

Farmer-led innovations in Commercial Dairy Farms of Punjab and Haryana

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ABSTRACT

Dairying plays a vital role in the economic development of low-income countries such as India. The present study was conducted to explore the important features of selected dairy-based grass root innovations developed by the commercial dairy farmers. Case study method was adopted to carry out the research. Six farmers were identified to conduct the study. The result reveals that, innovations developed by the farmers are locally adoptive in nature, involve less cost, are developed using locally available resources and have a high level of compatibility. However, not all the farmers commercialized the technologies due to their inability to demonstrate their advantages and market the innovations. Hence, it is important to validate the innovative technologies of farmers by the agricultural institutions.

Key words: Features, Innovations, Farmers, Case studies, Dairy

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Introduction

Dairying plays a significant role in the process of economic development of low-income countries like India. Along with agriculture, livestock is primarily practised as a complementary enterprise along with crop farming by vast majority of Indian farmers (Ponnusamy and Pachaiyappan, 2018). Around 80 million rural households in the country are engaged in milk production. Besides, the country is home to about 535.78 million livestock population, wherein bovine population accounts for 302.79 million (GoI, 2019). The value of output from dairying is higher than the value of output of wheat and paddy together. However, dairy farming is facing many challenges such as reduction in fodder grown area, non-interest of youngsters towards dairy, non-availability of suitable technologies, penetration of adulterated milk in the market, high dependence on external labour force, climate change, non-availability of land and manpower, low prices, incidence of disease and import of low-cost milk and milk products (Singh et al., 2021; Chugh and Kaur, 2022). One of the factors that determine the sustainability of dairy farming is providing appropriate technologies to the farmers at relatively low cost, with more adoptability and easy accessibility (Balaine et al., 2020).

In India, research work in agriculture and allied activities are mainly carried out by ICAR (Indian Council for Agricultural Research) with the help of large number of agencies that fall under this organization. According to Ponnusamy and Padaria (2021), investment of India on agricultural research is of 0.3 per cent of agriculture GDP, which is much lower than the spending of China (0.62 per cent). Although, agriculture investment supported the country in achieving higher production through effective implementation of innovative technologies and methods of agricultural institutions. Adoption of technologies depends upon the characteristics of innovation (Shanmugam and Shanmugam, 2021). To increase the rate of adoption, the approach followed in development of innovations is gradually changing from formal agricultural research to participatory development (Ponnusamy and Padaria, 2021). On the other hand, farmers themselves developed new innovations by means of experimentation of traditional knowledge and new ideas originated from a variety of sources (Ponnusamy et al., 2021). Generally, farmer's innovations are cost effective, suitable to local condition and easily accessible in nature, hence, farmer-led innovations were rapidly accepted by the other farmers (Datt et al., 2013; Gowda et al., 2019). Certainly, modern technologies help in augmenting the productivity of crops or livestock especially in the short run. However, in long run, the technologies that are developed by farmers have high level of sustainability. Farmer innovations remain unrecognized by communities themselves. Numerous agencies and organisations, including the Indian

Council of Agricultural Research (ICAR), the National Innovation Foundation, and the National Bank for Agriculture and Rural Development (NABARD), are working to document, validate, and commercialise farmer-led innovations in India (Sharma et al., 2018). Identifying and characterization of farmer-led innovation would give better insights that help in framing policies. With this view, the present study focused on studying the features of farmer-led dairy-based innovations.

Materials and Methods

In view of nature and significance of the study, case study method was adopted for the present investigation. The samples were selected purposefully based on the data given by the Progressive Dairy Farmers Association (PDFA) of Punjab, KVKs, NGOs and personal interaction with the experts of ICAR-NDRI, Karnal, GADVASU, Ludhiana and PAU, Ludhiana. As per World Bank (2011) report, two types of progress were observed in dairy production system across the country viz., i) leading: livestock activity is more commercialized and market-driven enterprise which includes states of Punjab, Haryana, Gujarat and Tamil Nadu; ii) lagging : includes the state of Odisha where livestock activity is mainly of subsistence nature and act as a livelihood security to the farmer's. However, Kale et al. (2016) classified the dairy production system of India into three categories viz., high, medium and low, wherein, Punjab and Haryana come under the high dairy progressive category, primarily due to the inclination of farmers towards high profit oriented dairy enterprise. Considering the progressiveness and commercialization of dairy enterprises, the present study was restricted to the state of Punjab and Haryana. Finally, six innovations namely sprinkler system using PVC pipe (developed by Mr. Ranjeet Singh), self-designed shed with movable sides (developed by Mr. Hemraj), individual water bowl (developed by Mr. Jatinder Singh), own feed preparation (developed by Mr. Pawan Kumar), silage pit cum storehouse (developed by Mr. Kumar Gautham Chauhan) and membership card for customers (developed by Mr. Rohit) that are relevant to the dairy farming were selected for this study. By seeing the utility of the farmer innovations and their potential for further upscaling, six innovations that are different from each other and could provide different insights as motivation for other farmers in dairy farming were selected. Apart from the personal interview method, observation method was also used in the collection of data.

Innovation is crucial for successful continuance of any enterprises. Farmers did not adopt the new technology as such, and they tend to modify the technology or create an alternative route or model according to their need and skill. An attempt was made to identify the characteristics of innovations which resulted in better performance of dairy farms of Punjab and Haryana.

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Fig. 1: Sprinkler system using PVC pipe

Besides, the country is home to about 535.78 million livestock population, wherein bovine population accounts for 302.79 million (GoI, 2019). The value of output from dairying is higher than the value of output of wheat and paddy together. However, dairy farming is facing many challenges such as reduction in fodder grown area, non-interest of youngsters towards dairy, non-availability of suitable technologies, penetration of adulterated milk in the market, high dependence on external labour force, climate change, non-availability of land

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Fig. 4: Silage pit cum storehouse

Innovation 5: Membership card for the customers

Customer loyalty is one of the business strategies in any venture. Retaining the customer base would substantially boost the income of the farmers. An innovation in customer retention will play a crucial role in commercial dairy farming. Mr. Rohit, a young farmer residing in Gurugram and owned a dairy farm in Delhi, has introduced a membership card for the customers. Anyone can avail the membership card from his dairy by paying Rs. 100, which is refundable in nature. The farmer used to provide a discount for card holders on litre basis, for instance, customer without membership get one litre of milk at Rs.70, while the cardholders get a discount of Rs. 3 per litre (Rs.67/lit). The discount rate varies according to the season; for example, during winter time, the rate of discount was high and it was lower during festival season. By adopting this method, the farmer has attracted around 180 membership customers to his farm. Among those, about 150 customers are regularly purchasing milk from their farm.



Fig.5: Membership card for customers

Table 1: Specific attributes of selected dairy-based farmer-led innovation

Farmer-led innovations					
Attributes	Sprinkler system using PVC pipe	Self-designed shed with movable sides	Individual water bowl	Silage pit cum storehouse	Membership card for the customers
Utility	Used to cool the dairy animals during summer	Most important factor which influences milk production is temperature. It protects the animals from both freezing and hot temperature and mosquitos.	No labour is required. Continuous supply of water to animals.	Generally, farmers use the silage pits for a period of 6 months especially during summer. This structure acts as both silage pit (during summer) and store house (during winter).	In the competitive dairy industry, attracting and retaining customer is a difficult task. Maintains a consumer base for the commercial farm.
Cost	The farmer recycled the available resources by using the broken PVC irrigation pipes.	Cost is much higher; however, it has longevity	To cover twenty animals, farmers need to spend approximately six thousand rupees.	Average cost for the construction of shed is about Rs. 1 lakh	Cost of membership card is around Rs. 2500 for 100 cards.
Benefits	It helps to protect the animals from heat stress that in turn increases the reproduction rate and milk yield.	It helps to reduce the mortality rate of young calf which are more vulnerable to freezing temperature.	It is a better alternative to the water trough which is much costlier than individual water bowl.	Quality feed is available for dairy round the year. No need of any additional structures to keep dairy implements.	Beneficial to farmers as well as consumers. As a result, it draws more customer and builds a customer base for the dairy farm, increasing the farmer's profit.

Suitability	Since the water usage is more, it is very much suitable for the farmers practicing both crop and dairy farming.	The structure requires small investment. Hence, it is suitable for medium to large dairy farmers.	This technology is much needed in commercial dairy farms which faces the problem of non-availability of labours. Suitable for all type of dairy farms.	Preparation of silage is an important practice among all type of dairy farms. So, its suitable for all the farms.	It is very much suitable for commercial farms and also farmers having 10-20 animals.
Sustainability	It paves a way to re-use of PVC pipes which affect environment negatively. This system also allows effective utilization of waste water.	This structure is eco-friendly.	This technology is made with bowl and simple concrete structure to improve the dairy animals' health.	This structure is made with the help of local wisdom and modifications of traditional structure.	Similar cards were issued in a variety of businesses, including the clothing, electronics, and medical industries. Strong consumer base encourages farmers to diversify their product lines.

Innovation 6: Own feed preparation (developed by Mr. Pawan Kumar)

Farm made feed is always helpful to the farmers to reduce the cost of milk production drastically. A progressive dairy farmer from the Karnal district of Haryana has prepared their own concentrate feed for their dairy animals. He used to prepare 5 quintals of nutritious concentrate for 100 dairy animals per month with a feed cost of Rs. 24/Kg. Earlier, he used to buy the feed from local market at cost range of Rs. 30-35/kg depending on the quality of feed. Preparation of one's own feed helped to save around Rs. 5000 per month. The ingredients were grinded and mixed well in the feed mill located at a nearby place. It has helped the farmer to improve milk quality as well as the productivity of animals by about 5-7%. The ingredients used were as follows:

Own feed formulations (5q/month):

- Wheat - 1 quintal
- Bengal gram - 1 quintal
- Cotton - 1 quintal
- Mustard - 2 quintal
- Mineral Mixture - 20 Kg
- Calcium - 5 litre



Fig.6: Own feed formulation

Conclusion

Innovation is crucial for developing the sustainable dairying. Six different innovations emanated from this study indicated that, most of farmers have developed the innovation which has the features of lesser cost, local adaptability, more convenient and comparative advantage over the existing technology available with them. However, the innovations developed by the farmers are neither commercialized nor reached many other farmers residing nearby places. Presently, government is encouraging the development of innovation through farmer's participation. In addition, extension agents should take vigorous efforts to focus more on validation of the farmer's innovations and its adoptability over other places. After the validation, the innovations need to be commercialized or diffused to other dairy farmers especially small and medium commercial dairy farms which helps to increase their income and animal health.

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