

Constraint Analysis in Adopting Mastitis Preventing Technologies in Rural Areas of Punjab, India

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Abstract

Mastitis is considered to be one of the expensive diseases affecting the profitability of milch animals through production losses. Various mastitis preventive techniques such as teat dip (TD) and mastitis diagnostic kits (MDK) are recommended to prevent intra-mammary infections and diagnosis at sub-clinical stage. Despite these innovations, very low adoption has been observed at field level, leading to higher prevalence of clinical mastitis. To understand the constraints faced by the dairy farmers in adopting mastitis preventing technologies, a cross-sectional study was carried out in six districts of Punjab, India. The responses were collected through personal interview schedule from 600 dairy farmers selected through multistage random sampling technique. The constraint analysis by Garret's Ranking Technique (GRT) revealed that lack of awareness about the technology, lack of technical knowledge and technical skill, inability to take decisions are the major constraints hindering the implementation of simple beneficial technologies. This study identified a dire need of extensive extension efforts to aware the farmers about their major problems at farms and scientific dairy farming technologies. Extension education can play a pivotal role to motivate farmers at individual, group and mass level for accelerating technology use to achieve optimum and sustainable quality production for maintaining social, economical and psychological welfare of society.

Keywords: Dairy Farmers; Mastitis Preventing Technologies; Garret's Ranking Technique; Constraint Analysis

Introduction

Mastitis, one of the expensive diseases, reduces the profitability of rearing animals through production losses [1] and economic returns of the Indian dairy farms heavily [2]. There are three types of contagious mastitis viz. Clinical mastitis (CM), subclinical mastitis (SCM) and chronic mastitis, among which SCM is a major and silent problem causing higher economic losses to the farmers [3]. Diag-

nosis and management of mastitis at the subclinical stage, results in an increase in milk production, improvement of milk quality and safety of consumer health [4].

As reported in previous studies, the prevalence of subclinical form was found to be more common in India (varying from 10% - 50% in cows and 5% - 20% in buffaloes) when compared to clinical form of mastitis (1% - 10%) [5] and it was higher (53.52%)

in Punjab [6]. Punjab is one of the leading states in dairying and milk production in country [7]. In Punjab early mastitis detection is the third constraint followed by the cost of treatment and poor cow and animal housing in controlling mastitis [8]. The majority of the farmers considered mastitis as a major constraint to their milk production, but none of the dairy farmers knew about SCM [9], despite the development and availability of technologies for SCM diagnosis. Studies in India reported that none of the farmers was aware of SCM and practices to control it [10,11]. It was also found that though the technology is having direct role in reducing the incidence of clinical mastitis and improving dairy farm productivity, the awareness and adoption of SCM diagnosis was very low [12].

Many Governmental, non-governmental, private and international institutions have been engaged in promoting and disseminating the scientific and modern dairy health management practices to majority of dairy farmers through various channels of extension such as technology verification and demonstrations, knowledge and skill enhancing training, experience sharing visits, farmer-to-farmer information exchange mechanisms and others. Mastitis diagnosis kit (MDK) and Teat dip (TD) are the two economical, effective and widely promoted technologies are always promoted and propagated to prevent mastitis along with improved management practices. In the present study, MDK refers to Bromothymol blue (BTB) card and Sodium lauryl sulphate (SLS) paddle test; whereas TD includes the practice of dipping all the teats of lactating cows and dry cows (during first 10 - 14 days of dry period) regularly after every milking in a germicidal solution which may be comprised on Iodine (0.5%) solution 6 parts + Glycerine 1 part or Chlorhexidine (0.5%) solution 1 Litre + Glycerine 60 ml.

Factors prohibiting the dairy farmers from adoption of the improved management practices, are generally termed as constraints. If the constraints are identified, it helps to bridge the gap between the technology awareness and its adoption by livestock farmers [13]. With this back drop, the present study was planned to identify the constraints faced by dairy farmers in adopting above said mastitis preventing technologies in rural areas of Punjab.

Materials and Method

Ethic permission

The ethic permission was taken from The Institutional Ethics Committee, Dayanand Medical College and Hospital, Ludhiana, Punjab, India (Ethics approval number: DMCH/ RandD/2018/1008).

Locale of the study

The study was conducted at Punjab, an agrarian state of India, located at the northwest end of India between 29°30'N to 32°32'N latitude and 73°55'E to 76°50'E longitude.

Research design and data collection

To identify the constraints faced by the dairy farmers in adopting mastitis preventing technologies, a cross-sectional study was carried out in six districts from different agro-climatic zones of Punjab, India. The responses were collected through personal interview schedule from 600 dairy farmers selected through multi-stage random sampling technique. The interview was followed in local language by receiving the farmer's participatory consent for the study.

Operationalization of variables and data analysis

The respondents were asked to rank the different constraints that limit the technology adoption as per their opinion from a scale of 1 to 5, 1 being the most important and 5 being least important, which were used for prioritization of constraints. The responses were recorded for three types of constraints viz. general, technical and socio psychological.

The data were compiled by Microsoft Excel and analysis was done by using SPSS Statistic software for Windows, Version 20 developed by IBM company, USA. Frequency and percentage analysis was performed to study the profile of respondents, awareness and adoption level of prescribed technologies.

The constraint analysis was done by employing Garret's ranking techniques (GRT). In GRT, the orders of merit as given by the respondents were converted into ranks, by using the following formula

$$\text{Percent position} = \frac{100 (R_{ij} - 0.05)}{(N_j)}$$

Where,

R_{ij} = Rank given for i^{th} problem by j^{th} individual.

N_j = Number of problems ranked by the j^{th} individual

The percent position of each rank was then converted into scores, by referring to the table, as given by Garrett and Woodworth, 1969 [14]. The scores of individual respondents for a par-

ticular problem were added and divided by the total number of respondents. The mean scores for all the constraints were arranged in descending order and thus, ranks were assigned to prioritize the constraints.

Results and Discussion

Socio-economic Profile of dairy farmers

Socio-economic profile of dairy farmers, the respondents of the study, revealed that most of the respondents belonged to middle age (43.50%) and had high school (32.20%) education. About 2/3rd respondents were engaged in agriculture activities and dairying as their occupation and possessed more than 10 years of dairy farming experience. About 30.83% farmers were small land holders followed by marginal (21.83%), semi-medium (21.33%), medium (12.17%), land less (11.00%). Majority owned medium herd size (between 6 - 15 animals). Very few respondents (12.20%) attended training and about 37% respondents had social participation.

Awareness and adoption of mastitis preventing technologies

Regarding awareness about mastitis preventing techniques, around thirteen per cent (78/600) dairy farmers were aware about mastitis diagnostic kit (MDK) whereas 15.80 per cent (95/600) knew about teat dip (TD). Previous studies [15,16] also reported that none of the farmer was aware about sub-clinical mastitis (SCM) and practices to control it in the respective study area.

Only few dairy farmers adopted the practice of teat dip fully (3.5%, 21/600) and partially (2.0%, 12/600) in the study area. Mostly the farmers using milking machines were adopting the post-teat dip with potassium permanganate solution. The findings look better than the study [16], which found that not a single respondent in Jammu practiced post and pre-milking tip dipping with potassium permanganate solution. Regarding adoption of mastitis diagnosis kit only 3.50 (21/600) and 3.20 per cent (19/600) farmers reported full and partial adoption. Lack of awareness about SCM and its prevention is considered to be one of the reason that leads to very less adoption of SCM diagnosis test by livestock farmers [17].

Analysis of constraints faced by farmers in adoption of mastitis preventing technologies

Factors inhibiting the adoption of two mastitis preventing technologies viz. teat dip and mastitis diagnosis kit were studied as

three types of constraints viz. general, technical and socio-psychological. The results are discussed below.

General constraints

The results of general constraint analysis by Garret's Ranking Technique (GRT) for adoption of mastitis preventing technologies are presented in table 1. Among the five constraints in case of adoption of teat dip and mastitis diagnosis kit, lack of awareness about the technology was the first constraint, followed by inadequate knowledge about the technological use as second constraint. Poor accessibility to technology inputs, lack of timely services and inadequate government support were remained as third, fourth and fifth constraint respectively in case of teat dip practice, whereas inadequate government support, poor accessibility to technology inputs and lack of timely services were found at third, fourth and fifth place respectively in case of mastitis diagnosis kit. As none of the dairy farmers found known about subclinical mastitis [10,18-19] and very few had corrected knowledge about mastitis diagnostic kit [20]; farmers were not known about the availability of technology inputs and cost to be incurred on it and expecting government to provide it.

Constraints	Teat Dip		Mastitis Diagnosis Kit	
	Garret's Mean score	Rank	Garret's Mean score	Rank
Lack of awareness about the technology	67.17	I	68.50	I
Inadequate knowledge about technology use	56.87	II	59.85	II
Poor accessibility to technology inputs	51.57	III	43.13	IV
Lack of timely services	44.07	IV	29.48	V
Inadequate government support	30.33	V	49.05	III

Table 1: General constraints faced by dairy farmers in adoption of mastitis preventing technologies.

Technical constraints

The technical constraints faced by farmers in adoption of TD and MDK presented in table 2, revealed that lack of technical knowledge about the technologies is the major constraint faced

by the dairy farmers. Technical knowledge is an understanding of modern technology, its working and advances in clear utilization of the technology. Lack of such knowledge makes people less confident to go further with the implementation as well as adoption of the innovation. The findings are in line with understanding that insufficient technical knowledge is an obstacle for implementing technology [21].

Constraints	Teat Dip		Mastitis Diagnosis Kit	
	Garret's Mean score	Rank	Garret's Mean score	Rank
Lack of technical knowledge	69.90	I	72.54	I
Lack of technical skill	63.35	II	62.13	II
Lack of trained, field oriented and experienced veterinary personnel for technical guidance and service	40.81	V	38.93	V
Inadequate training facilities	53.37	III	53.82	III
Improper communication and poor extension contacts	48.33	IV	47.07	IV
Lack of satisfactory/ expected results	24.25	VI	25.52	VI

Table 2: Technical constraints faced by dairy farmers in adoption of mastitis preventing technologies.

Lack of technical skill is the second most constraint hindering the adoption followed by inadequate training facilities, improper communication and poor extension contacts. As training provides detailed information, knowledge and opportunity to meet with different experts might be the cause to motivate the farmers to attend it.

For technology adoption, there is need of technical person to guide as well as to train the farmer in scientific way, hence the lack of trained, field oriented and experienced veterinary personnel for technical guidance and service was fifth constraint followed by lack of satisfactory and expected results at sixth position. Lack of technicality and scientific guidance may lead to improper application of innovation n leading to non-satisfaction of the end-user.

Socio-psychological constraints

The socio-psychological constraints faced by dairy farmers in adoption of dairy farming practices are presented in table 3.

Regarding the implementation of teat dip technology, inability to take decisions was the first ranked constraint followed by shortage of time for animal management, shortage of manpower, poor socio-economic condition and lack of interest in dairy farming at second, third, fourth and fifth rank position respectively. The inability to take decision might be due to poor-socio economic condition which make the farmers unaware of their felt and unfelt needs and hence, farmers never want to spend extra time and cost for animal management. This leads to confusion in the minds of farmers regarding the implementation of the technology at their farms.

Shortage of manpower is positioned at first rank in case of utilization of mastitis diagnostic kit. As this process takes additional time to test the animals for sub-clinical mastitis detection, shortage of manpower was reported in case of medium and large herds. This was followed by constraint shortage of time for animal management, poor-socio-economic condition, inability to take decisions and lack of interest in dairy farming. The results are in partial agreement with previous study [22] which concluded that lack of knowledge, scope and time to manage scientific shed was the major hurdle (59%) under the subhead of dairy management.

Constraints	Teat Dip		Mastitis Diagnosis Kit	
	Garret's Mean score	Rank	Garret's Mean score	Rank
Poor socio-economic condition	47.41	IV	45.79	III
Shortage of manpower	55.80	III	67.90	I
Shortage of time for animal management	60.00	II	58.23	II
Inability to take decisions	61.79	I	52.83	IV
Lack of interest in dairy farming	25.00	V	25.25	V

Table 3: Socio-psychological constraints faced by dairy farmers in adoption of mastitis preventing technologies.

Conclusion and Recommendations

The conclusions are made in light of the findings based on the information provided by the dairy farmer respondents. Majority of farmers (62.80%) were possessing less than two hectares of land including landless farmers, having medium herd size (6-15 dairy animals). Very less number of farmers were involved in any kind of social organization, projects etc and had received training in respect of dairy farming. The constraint analysis by GRT revealed that lack of awareness about the technology, lack of technical knowledge and technical skill, inability to take decisions are the major constraints hindering the implementation of simple beneficial technologies. This study identified a dire need of extensive extension efforts to aware the farmers about their major problems at farms and scientific dairy farming technologies. Extension education can play a pivotal role using all traditional and modern means of communication to motivate farmers at individual, group and mass level for accelerating technology use to achieve optimum and sustainable quality production with higher net returns for maintaining social, economical and psychological welfare of society.

Conflict of Interest

None.

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