICLE :

Adoption level of dairy farmers regarding clean milk production practices at field level in western U.P.

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SUMMARY : The challenge before the dairy farmers is how well they can manage the livestock to enhance the raw milk quality on a sustained basis. Therefore, efficient use of resources depends to greater extent on how they acquire and adopt innovations in the sector of animal husbandry in effective manner to reach higher level of performance. The milk quality is determined by aspects of composition and hygiene of milk. Dairy farmer is the key client in this process who decides the quality of milk. The study was conducted to know the adoption level of dairy farmers regarding clean milk production practices in four milk unions of western Uttar Pradesh in the year 2008-09. A total of 120 respondents (60 CMP and 60 N-CMP) were interviewed from four said milk unions. In each milk union 30 selected dairy farmers were again divided in two groups *i.e.*,15 farmers of CMP and 15 farmers of N-CMP programme under dairy co-operative society such type of distribution of sample size was done for assessing the comparison between CMP and N-CMP programme villages. It was observed that 58.33 per cent and 53.33 per cent had medium level of overall adoption, 13.33 per cent and 26.67 per cent of them having low level of overall adoption, while 28.33 per cent and 20 per cent of the respondents had high level of overall adoption, under CMP and N-CMP, respectively. The results in study clearly showed that milk quality at all levels of milk collection *i.e.* pail level (milk sample collected at the time of milking), DCS level (milk sample collected at dairy co-operative society) and dock level (milk sample collected at dairy plant) level was positively correlated with adoption level of dairy farmers regarding CMP practices. Therefore, raising adoption of clean milk production practices are of paramount importance for dairy farmers. This will open up new vistas and make possible for dairy farmers to achieve substantial gains in income. Raising the clean milk production is the fundamental problem. This problem needs to be carefully tackled for long run resolution of under developed animal husbandry.

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BACKGROUND AND OBJECTIVES

Milk is one food article and there can be adverse effect on quality of the same if proper care is not taken during production, procurement and transit. Milk is a raw material and from it milk, and milk products like ghee, powder, butter, paneer, curd, buttermilk, sweets etc is being manufactured. Quality of all products depends on process and raw

material. If raw material has good quality then finished product will have better quality. India has first ranks in cattle population and second in buffalo population in the world. According to livestock census, 2012 there were about 199.9 million cattle and 108.7 million buffalo population in country. Economic survey (2015-16) noted that India has first ranks in milk production with an annual output of 146.3 million tonnes with a growth of 6.26 per cent during 2014-15 accounting for 18.5 per cent of world milk production. The per capita availability of milk in India has increased from 146 g/day in the year 1990-91 to 322 g/day by 2014-15 which was more than the world average of 294 g/day during the year 2013 (Madhu *et al.*, 2016).

Clean milk production is one important aspect in enhancing the quality of milk. It is important to know farmer's perception about it. The clean milk does not mean making the milk free from extraneous matters by passing it through sieve or muslin cloth. It actually means the raw milk that has been produced in the udder of healthy dairy animals, handled under hygienic conditions and contains only allowed quantity of pathogens and chemicals. There are mainly four factors (Animal hygiene, Milking hygiene, Equipment hygiene and Processing hygiene) to be considered in Clean Milk Production (CMP) practices (Jacob and George, 2013).

The most important part of CMP programme is provision of bulk cooling facility. This is encouraged by N.D.D.B. and by providing Automatic Milk Collection Stations (AMCS), bulk milk cooling facilities and other needed infrastructure. The milk plants should also introduce differential pricing system based on bacteriological quality of milk (Saha, 2002). This will help in overall improvement in the bacteriological quality of raw milk reaching dairy dock. As a member of W.T.O. India is a signatory to the Sanitary and Phyto Sanitary (SPS) agreement. In the framework of SPS agreement, food chain starts from primary production to processing, storage, and distribution to consumption. One of the major concerns of SPS agreement is that the raw milk used in the manufacture should be produces using Good Hygienic Practices (GHP). Raw milk quality being the very basis of winning the market of milk and milk products, concerted efforts for wide scale adoption of CMP practices at farm level and strategies to improve it are required (Gupta, 2003). 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 per cent grants-in-aid basis to the state government/union territories by the centre government. The aim of scheme is to create necessary infrastructure for production of quality milk at the farmers level upto 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 present study was planned to know the adoption level of dairy farmers regarding clean milk production practices at field level in western U.P. The present study would not only fill in the information gap but would also be beneficial to milk producers and users. This study will also be helpful to the researchers, NGOs and government agencies, policy makers, planners and administrators in formulating policy for ameliorating and national adjustment of the policies for the benefit of milk producers and users in the area.

RESOURCES AND METHODS

The study was conducted in Uttar Pradesh state (mainly in western Uttar Pradesh), which was purposively selected. Study was mainly focused on status of clean milk production in western Uttar Pradesh. So it was utmost important to select only those milk unions, which were having sufficient number of co-operative societies under CMP programme. The representation of four Milk unions namely, Meerut, Moradabad, Bulandshahr and Jyotiba Phule Nagar were selected purposively for the study.

After selection of four milk unions, in each union select four villages dairy co-operative societies (Kaul, Tigri under CMP and Dhantla, Dadri under N-CMP from Meerut union, Dheri, Chaupura under CMP and Lodhipur vashu, virpurthan under N-CMP from Moradabad union, Saidpur, Dhakoli under CMP and Kisoli, Raina under N-CMP from Bulandshahr union, Rajhoya, Kuakhera under CMP and Mahila Nazirpur, Hasanpur Klan from J.P. Nagar union) in which two societies under CMP (clean milk production) and two societies under N-CMP (Not covered under Clean Milk Production) were selected purposively, out of which two societies one under CMP and one under N-CMP which was nearest to dairy plant

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and two societies one under CMP and one under N-CMP which was farthest from dairy plant in that villages. Thus, the purpose was to decide the effect of distance on raw milk quality. The totals of 120 farmers were selected. In each district 30 selected dairy farmers was again divided in two groups *i.e.*,15 farmers of CMP programme under dairy co-operative and 15 farmers of N-CMP programme under dairy co-operative Such type of distribution of sample size was done for assessing the comparison between CMP programme and N-CMP programme villages. CMP villages means those societies who are working under district co-operative societies and many facilities was providing by government. While N-CMP villages was also working under district co-operative societies but they have not avail above facilities. After selection of milk societies a list of dairy farmers from each dairy co-operative society in four selected milk unions, who were pouring milk for the last two years, was prepared.

The reference period was 2008-09. The interview schedule was prepared by incorporating all the inevitable information required for the study. While constructing the interview schedule, the objectives and dimensions of the study was kept in view. The designed interview schedule was pre-tested in the non-sampling area with respondents using different CMP practices in order to remove ambiguity if any. The various statistical tools was use, these were frequency, percentage, means, standard deviation, correlation co-efficient and ranking for preliminary analysis of variables. Adoption of CMP refers to the practices recommended for quality milk production is in continuous use by the dairy farmers of the study area. In the present study adoption was measured by collecting the all relevant items related to CMP with consultation of literature of N.D.R.I., subject matter specialists from N.D.D.B., different milk union's quality and extension staff, veterinarians, concerned literature and previous research studies. The selected items were divided in following heads: healthy herd management, housing, cleaning of animal, feeding and fodder, milking, cleaning of utensils, cooling of milk and transportation. To calculate the quantitative score of individual respondent, the data were collected on the basis of four point continuum scale *viz.*, always, most frequently, some times and never with the score of 3, 2, 1 and 0, respectively. To measure the individual respondent adoption level score following formula was used. The

milk quality was measured by Methylene Blue Reduction Time (MBRT) test.

$$\text{Adoption score} = \frac{\text{Score obtained}}{\text{Maximum obtainaible score}} \times 100$$

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Adoption level of dairy farmers in various aspects of cmp practices:
Adoption level of healthy herd management practices:
A close perusal of data presented in Table 1 indicated that 66.67 per cent and 58.33 per cent farmers had medium level of adoption regarding healthy herd management under CMP and N-CMP village, respectively followed by 1.67 per cent and 3.33 per cent in low category of adoption under CMP and N-CMP village, respectively while 31.67 per cent and 38.33 per cent in high category of adoption under CMP and N-CMP villages, respectively. The Adoption Index (A.I.) of this aspect was 55.84 and 51.65 under CMP and N-CMP villages, respectively which is very less in comparison with other aspects. The reasons behind this were no availability of health care practices in nearby villages, lack of knowledge about contagious diseases, high cost of veterinary medicines, unawareness about severity of diseases and development programmes launched by veterinary department.

Adoption level of housing practices:
The figure presented in Table 1 revealed that 80 per cent and 73.33 per cent of the dairy farmers had medium level of adoption regarding housing of animals under CMP and N-CMP village, respectively. On the other hand 3.33 per cent and 1.67 per cent of them were in high adoption category under CMP and N-CMP village, respectively followed by 16.67 per cent and 25 per cent had low level of adoption regarding housing under CMP and N-CMP village, respectively. The further analysis showed the extent of adoption index of this aspect, which was 66.58 and 63.51 under CMP and N-CMP village, respectively. These results were somewhat satisfactory because the dairy is a traditional business in western Uttar Pradesh, which developed a good

framework of set of practices for its different aspects in farmer's community. It was interesting to know that, some practices like, use of bovine disposals for compost making, open housing, see of clean potable water at community water center, daily cleaning of animal house etc. were generally in practice as a part of their traditions. Some practices which were not in use like regular white washing in cattle shed, use of disinfectants for keeping the cattle shed free from flies, ants, cockroaches etc. might be due to high cost of white washing and disinfectants, which may reduce benefits from the business of dairying.

Adoption level of cleaning of animals practices:

In case of cleaning practices, Table 1 indicated that respondents 75 per cent and 88.33 per cent were in medium category for the adoption of cleaning of animals under CMP and N-CMP, respectively whereas, 25 per cent and 11.67 per cent in high adoption category under CMP and N-CMP, respectively. Further, it could be seen from the table the calculated adoption index was 62.45 and 59.37 under CMP and N-CMP, respectively. The main items in animal cleaning were cleaning before and after of milking by using water followed by wiping with clean cloth by the dairy farmers.

Adoption level of feeding practices:

Table 1 revealed that 66.67 per cent of the dairy farmers had medium level of adoption under CMP and N-CMP were same followed by those who were having high 30 per cent, 25 per cent and low 3.33 per cent, 8.33 per cent level of adoption, under CMP and N-CMP, respectively. A critical observation of the results suggested that the calculated adoption index 59.88 and 60.93 under CMP and N-CMP, respectively among the respondents. The present study was conducted under co-operative system of western Uttar Pradesh, where feeding materials like, concentrates, minerals, seed of high yielding fodder crops and some growth promoters provided by union at reliable cost with all relevant information regarding use and manufacturing, leading to higher scores. The major brand of concentrates was parag pashu ahar, which was manufactured by P.C.D.F. at their feed plants.

Adoption level of milking practices:

It is apparent from the Table 1 which revealed that

the majority of respondents were in medium 56.67 per cent and 61.67 per cent under CMP and N-CMP category, respectively followed by 41.67 per cent and 33.33 per cent in high level category of adoption under CMP and N-CMP, respectively only 1.67 per cent and 5 per cent of farmers had low level of knowledge in this aspect under CMP and N-CMP, respectively. A close perusal of table showed that the adoption level of this aspect was almost similar, which indicated the efficiency of CMP programme. Further, their adoption index was 78.54 and 75.41 under CMP and N-CMP, respectively which is a highest figure. It might be due to the adoption of teat dipping after milking, use of clean cloth for dry cleaning, removal of fore stripping of milk in separate utensil by farmers under CMP route in Meerut and J.P. Nagar union.

Adoption level of cleaning of utensils practices:

It is evident from the Table 1 that 55 per cent and 51.67 per cent farmers had medium level of adoption under CMP and N-CMP, respectively followed by 38.33 per cent and 28.33 per cent in high level of adoption category under CMP and N-CMP, respectively while 6.67 per cent and 20 per cent farmers had low level of adoption regarding this aspect under CMP and N-CMP, respectively. Further, it can be seen from the table the calculated adoption index was 66.32 and 58.22 under CMP and N-CMP, respectively. It was observed that generally milking utensils (both for milking as well as pouring) were distributed by respective milk unions at the subsidized rate but they did not prefer narrow mouth pails. This may be a reason for not a single respondent used it, which was essential as per CMP practices. The high cost of detergents and unawareness about cleaning of utensil were important factors, which hindered the adoption level of this particular aspect. One more important factor observed in this line was that, DCS secretary had the major role for enhancing the adoption level of all the practices but most of N-CMP route secretaries did not talk about cleaning of utensils to their members.

Adoption level of cooling of milk practices:

In case of cooling of milk, Table 1 indicated that a large number of respondents *i.e.* 51.67 per cent and 70 per cent had medium level of adoption under CMP and N-CMP, respectively as compared to 1.67 per cent and

3.33 per cent having low level of adoption under CMP and N-CMP, respectively while 46.67 per cent and 26.67 per cent respondents indicated high level of adoption under CMP and N-CMP, respectively. Interestingly there was a single farmer which was in high category of adoption. He was exception in Bulandshahr milk union's some DCS, who used refrigerator for cooling of his milk before pouring at the society. Further, it could be seen from table that the adoption index was 58.37 and 56.66 under CMP and N-CMP, respectively. The cooling of milk was issue of debate in farmers community because, lack of incentives for cooling of milk, high cost of cooling units, unawareness of secretary, unavailability of electricity and high temperature were the major obstacles in this aspect. One another aspect which was found in Meerut union where market competition was so high was that in the particular route supervisors were emphasizing on quantity rather than quality, probably because of where the member farmers did not bother much about cooling of milking practices.

Adoption level of transportation of milk practices:

The data reported in Table 1 depicted that the large number of the respondents 30 per cent had medium level of adoption under CMP compared to N-CMP 48.33 per cent, whereas, 45 per cent and 16.67 per cent of them belonged to high knowledge category under CMP and N-CMP, respectively on the other hand 25 per cent and 35 per cent of the farmers had low level of adoption regarding this aspect under CMP and N-CMP, respectively. Further, their adoption index was 60.04 and 58.95 under CMP and N-CMP, respectively which is satisfactory in comparison with all aspects. In the research area it was found that, all the members of DCSs

Table 1 : Adoption level of dairy farmers in various aspects of clean milk production practices

Sr. No.	Aspects	Category	Criteria (Score)	Frequency (%)		Adoption index	
				CMP	N-CMP	CMP	N-CMP
1.	Healthy herd management	Low	<10.27	01 (1.67)	02 (3.33)	55.84	51.65
		Medium	10.27 to 11.93	40 (66.67)	35 (58.33)		
		High	>11.93	19 (31.67)	23 (38.33)		
2.	Housing	Low	<12.50	10 (16.67)	15 (25)	66.58	63.51
		Medium	12.50 to 14.08	48 (80)	44 (73.33)		
		High	>14.08	02 (3.33)	01 (1.67)		
3.	Cleaning of animal	Low	<0.59	0 (0)	0 (0)	62.45	59.37
		Medium	0.59 to 2.01	45 (75)	53 (88.33)		
		High	>2.01	15 (25)	07 (11.67)		
4.	Feeding	Low	<8.14	02 (3.33)	05 (8.33)	59.88	60.93
		Medium	8.14 to 9.90	40 (66.67)	40 (66.67)		
		High	>9.90	18 (30)	15 (25)		
5.	Milking	Low	<14.99	01 (1.67)	03 (5)	78.54	75.41
		Medium	14.99 to 16.93	34 (56.67)	37 (61.67)		
		High	>16.93	25 (41.67)	20 (33.33)		
6.	Cleaning of utensils	Low	<7.80	04 (6.67)	12 (20)	66.32	58.22
		Medium	7.80 to 9.90	33 (55)	31 (51.67)		
		High	>9.90	23 (38.33)	17 (28.33)		
7.	Cooling of milk	Low	<1.96	01 (1.67)	02 (3.33)	58.37	56.66
		Medium	1.96 to 2.98	31 (51.67)	42 (70)		
		High	>2.98	28 (46.67)	16 (26.67)		
8.	Transportation	Low	<5.20	15 (25)	21 (35)	60.04	58.95
		Medium	5.20 to 7.70	18 (30)	29 (48.33)		
		High	>7.70	27 (45)	10 (16.67)		
	Overall	Low	<66.14	08 (13.33)	16 (26.67)	67.87	65.17
		Medium	66.14 to 70.82	35 (58.33)	32 (53.33)		
		High	>70.82	17 (28.33)	12 (20)		

Number of respondents CMP=60 and N-CMP=60   Figures in parenthesis indicate percentage

were aware about time of milk collection and trip of milk van at society, which motivate them for early pouring of milk. The milk transportation van is used as vehicle for animal feed supply as well as emergency service for animal health, which was the reason behind high AI of this aspect. It was found that all the DCSs of Meerut and most of CMP occupied milk routes of other union's the farmer poured their milk at DCS within two hours of milking, which is very good indication for improving the quality of milk.

Table 2 : Relationship between adoption level and milk quality in CMP		
Sr. No.	Milk quality	Correlation co-efficient (r)
1.	Pail level	0.513**
2.	DCS level	0.647**
3.	Dock level	0.273**

** indicates significance of value at P= 0.01 level of probability

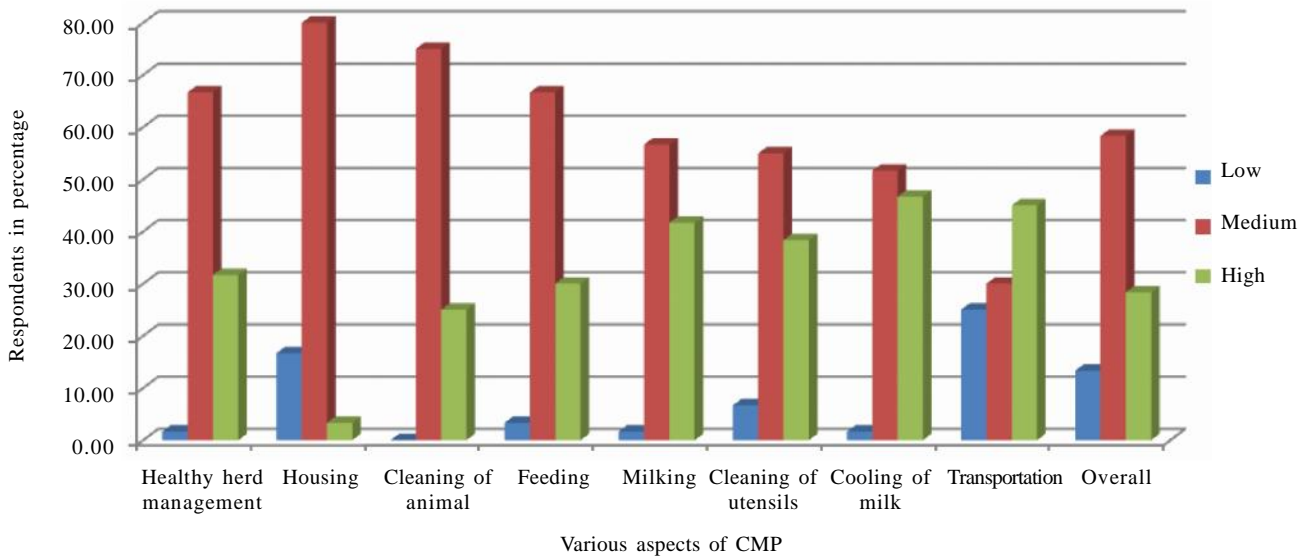

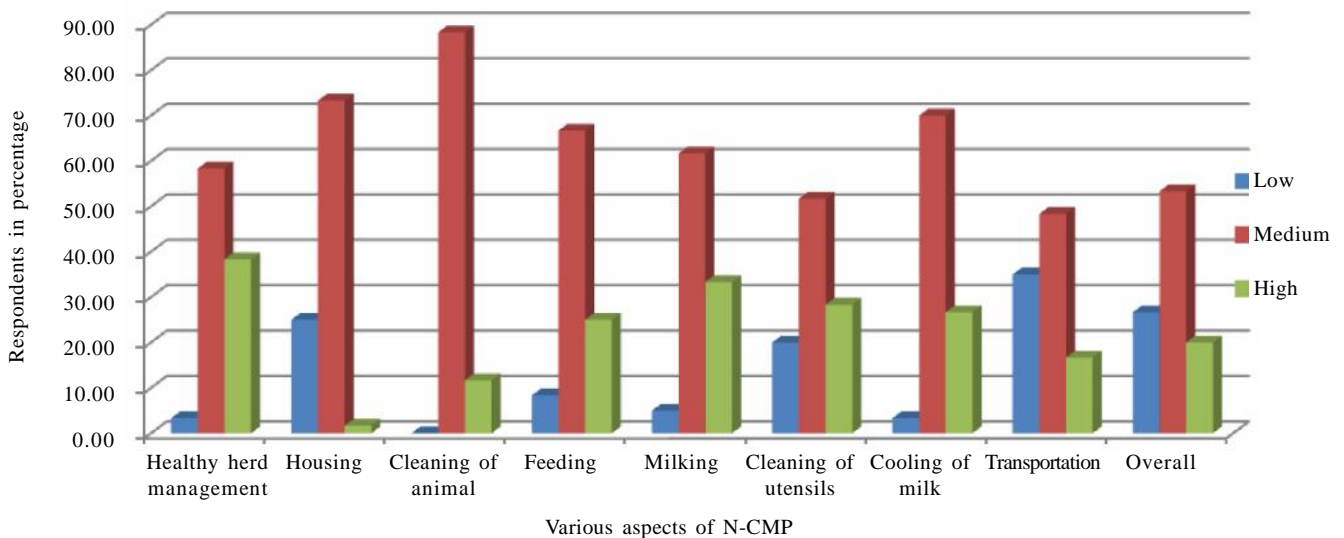Fig. 1 : Adoption level of dairy farmers in various aspects under CPM

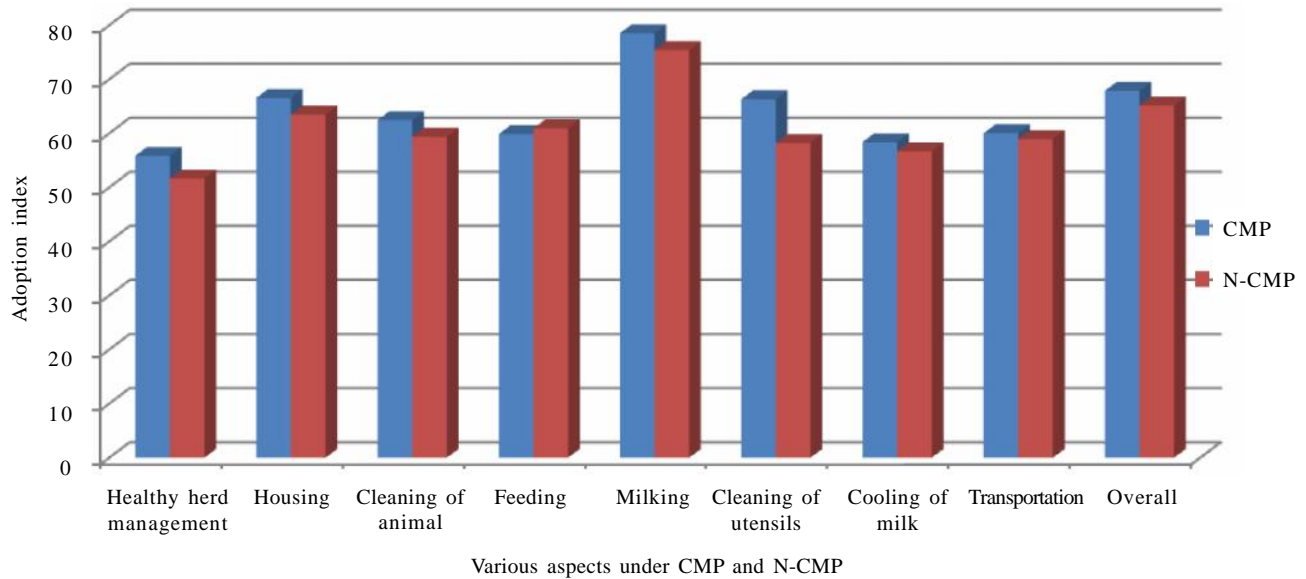Fig. 2 : Adoption level of dairy farmers in various aspects under N-CPM

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Fig. 3 : Adoption index of dairy farmers in various aspects under CPM and N-CMP

Overall adoption level regarding CMP practices:

It can be observed from the Table 1 that the majority of the respondent *i.e.* 58.33 per cent and 53.33 per cent (under CMP and N-CMP) had medium level of overall adoption regarding CMP practices followed by those having 13.33 per cent and 26.67 per cent low level of overall adoption under CMP and N-CMP, respectively on the other hand, 28 per cent and 20 per cent of the respondents had high level of overall adoption under CMP and N-CMP, respectively when all the eight aspects were combined together. All these findings regarding level of adoption practices were in conformity with Maity (1999); Havranek and Kalit (2000); TIFAC (2001); Saha (2002); Donald (2003); Heneriksson (2005); Srairi *et al.* (2006); Singh *et al.* (2010) and Singha *et al.* (2011). Further analysis of data indicated that the adoption index of the respondents, on the overall basis was 67.87 and 65.17 under CMP and N-CMP, respectively. The Table 1 clearly showed that overall adoption level of CMP village dairy farmers in various aspects have high frequency under medium and high score category whereas, N-CMP dairy farmers have high frequency under low score category in the same aspects due to lack of aware and lack of facility about clean milk practices. The adoption level of dairy farmers was higher in CMP villages in comparison to N-CMP villages. It was due to lack of knowledge and information about clean milk production among N-CMP dairy farmers.

Relationship between adoption level and milk quality in clean milk production:

To find out the relationship between adoption level and milk quality, correlation analysis was carried out and calculated co-efficient (r) for milk quality has been presented in Table 2. The results clearly showed that milk quality at all levels of milk collection *i.e.* pail level (milk sample collected at the time of milking), DCS level (milk sample collected at dairy co-operative society) and dock level (milk sample collected at dairy plant) was positively correlated with adoption level of dairy farmers regarding CMP practices. The correlation was statistically significant at 1 per cent level of significance. The relationship between milk quality and adoption level at DCS level was to follow CMP practices high. It might be due to the more emphasis given by dairy secretary found adopter of more practices. It was also observed that, DCS level was the hub for gathering of all members and it was obvious that every one tried to improve their image by using good practices. It was also noted that at dairy co-operative society level was the hub for gathering for all members and it was seen that every one tried to improve their image by using good clean milk production practices. The same study was conducted by Shibu and Anu (2013) and Surkar *et al.* (2014).

Conclusion :

The dairy farmers had medium level adoption in various aspects of CMP and N-CMP practices. The adoption index was higher in CMP villages in comparison to N-CMP villages. However, they had adopted recommended practices of milking practices upto maximum extent followed by housing and feeding. Same time extent of adoption regarding cleaning of utensil and healthy herd management was less. These results are showing that milk unions should develop literature and organize effective awareness programmes for CMP practices, which can support in improving the quality of milk. Thus, there is an urgency to improve the milk quality at all levels of milk collection which can achieve by launching CMP programme through dairy co-operatives.

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REFERENCES

Donald, E.P. (2003). Udder health affected by bedding management proceedings of annual meeting report of the NMC. North Carolina State University. pp. 78-79.

Gupta, J. (2003). *Clean milk production.* E-book published by National Dairy Research Institute, Karnal, Haryana

Havranek, J. and Kalit, S. (2000). Croatia; milk collection in croatia e-mail conference on "small scale milk collection and processing in developing countries". 29 May - 28 July. (FAO), Rome.

Heneriksson, A. (2005). Experience from community milking centers in Rural India. Thesis No. 425. Uppsala.

Jacob, S.K. and George, A. (2013) Analysis of the clean milk production practices of dairy farmers of Kerala. *Indian J. Appl. Res.,* **3**(7) : 604-606.

Livestock Census (2012). Department of animal husbandry, dairying and fisheries, ministry of agricultural, government of India.

Madhu, M., Shiva, G., Chander, D. and Gautam, M. (2016).Life cycle assessment of green house gases of milk production- A review. *Indian J. Animal Nutr.,* **33**(2):118-130.

Maity, M. (1999). Study of adoption of clean milk production and health care practices among dairy farm women in south 24-parganas district of West Bengal. M.Sc. Thesis, NDRI Deemed University, Karnal, HARYANA, (INDIA).

Saha, B. (2002). A comprehensive study on clean milk production practices among dairy farmers in West Bengal. M.Sc. Thesis, NDRI Deemed University, HARYANA, (INDIA).

Shibu, K. Jacob and Anu, George (2013). Analysis of the clean milk production practices of dairy farmers of Kerala. *Indian J. Appl. Res.,* **3**(7):604-606.

Singh, S., Kumar, R. and Meena, B.S. (2010). Adoption level of scientific dairy farming practices by dairy farmers of Haryana, *Indian Res. J. Extn. Edu.,* **10** (3):45-48.

Sinhga, A.K., Baruah, M.J. and Dutta, P. (2011). Adoption of scientific dairy farming practices by small farmers in different farming systems of Assam. *Indian J. Dairy Sci.,* **64**(6) : 537-538.

Srairi, M.T., Moudnib, J., Rahho, L. and Hamama, A. (2006). How do milking conditions affect the hygienic quality of raw milk? Case study from Moroccan dairy farms. *Livestock Res. Rural Dev.,* **18**(7):64-65.

Surkar, S.H., Sawarkar, S.W., Kolhe, R.P. and Basunathe, V.K. (2014). Adoption of quality milk production practices by dairy farmers in Wardha district of Maharashtra. *Agric. Rural Develop.,* **1**(1):1-4

TIFAC (2001). Improvement in milk quality and yield by establishing modern dairy farming at Kolar. Technology Vision Mission: Agriculture and Agro Food Sector. Department of Science and Technology of India.

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