Distribution and Preference of Selected Dairy Breeds among Farmers of Bihar: A Socio-economic Analysis

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ABSTRACT

The preference for dairy breeds is likely to depend on resource availability. This study attempted to analyze the distribution of the selected breeds of dairy animals among the farm size category, education, and experience of the dairy farmers. The study was conducted in the central region of Bihar and primary data was collected from January-March 2021, from 70 farmers in respect of the selected dairy animals using a pre-structured interview schedule. Ease of rearing index was developed and the preference of the dairy farmers towards the selected dairy breeds was estimated. The key findings revealed that 55 per cent of farmers were marginal farmers and mostly preferred indigenous breeds like Graded Sahiwal and Graded Murrah. The farmers rearing Graded Sahiwal (67%) and Graded Murrah (69%) were having qualifications up to secondary education. Highly experienced farmers were rearing buffalo whereas Graded Sahiwal (67%) and crossbred (72%) animals were kept by farmers having experience less than or equal to 20 years. The ease of rearing index revealed that most of the farmers were preferring indigenous breed to rear because of its qualitative parameters. It can be concluded that farmers are having likeness towards indigenous breeds which needs to be promoted.

INTRODUCTION

Indian dairy sector has undergone massive changes since the advent of the white revolution and becoming a world front-runner in terms of milk revolution and hence the dairy sector is having enormous potential to provide job opportunities to a massive population (Aski & Hirevenkanagoudar, 2010; Das et al., 2020; Mandi et al., 2022). Dairy farming is supplement to agricultural growth and an effective tool to uplift the socio-economic status of the rural areas as well as the farmers (Gangasagare & Karanjkar, 2009; Vekariya et al., 2016 & Mondal et al., 2022). India is well versed with bovine diversity and possess one-ninth of cattle germplasm (Bhandari et al., 2020). The total livestock population is 535.78 million in the country showing an increase of 4.6 per

cent over livestock census-2012. The indigenous female cattle population has increased by 10 per cent and the total exotic crossbreed cattle population increased by 29.3 per cent in 2019 as compared to previous census (20th Livestock Census). The milk production has grown at a compound annual growth rate of 6.2 per cent to reach 209.96 million tonnes in 2020-21 from 146.31 million tons in 2014-15. The all-India per capita availability of milk has been reported as 427 gram per day in 2020-21 (Economic Survey, 2021-22). There are about 53 recognized indigenous breeds of cattle and 20 buffalo in India (NBAGR, 2022). The major indigenous cattle breeds of India are Gir, Red Sindhi, Sahiwal, Amrit Mahal, Umbalacheri, Deoni, Hariyana, Ongole, Rathi, Vechur, etc. The major indigenous breeds of buffalo are mainly Bhadawari,

Jafarabadi, Mehsana, Murrah, Surti, etc. Among dairy animals, India has a large population of Indigenous breeds which have survived over a long time and fits well into the agro-ecological environment of their habitat (Kumar et al., 2022). They are robust, have the capacity to thrive in conditions of great dietary deprivation, and have the ability to tolerate heat (Sharma et al., 2015; Savalia et al., 2019). They are also known for their gentle temperament and ease of Calving. Ease of rearing index is one criterion which can help in comparison of the different breed on the basis of their qualitative parameter. The socio-economic status of the farmers has an effect on animal and farm management, decision making, and the general perception of breed and species of the farmers. High milk yield, less expenditure on feed, breeds suitable for an area and climate, availability of government support schemes, specific farm conditions is having direct relationship with breed preference (Kumar et al., 2016). Without understanding these factors, it would be difficult to analyze the requirements of the farmers and to persuade them to fully participate and cooperate in a breeding program (Kosgey et al., 2006).

METHODOLOGY

The present study was designed to know the societal status of the farmers keeping different breeds of dairy animals of different lactation group. The study was conducted in central region of Bihar based on the report of Livestock sector analysis (Singh et al., 2018) in Bihar stating that Sahiwal breed of cattle, Murrah buffaloes and Jersey/ HF crossbred dairy animals are the suitable breeds for the region. These breeds are performing well in their breeding tract and having good livestock infrastructure to support, but in the non-traditional areas like Bihar, where the agroclimatic condition and the livestock services are not alike to the traditional regions. Hence, this study was purposively conducted in order to explore breed's performance and preference among the farmers in Bihar. Primary Data was collected from 70 farmers during January-March 2021, with the help of pre tested survey schedule of a sample size of 108 animals from three lactation groups of each selected breed i.e., 1-3 lactation number, 4-6 lactation number and ≥ 7 lactation number to cover the productive life of a breed. 12 animals in each lactation group were selected by snowball sampling method. The aspects discussed in this section are distribution of animals of different breeds across operational holdings, education status and experience of the owner of a breed.

An Ease of Rearing Index was also developed to capture the preference of the farmers towards keeping the dairy animals of different breed. The qualitative traits apart from their milk production aspect namely handling of animals, incidence of diseases, incidence of ticks and worms, feed and fodder requirement, and out of pocket expenses were kept in mind to ask the farmers for keeping the particular animal. To combine all the six indicators, into one value of the EoR index, weights were assigned to each selected indicator with the help of the expert opinion method. As the scores were having negative functional relationship with the EoR index, the following formula was used to normalize the score in order to range between zero and one.

$$\text{Normalization} = \frac{\text{Maximum value} - \text{Actual value}}{\text{Maximum value} - \text{Minimum value}}$$

The Ease of rearing (EoR) index was computed by the normalized score of each indicator with assigned weight of the respective indicator.

$$\text{EoR} = \frac{\sum_{i=1}^{n} X_i W_i}{\sum_{i=1}^{n} W_i}$$

Where, X_i represents the normalized value of the ith indicator (normalized), W_i is the weight of ith indicator and 'i' varies from 1 to 6.

Finally, EoR was calculated by taking the average of the indices of the indicators. Based on the computed EoR index for all the animals, the selected animals were categorized into the low, medium and high range of EoR index by cumulative square root frequency method.

RESULTS AND DISCUSSION

In the selected sample, there were about 56 per cent marginal farmers and 13 per cent medium farmers. The average farm size operational holding of marginal, small and medium farmers was 0.64 ha, 1.22 ha and 3.07 ha, respectively. The share of operation holding allocated to fodder production was about 30 per cent (0.19 ha) by marginal farmers, 20 per cent (0.24 ha) by small farmers and 12 per cent (0.38 ha) by medium farmers.

Table 1 reveals that the more animals of Graded Sahiwal and Graded Murrah were kept by marginal farmers while the crossbred animals were more with medium farmers. It might be due to the fact that marginal farmers were more resource scarce as compared to medium famers and hence the maintenance of indigenous breeds was easier for marginal farmers compared to crossbred. Similar result was reported by Rangnekar (2006) in International Livestock Research Institute report. The percentage share of Graded Sahiwal and Graded Murrah with marginal farmers was 55.55 and 41.67 per cent, respectively. The share of crossbred animals was the highest (41.67%) with small farmers. The table further shows that, marginal farmers were having 40 to 60 per cent of animals in their late lactation except in case of crossbred animals (25%) due to lack of capital and resource scarcity. They used to keep old animals rather than buying early lactation animals as less maintenance was required to keep old lactating indigenous animals. Late lactation crossbred was not kept because they used to get frequent health issue in their late lactation and hence the rise in veterinary cost was not easy to bear by marginal farmers. Kabir et al., (2010) also reported similar result for goats where adult goats were having higher frequency of disease compared to young ones.

Distribution of breed across educational level of head of house hold

About 67 per cent of Graded Sahiwal (cumulative) and 69 per cent of Graded Murrah (cumulative) were reared by the head of the households having education qualification up to secondary level (Table 2). Contrast was the case in crossbred, about 58 per cent of the animals of this breed (cumulative) was reared by the head of the households who were having education qualification more than secondary education. It shows that highly qualified farmers preferred to rear crossbred cattle (Hossain et al., 2005). This might be due to the fact that higher qualified persons are

Table 1. Distribution of different age group animal's breed across farm size categories (number of animals)

Breed	Lactation Number	Farm household (number)		
		Marginal	Small	Medium
Graded Sahiwal	1-3	7(58.33)	3(25.00)	2(16.67)
	4-6	5(41.67)	3(25.00)	4(33.33)
	≥7	8(66.67)	2(16.67)	2(16.67)
	Total	20(55.55)	8(22.22)	8(22.22)
Crossbred	1-3	2(16.67)	4(33.33)	6(50.00)
	4-6	3(25.00)	5(41.67)	4(33.33)
	≥7	4(33.33)	3(25.00)	5(41.67)
	Total	9(25.00)	12(33.33)	15(41.67)
Graded Murrah	1-3	3(25.00)	5(41.67)	4(33.33)
	4-6	7(58.33)	3(25.00)	2(16.67)
	≥7	5(41.67)	3(25.00)	4(33.33)
	Total	15(41.67)	11(30.55)	10(27.78)

Figures within parentheses indicate percentage of the row total, and some farmers were having more than one breed

Table 2. Distribution of different age group animal's breed across educational level of head of household

Breed	Lactation Number	Educational level of household head				
		Illiterate	Primary	Secondary	Higher Secondary	Grad. & Above
Graded Sahiwal	1-3	(25.00)	(16.67)	(25.00)	(16.67)	(16.67)
	4-6	-	(8.33)	(50.00)	(16.67)	(25.00)
	≥7	(25.00)	(8.33)	(41.67)	(8.33)	(16.67)
	Total	(16.67)	(11.11)	(38.89)	(13.88)	(19.44)
Crossbred	1-3	(8.33)	(33.33)	-	(25.00)	(33.33)
	4-6	-	(16.67)	(41.67)	(8.33)	(33.33)
	≥7	(16.67)	(8.33)	(8.33)	(58.33)	-
	Total	(8.33)	(19.44)	(16.67)	(30.55)	(22.22)
Graded Murrah	1-3	(25.00)	(33.33)	(8.33)	(8.33)	(25.00)
	4-6	(25.00)	(8.33)	(41.67)	(16.67)	(8.33)
	≥7	(16.67)	(25.00)	(25.00)	(16.67)	(16.67)
	Total	(22.22)	(22.22)	(25.00)	(13.88)	(16.67)

Figures within parentheses indicate the percentage of the row total

adopting the modern practices (Alene & Manyong, 2007). Observing the results of distribution of breeds among farm size categories and the education status of household, clearly reveals that indigenous breeds are preference over crossbred by the resource poor farmers having lower education level might be due to the fact that the rearing of indigenous breeds requires fewer modern inputs and services (Balaraju et al., 2016; Duguma & Janssens, 2016).

Distribution of breed across experience of the farmers in dairying

The dairy animals of different lactation number have been distributed across the experience of the farmers in dairying (Table 3). It reveals that crossbred (72%) animals were kept by farmers having experience less than or equal to 15 years. It might be because less experienced farmers would be more profit oriented to get more return from crossbred (Balaraju et al., 2016). While farmers having experience of less than or equal to 20 years were keeping Graded Sahiwal (83%) and Murrah (77%). Less experienced farmers rarely go for animals in their advanced lactation number (≥ 7th lactation number) as there was no crossbred and Graded

Murrah in this lactation number group among the farmers of 0-5 years of experience. It might be because of the lack of information about management practices in late lactation. Around 55 per cent of respondents had 11 to 20 years of experience in buffalo rearing. The result was somewhat similar to findings of Sivaji et al., (2018) who reported 35 per cent of respondents were having experience of 11 to 20 years in rearing buffalo. It might differ from region to region.

Average index score of indicators for the dairy breed

Table 4 gives the score value of individual indicators and overall index value for different breeds. It indicates that the overall EoR index value was the highest for Graded Sahiwal (0.705) followed by Graded Murrah (0.611) and crossbred (0.334). The EoR index of Graded Sahiwal and Graded Murrah was 2.110 times and 1.829 times higher than EoR index of crossbred cow. This clearly indicates that overall ease of rearing of indigenous breeds was almost double the ease of rearing of crossbred.

The overall EoR index was based on score value of six indicators as mentioned in Table 4. The Graded Sahiwal was

Table 3. Distribution of breeds across experience of the farmers in dairying

Breed	Lactation Number	Experience in dairy farming (years)				
		0-5	6-10	11-15	16-20	>21
Graded Sahiwal	1-3	(8.33)	(41.67)	(33.33)	(16.67)	-
	4-6	(8.33)	(33.33)	(25.00)	(25.00)	(8.33)
	≥7	(8.33)	(16.67)	(25.00)	(8.33)	(16.67)
	Total	(8.33)	(30.55)	(27.77)	(16.67)	(8.33)
Crossbred	1-3	(16.67)	(25.00)	(33.33)	(8.33)	(16.67)
	4-6	(25.00)	(16.67)	(50.00)	(8.33)	-
	≥7	-	(8.33)	(41.67)	(25.00)	(25.00)
	Total	(13.89)	(16.67)	(41.67)	(13.89)	(13.89)
Graded Murrah	1-3	(8.33)	(16.67)	(33.33)	(25.00)	(16.67)
	4-6	(16.67)	(8.33)	(16.667)	(33.33)	(25.00)
	≥7	-	(16.67)	(25.00)	(33.33)	(25.00)
	Total	(8.33)	(13.89)	(25.00)	(30.55)	(22.22)

Figures within parentheses indicate the percentage of the row total

Table 4. Index score for the different indicators and overall index of the breeds

Indicators	Selected breeds			
	Weights assigned (Per unit of 100)	Graded Sahiwal	Crossbred	Graded Murrah
Handling of animal	16	0.286	0.518	0.862
Out of pocket expense	20	0.650	0.376	0.629
Incidence of diseases	15	0.768	0.179	0.759
Incidence of ticks and worms	11	0.813	0.268	0.517
Fodder requirement	18	0.830	0.339	0.474
Feed requirement	20	0.875	0.295	0.457
EoR index (overall)		0.705	0.334	0.611
EoR index ratio (based CB)		2.110	1.00	1.829

having the highest score value of all the indicators except one, that is, handling of animal. The average score of handling of animal of Graded Sahiwal was the lowest (0.286) and it was the highest (0.862) for Graded Murrah which indicates that it is the easiest to move, milk and feed the Graded Murrah animal as compare to other two breeds and the vice-versa was the true for Graded Sahiwal animal.

Classification of dairy breeds based on ease of rearing index (EoR)

From Figure 1, it can be inferred that Graded Sahiwal was considered having high rearing index by 100 per cent of the farmers. Similarly, crossbred was considered for low rearing index by 25 (89%) farmers and 3 (11%) farmers considered for medium rearing index and none of the farmers considered it for high rearing index which showed its disadvantage over Graded Sahiwal. It is because, indigenous breed like Graded Sahiwal is superior in the qualitative parameters like ease of feed and fodder requirement, disease resistance, quality of milk compared to crossbred. Similar results were also reported by Balaraju et al., (2016); Rahman et al., (2013) & Siddiquee et al., (2013). Whereas for Graded Murrah, 11 farmers (38%) considered medium ease of rearing index, 18 farmers (62%) reported for high rearing index and none of the farmers reported for low rearing index. In contrast, Singh et al., (2022) reported that Murrah was found more preferred (81.42%) followed by Crossbred (65.82%) in Punjab. It might be due to
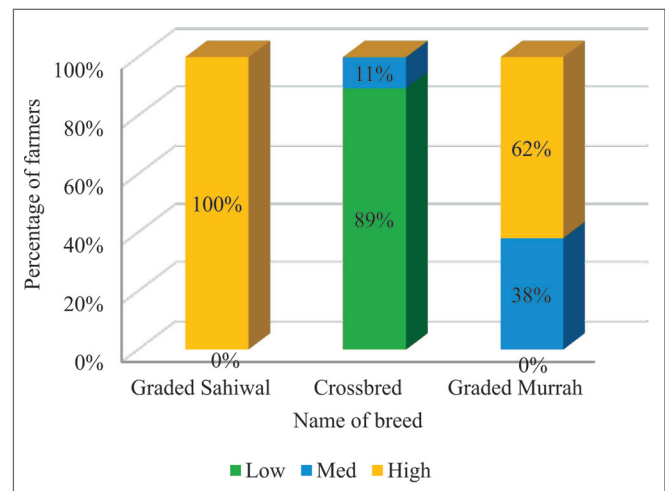
Figure 1. Categorization of breeds according to Ease of Rearing Index (EoR)

variation in availability of feed and fodder, availability of grazing areas and milk price from region to region. It is inferred that indigenous breeds (Graded Sahiwal and Graded Murrah) were having higher ease of rearing as compared to crossbred cattle therefore, these breeds are preferred by the farmers in situations where there is scarcity of resources as supported by findings of Balaraju et al., (2016).

CONCLUSION

It can be concluded from the study that marginal farmers were mostly preferring indigenous breeds as per the availability of the resources and small farmers preferred crossbred animals. Farmers having less than secondary education and experience less than twenty years were mostly found to rear Graded Sahiwal and Graded Murrah. Late lactation animals were marginally favored by less experienced farmers. Based on the estimated ease of rearing index, farmers had greater preference for Graded Sahiwal. It shows that, still farmers prefer to keep indigenous breeds due to its qualitative parameter despite of its low milk yield. There is a need to have more robust study on improving the genetic value of the indigenous breeds as well as a method to estimate the economic value of the qualitative parameters to conserve the indigenous breeds.

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