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Research Article

AN INNOVATIVE MODEL OF CONVERGENCE OF STAKEHOLDERS FOR IMPROVEMENT IN KNOWLEDGE OF FARMERS ABOUT MASTITIS AND CLEAN MILK PRODUCTION

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ABSTRACT

An innovative model of convergence of Stakeholders of dairy development was developed and tested for improvement in knowledge of farmers about mastitis prevention and control and clean milk production at village level in Murrah buffaloes. Village Chindar of Fatehabad district of Haryana state of India was selected purposively. For this study, 100 farmers who were registered members of the milk cooperative society and were contributing milk daily were also purposively selected. Knowledge tests developed earlier were used to measure farmers' knowledge about mastitis and clean milk production. Their mean knowledge scores about mastitis and clean milk production were 8.29 and 20.01, respectively. As per the plan of work for testing the model, different types of interventions were done by multiple stakeholders collaborating together. Impact of these interventions was studied which suggested an increase in the knowledge of respondents regarding mastitis and clean milk production to the tune of 36.55 and 18.9 per cent, respectively. $\chi 2$-values were also found to be significant indicating that there was association between the frequency of respondents and the interventions done in the study.

Keywords: Convergence, Mastitis, Clean milk production, Stakeholders

Buffalo plays a vital role in rural livelihood, food security and agricultural economy of India. The buffalo is "black gold" and rightly occupies a central role in the dairy sector, meat industry and animal draught power. Besides, the buffaloes are heralded as key contributors for ensuring nutritional security to the masses in the Asian region. However, 97.07 per cent of the buffalo milk is produced in the Asian region, with a predominant contribution of 67.75 per cent by India alone (Singh *et al.*, 2018). Therefore, it is no surprise that buffalo population has increased by 3.19 per cent during the inter-censual period 2007 to 2012 (DAHD, 2017) which further increased by 1% by 2019 (DAHD, 2019).

The convergence of multi agencies aimed at promoting integrated approaches is the need of the hour. It has to be noted that without convergence of efforts by various public, private and other agencies, it is difficult to reach a large number of dairy farmers with new and improved knowledge of dairying effectively (Dixit *et al.*, 2016). Poor health of livestock causes economic losses while these are more serious in case of poor and landless farmers. Mastitis is a serious disease particularly of high yielding milch buffaloes. An economic loss of over 7,615.51 crores, has been estimated annually because of bovine mastitis (Bansal and Gupta, 2009); and mastitis has been identified as one of the major economically important diseases of dairy animals in India (Sasidhar *et al.*, 2002). Clinical mastitis is characterized by overt changes in the udder or milk; however, in subclinical mastitis (SCM) such changes are not obvious. SCM accounts for severe economic losses to the dairy industry (Mdegela *et al.*, 2009). It is therefore, essential to have strong measures for controlling mastitis working in a synergistic manner which requires the convergence of all the dairy development related organizations.

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MATERIALS AND METHODS

In Haryana State of India, various extension services are delivered by several agencies like ICAR - Central Institute for Research on Buffaloes (CIRB), Krishi Vigyan Kendras (KVK), State Agriculture and Veterinary Universities (LUVAS & CCS HAU), Department of Animal Husbandry, Haryana and Haryana Dairy Cooperative, Agriculture Technology Management Agency (ATMA) etc. Institutions like Veterinary University and CIRB are responsible for the generation of scientific technologies for dairy development. While agencies like Department of Animal Husbandry, KVK and Haryana Dairy Cooperatives are mainly responsible for extension services and milk collection. A model of convergence was developed. It was envisaged that all the above mentioned agencies would work together for development of technologies and mobilization of farmers for dissemination of technologies on mastitis control and clean milk production, which is very important for increasing the milk production. Different types of interventions were introduced during October 2018 to May 2019 and their impact was studied about knowledge of farmers about mastitis prevention and control and clean milk production. The details of activities are mentioned

below in plan of work. This model was tested in village Chinder of Fatehabad district of Haryana purposively as it had one of the most vibrant and profitable milk cooperative society in Haryana and the members of this society were having close interaction among themselves and shared their experiences and information with one another very frequently.

To ascertain farmers' level of knowledge about mastitis, a test developed by Pachauri (2004) was used. The scores for knowledge test that farmers could attain ranged between 0-19. Similarly, to determine the knowledge of farmers about clean milk production, SOPs developed by NDDB were used. Each selected practice was further divided into several questions. Score of '1' was assigned to each respondent who was having knowledge about a SOP related to clean milk production practice while score of '0' was assigned to those who were not knowing a particular practice. Thus, score of each respondent was calculated by summation of scores on all the SOPs which ranged between 0-33. Suitable statistical tests like $\chi 2$- and t-tests were used for interpretation of the data generated under this study.

Plan of work undertaken for testing of model: The details of activities undertaken for testing the model for mastitis control are presented in Fig.1. To initiate the work, 100 farmers who were members of the village Chinder cooperative society and were contributing milk daily were purposively selected and registered for this study. CIRB registered the farmers and their animals while the cooperative society helped in identifying the buffaloes. A standardized questionnaire was developed to measure the knowledge of farmers about mastitis and clean milk production. Different types of extension activities were jointly undertaken by CIRB, LUVAS, SDAH, Cooperatives and KVK like sensitization of farmers about symptoms of mastitis, training on udder health management, improved buffalo husbandry and some special days like women's day, Kisan Diwas, were celebrated and during these events, public health campaigns about cleaning of animals sheds, milker, milking and storage utensils were organized. Farmers who constituted the study sample were also demonstrated individually about California Mastitis Test (CMT) by scientists of CIRB and Veterinary University. Literature on mastitis and clean milk production and improved buffalo husbandry was distributed by CIRB and LUVAS. Knowledge test on mastitis and clean milk production were administered before and after the interventions done in the study.

RESULTS AND DISCUSSION

Among animal diseases which affect the profitability of animals, mastitis is considered to be one of the most expensive disease in terms of production losses (Bardhan, 2013). Further, the mastitis milk is unsuitable for human consumption as it is not clean and is one of the sources of communicable diseases. Thus, in this study which was conducted under field conditions efforts were made to increase the knowledge of farmers about mastitis prevention and control and clean milk production through multifarious extension activities as mentioned in the innovative model of convergence.

Before the interventions envisaged in the model developed for this purpose, a knowledge test was administered to all the 100 respondents selected for this study and their response on all the questions contained in the test was obtained. The mean knowledge score of all the respondents about mastitis was calculated and it was found to be 5.26 (Table 1). After finding out the pre-interventions score, all the interventions as mentioned in Fig. 1 were done and knowledge of the respondents was calculated again and the mean score was found to be 8.29. Thus, there was increase in the knowledge of respondents about mastitis to the extent of 36.55 percent which was found to be significant at 1% level as indicated by t-value (6.4). The findings of the study were in line with the contentions of Dixit *et at.* (2010) who reported significant increase in the knowledge of respondents due to scientific interventions.

Clean milk refers to raw milk obtained from healthy animals that has been produced and handled under hygienic conditions, it should contain very small number of harmless bacteria, it should be free from hazardous chemical residues. Therefore, it is essential that farmers produce clean milk. It was thus, considered imperative to sensitize the farmers about clean milk production. However, according to NDDB, good hygiene and sanitation practices would keep it free form bacterial contaminations. Thus, SOPs given by NDDB were used in the study and the knowledge test was developed as

Table 1

Impact of interventions on knowledge of respondents about mastitis

Mastitis Knowledge scores	Mean	SD
Pre intervention	5.26	1.5
Post intervention	8.29*	2.02

*Significant at 1% level

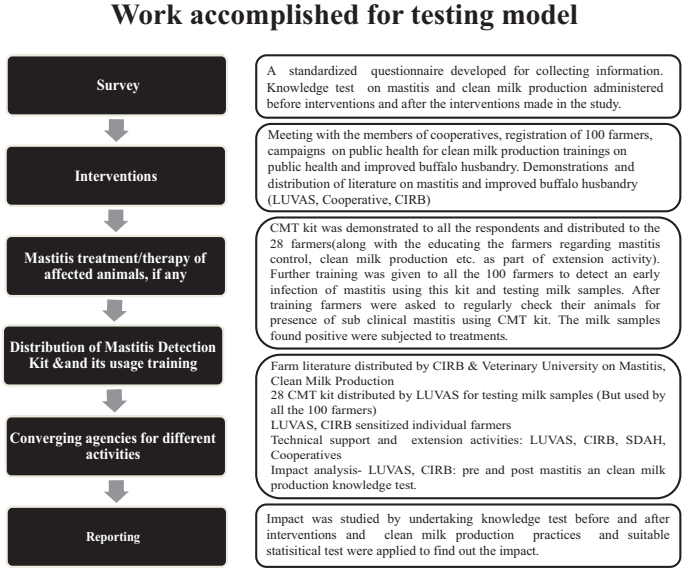

Fig 1. Plan of work for testing the model

mentioned in the methodology. This test was administered to the respondents and their response on all the practices was elicited and summated to arrive at a total score of respondents' knowledge about clean milk production. Thus, the mean knowledge score of all the respondents about clean milk production was calculated and results are presented in Table 2. The mean score before interventions was found to be 20.01. However, mean knowledge of score of respondents about clean milk production was calculated again after the interventions and due to the impact of various interventions, the mean knowledge score of farmers increased to 24.67. Thus, there was gain in knowledge of respondents to the tune of 18.9 percent which was significant as revealed by t-value (5.6) after the interventions undertaken in this study. Pachauri (2004) also reported improvement in the knowledge of respondents about scientific buffalo husbandry practices after interventions.

Respondents were categorized according to their knowledge about mastitis prevention and control by using Mean ± SD method. Thus, respondents were classified into three categories having low, medium and high knowledge. Different range score categories were formed before and after the interventions. It was observed from the Table 3 that 11,65 and 24 respondents had low, medium and high knowledge, respectively about mastitis before interventions. While after the interventions 7, 36 and 57 respondents had low, medium and high knowledge about mastitis, respectively. In order to find out association between knowledge of mastitis before and after interventions with the frequency of respondents, χ2-test was applied which was found to be significant as revealed by χ2-value (6.9). Thus, the interventions had impact on the knowledge of respondents belonging to low, medium and high categories. Their frequencies in each category changed after the interventions. The numbers of respondents having low and medium knowledge reduced while the number of respondents having high knowledge increased. The table further indicated that there were 36.36, 44.62 and 27.89 percent change in the frequency of respondents having low medium and high knowledge about mastitis, respectively which suggested that the interventions done in the study had impact on the knowledge as the number of respondents having low and high knowledge about mastitis changed. The study was in the line with the contentions of Dixit *et al.* (2010).

Respondents were categorized according to their knowledge about clean milk production by using mean ± SD method. Thus, different range score categories were formed before and after interventions done in the study. It was observed from Table 3 that 11, 65 and 24 respondents were having low, medium and high awareness about clean milk production, respectively. While after the interventions 12, 54 and 34 respondents were having low, medium and high knowledge, respectively about clean milk production. In order to find out association between before and after interventions regarding knowledge about clean milk

Table 2

Impact of intervention on knowledge of respondents about clean milk production

Mastitis Knowledge scores	Mean	SD
Pre intervention	20.01	1.49
Post intervention	24.67*	1.46

*Significant at 1% level

Table 3

Classification of Respondents according to their knowledge of mastitis

Knowledge Level	Frequency	Range Score	Frequency	Range Change	Percent change
	Before Intervention		After Intervention		
Low	11	<3.76	7	<6.27	36.36
Medium	65	3.76-5.26	36	6.27-8.29	44.62
High	24	>5.26	57	>8.29	57.89

χ2 Significant at1% level

Table 4

Classification of Respondents about their awareness on Clean Milk Production

Knowledge Level	Frequency	Range Score	Frequency	Range Change	Percent change
	Before Intervention		After Intervention		
Low	28	<18.52	12	<23.21	57.14
Medium	48	18.52-20.01	54	23.21-24.67	11.11
High	24	>20.01	34	>24.67	29.41

$\chi 2$ Significant at1% level

production and frequency of respondents, $\chi 2$-test was applied which was found to be significant ($\chi 2$=7.6). The frequency of respondents having low knowledge about clean milk production decreased while frequency of respondents having medium and high knowledge about clean milk production, increased considerably. Thus, the interventions, had impact on frequency of the respondents having low, medium and high knowledge about clean milk production. The table further indicated that there was 57.14, 11.11 and 29.41 per cent change in the frequency of respondents having low medium and high awareness about clean milk production, respectively. It suggested that due to interventions, the number of respondents having low, knowledge about clean milk production was reduced considerably. While the number of respondents having medium and high knowledge also increased.

Presently all the agencies involved in dairy development are working in isolation. There is duplication of efforts by various agencies/organizations which is resulting in precious loss of resources, money, man power, material etc. Therefore, convergence of all the concerned agencies/organizations aimed at promoting integrated approach which was attempted in this study lead to increase in the knowledge of farmers with regard to mastitis and clean milk production. Further, a synergistic effect was observed as each agency contributed according to its strength without duplication. It would help in reaching large number of farmers and providing specialized services at a lower cost. Moreover, it would bring dairy development and increase in milk production and it will enhance the income of farmers.

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