Determinants for adoption of crossbred cows by the small farmers in Manipur

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ABSTRACT

The study was conducted to find out the determinants for adoption of crossbred cows by the small farmers in Thoubal district of Manipur. The primary data on various socio-economic variables were collected and analyzed by using descriptive statistics and the logistic regression technique. The results of the logistic regression revealed that landholding, extension service and education were the important factors which had a positive and significant effect on the adoption of crossbred cows implying that farmers having higher landholding, extension service participation and educational level were more likely to adopt crossbred cows. Family size had a negative effect on the adoption of crossbred cows. This shows that as the family size increased there was less likelihood of adoption of crossbred cows. Thus crossbreeding of a local breed with the existing exotic cattle breeds should be encouraged by the government. The veterinary and extension workers should also take initiatives to improve the veterinary and animal husbandry activities so that the farmers' knowledge in scientific livestock management techniques and adoption of crossbred cows could be increased.

Keywords: Determinants; crossbreed; logistic regression; small farmers

INTRODUCTION

India being the largest milk producing country in the world, dairy farming is considered one of the main tools for shaping the socio-economic development of rural areas. The country's total milk production was about 187.7 million metric tonnes in the year 2018-19 (Anon 2019a). The majority of the country's total milk supply emanates from millions of small and marginal producer farmers who are spread throughout the rural areas. About 78 per cent of milk producers are small and marginal farmers and they together contribute around 68 per cent to total milk production (Kumar et al 2013). More or less, this trend holds all across the states of the country. In terms of actual number, marginal farmers and landless labourers form the largest group of rural milk producers (Himabindu et al 2014). Dairy farming specially crossbred/exotic has a huge potential for improving the socio-economic status of small and marginal farmers as the farming is gender-neutral, requires less area, easy to practice and manage and has a good return to the dairy farmers. Recent studies pointed out that the adoption of crossbred cattle in the context of Assam was significantly rewarding in terms of higher farm income and gain in nutrition from increased self-produced milk consumption (Bayan and Dutta 2017).

According to the 19th Quinquennial Livestock Census 2012, GoI (Anon 2012), the cattle population in Manipur state was 263.84 thousand which constituted 44.31 thousand crossbred and 219.53 thousand local bred. The population of the cattle has declined marginally from 341.96 thousand (2007) to 263.84 thousand (2012) in both cattle groups. But the change in milch exotic cattle population during 2007-12 has increased by 23 per cent in rural areas as compared to 2003-07 in all over India estimate. In Manipur, dairy farming is a primary or subsidiary occupation for many farmers. Farmers rear one to three local non-descript cattle which depend on agricultural waste and open grazing in the field for feeding. The cattle are specially used for milk production and secondarily as farm manpower in their fields and the residues are used as fuel after drying for burning and as manure for crop farming. Even programmes such

as Intensive Cattle Development Project (ICDP) and Rashtriya Krishi Vikas Yojana (RKVY) have encouraged the adoption of cross breeding technology and there is also increase in milk production from 81.56 thousand tonnes in 2016-17 to 84.04 thousand tonnes in 2017-18 (Anon 2019b). Dairy sector is not much developed in the state. Priscilla and Chauhan (2019) stressed upon the importance of dairy cooperatives in the adoption of crossbred cows in the state. Various socio-economic factors such as poor farming system, low scientific knowledge about dairy farming and producers being small and marginal farmers, hinder the development of this sector and adoption of crossbred cows in the state. Even the adoption of crossbred cows is not much improved in the state. A study conducted by Singh et al (2019) revealed that per day net return of a crossbred cow dairy farmer is much higher than a non-descript local cow dairy farmer. Therefore, it is necessary to understand the determinants for the adoption of crossbred cows by the dairy farmers and to formulate the right strategies for the overall socio-economic development of the farmers. The present study was conducted to find out the determinants for adoption of crossbred cows by small dairy farmers of Manipur.

METHODOLOGY

The study was conducted in the Thoubal district of Manipur. A multistage sampling plan was used for the selection of the respondent farmers. Two blocks viz Thoubal and Lilong were selected from the district. A total of four villages, two from each block, were selected. From these four villages, a total of 100 respondent dairy farmers were selected randomly which constituted 60 farmers rearing crossbred cows and 40 farmers rearing local non-descript cows based on an adult milch cow. Primary data were collected from the selected farmers using a well-structured pre-tested personal interview schedule. The data on age, family size, family type, landholding, education, occupation, extension service participation, etc were collected and used for the analysis. Description of the variables used in the study is given in Table 1. To examine the significance of socio-economic parameters among the dairy farming households, Pearson's chi-square and t-test were used. For assessing the determinants of adoption of crossbred cows by the dairy farmers, a binomial logit model was applied. The dependent variable was a dummy variable, dichotomous in nature (assuming a value of 1 in case of crossbred adopter and 0, otherwise).

The model is of the form:

$$D_i = \alpha X_i + V_i$$

$$D_i = 1, \text{ if } D_i^* > 0 \text{ and } 0 \text{ if } D_i^* < 0$$

where D_i^* = Latent variable that takes the value 1 if the famer is crossbred adopter, 0 for local cow adopter, V = A vector of household characteristics, α = A vector of parameter

RESULTS and DISCUSSION

A description of the various socio-economic variables considered in the present study and their significance level is given in Table 2. There was a significant difference (at 5 and 1% LoS) between the family size and landholding of the crossbred and local cow adopted households. Educational level and extension service participation functionaries were significantly different between the two categories of households. The variables age, family type and occupation of the two households did not have any significant impact.

The results of the logistic regression analysis and the marginal effect of the present study are shown in Table 3. The data show that the factors landholding, extension service participation and education of the respondent farmers were the important variables that encouraged the respondent dairy farmers to adopt crossbred cows at 1 per cent LoS (landholding and extension service participation) and 5 per cent LoS (education). This means that farmers having higher landholding had more likelihood of adopting crossbred cows. These findings are supported by the observations of Yadav and Naagar (2021). Higher the contact with the extension workers, more was the likelihood of adopting crossbred cows. Garai et al (2020) also reported the same. Similarly, higher the education level more was the likelihood of adopting crossbred cows. Similar observation has been made by Quddus (2017). The explanatory variable, family size had negative relationship at 5 per cent LoS with the adoption of crossbred cows. This shows that if the number of family members increased, there were fewer chances of adoption crossbred cows implying that as number of family members increased, the probability of adoption of crossbred decreased.

Marginal effects are used to describe the average effect of changes in explanatory variables on the change in the probability of outcomes in logistic

Table 1. Description of the variables used in the study

Explanatory variable	Measurement
X_1: Age of respondents	Years
X_2: Family size	Number
X_3: Family type	Joint = 0, Nuclear = 1
X_4: Landholding	Hectares
X_5: Education	Illiterate = 0, Primary = 1, Middle = 3, High school = 4, Secondary = 5 , Graduation & above = 5
X_6: Occupation	Dairy = 1, Agriculture = 2, Business = 3, Service = 4
X_7: Extension service participation	Yes = 1 or Otherwise = 0

Table 2. Socio-economic profile of crossbred and local cow dairy farmers

Explanatory variable	Crossbred (60)		Local (40)		Difference mean	Pearson χ^2	t-test value
	Mean	SD	Mean	SD			
Age	49.11	11.2	49.22	11.53	–0.11	-	–0.047
Family size	5.31	1.1	5.7	1.01	–0.39	-	–1.82*
Family type	-	-	-	-	-	0.68	-
Landholding	0.61	0.11	0.46	0.2	0.15	-	2.57**
Education	-	-	-	-	-	5.40*	-
Occupation	-	-	-	-	-	0.57	-
Extension service participation	-	-	-	-	-	11.8**	-

*Significant at 5% LoS, **Significant at 1% LoS

Table 3. Logit estimates of the determinants for adoption crossbred cows by the dairy farmers

Variable	Coefficient	SE	Marginal effect
Age	0.296	0.042	.006
Family size	–1.649*	0.551	–.362
Family type	–1.203	0.990	–.264
Landholding	4.800**	1.689	1.054
Education	0.426*	0.234	0.935
Occupation	–0.418	0.401	0.919
Extension service participation	2.33**	0.791	0.465
Constant	4.23	4.31	

*Significant at 5% LoS, **Significant at 1% LoS

regression. The value of the marginal effect of family size showed that if one person was added in the family, there was 0.36 per cent probability of decreasing adoption for crossbred cows. Similarly, if the landholding of the farmer increased by one hectare, there was 1.05 per cent chance of increase in adoption crossbred cows. Also if the education and extension service increased to some higher level, there was 0.91 and 0.46 per cent probability of increase in adoption.

CONCLUSION

The study concluded that landholding, extension service participation and education were the important factors positively influencing dairy farmers to adopt crossbred cows. This might be due to the farmers' requiring a large amount of dry and green fodder for feeding crossbred cows. If the farmers had large landholding, there were fewer problems of feeding because they could use the agricultural product residues of the farm for feeding. Also, if the farmers

had higher education and more contact with the extension workers they got more new ideas and innovations and thus adopted crossbred cross which was more profitable for dairying as compared to the conventional local cow dairy farmers. To improve the overall socio-economic conditions of farmers of the two categories, the veterinary and extension workers of the related departments should take initiatives to increase the awareness on veterinary and animal husbandry activities so that the farmers' knowledge in scientific livestock management techniques and adoption of crossbred could be increased. The farmers also needed to organize themselves into dairy cooperatives or Farmer Producer Organizations (FPOs) to increase the efficiency in farming and marketing activities.

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