Socio-demographic Determinants of Knowledge and Adoption of Animal Husbandry Practices among Dairy Farmers

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Article Information

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here:
https://pr.sdiarticle5.com/review-history/144097

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ABSTRACT

Dairy farming plays a crucial role in sustaining rural livelihoods in India. Despite its importance, farmers' income in the dairy sector is constrained by various factors. To improve income levels, there is a need to adopt modern and scientific husbandry practices. With this objective, a study was undertaken in Banda district of Uttar Pradesh to explore the relationship between socio-demographic characteristics, knowledge levels and adoption of dairy animal husbandry practices. A random sample of 80 dairy farmers was selected from 10 villages, and the investigation was based on an ex-post facto research design. The findings revealed that 63.75% of the respondents possessed a medium level of knowledge, while 61.25% demonstrated a medium level of adoption of dairy practices. Further analysis indicated that education, dairy farming experience, herd size, social participation, and risk orientation had a positive and significant association with farmers' knowledge levels. Likewise, herd size, education, risk orientation, and annual income were significantly associated with the adoption of animal husbandry practices. These results highlight the importance of socio-demographic and economic factors in shaping both knowledge and practice adoption, thereby providing useful insights for policy interventions aimed at improving dairy farmers' livelihoods.

1. INTRODUCTION

In the past three decades, dairy industry in India has come a long way that has experienced a never witnessed growth in milk production and per capita milk availability. The milk produced by cattle and buffalo is the biggest agricultural product that contributes largely to the Indian economy. The dairy farming in India are significantly supported by small-scale and marginal farmers for producing milk. India belongs to the list of countries that managed to modernize its dairying and has realized their increased production due to the usage of scientific technologies in the dairy farming system (Khayali et al., 2015). According to report of BAHS 2024, the milk production has grown 3.78 percent in year 2023-24 compared to 2022-23 in India. The availability of milk per head is currently 471grams/day. The milk production from exotic/crossbred cattle has increased by 8% and indigenous/ non-descript cattle has increased by 44.76% in 2023-24 against the previous year. There is a 16 per cent decline in the buffalo milk produced when compared to the last year. The leading 5 states in Milk production in India are Uttar Pradesh (16.21%), Rajasthan (14.51%), Madhya Pradesh (8.91%), Gujarat (7.65%) and Maharashtra (6.71%). They all are responsible in providing 53.99 percent of the total

Milk Production within the country. India has been ranked the top milk producer nation in the world but it has low potential of producing per unit milking (Parmar et al., 2025). The main reason of this low production in India is a lack or low spread of the knowledge among the dairy farmers about the better animal husbandry ways which create differences in socioeconomic situation.

Dairy farming in Bundelkhand is mostly small-scale and subsistence-based, facing challenges like water scarcity, low milk productivity, poor infrastructure, and limited veterinary services. However, there is growing potential due to government schemes, the involvement of self-help groups, and interest from private players (Yadav et al., 2025). The effects of climate change on livestock affect the region like Bundelkhand particularly hard due to their large population who make their living from agriculture. Integrated dairy models and breed improvement initiatives are being promoted to make dairy a reliable source of income and nutrition, especially for small farmers and women (Mishra et al., 2025, Pathak et al., 2024). High ambient temperatures coupled with heat stress reduce the milk yield and reproductive efficiency of dairy animals. Indigenous breeds, though relatively more heat-tolerant, also show declines in

productivity when exposed to prolonged heat waves (Singh & Mishra, 2020). Crossbred cows are especially vulnerable due to their lower adaptability to heat stress. Water scarcity, a recurring issue in this region, further aggravates the problem by reducing the availability of drinking water and green fodder for animals (Pathak et al., 2024). This shortage of quality feed leads to nutritional stress, thereby lowering milk yield and animal health (Kumar et al., 2019).

In Banda district of Uttar Pradesh, dairy activities are important sources of economic activities and livelihoods of small farmers and marginal farmers. The agro-climatic condition of the region favors the rearing of livestock, primarily being indigenous and crossbred cattle and buffaloes that are the major components of milk. Though there are a number of issues (Poor access to veterinary services, poor fodder supply levels, and traditional rearing methods) but, nevertheless, dairy farming has been gradually expanding as there is a growing demand in the market on dairy products and dairy produce. Different government schemes, training schemes of Krishi Vigyan Kendras (KVKs) and information regarding the scientific maintenance methods of the animals have begun impacting the level of knowledge and application of the practices among farmers. Nevertheless, social-demographic characteristics like education, land ownership and household income still influence the speed of adoption of improved modes of dairy farming in the district. It is known that in case of improvement needs to be made to dairy farmers, they need to be modernized in terms of knowledge, adoption, and their personal, social, and economic traits should be enhanced (Surkar et al., 2014). Dairy farmers experience climate change as a serious problem therefore their understanding about climate volatility and its consequences for livestock and yields are most important aspect. A limited number of studies exist about dairy farmers' understanding of climate change along with their adoption measures in Bundelkhand, India.Indian production relies primarily on small-scale producers whose lack of education about economic aspects leads them to being poor (Kalia et al., 2021). In such respects, current research was conducted to understand the socio-demographic background of dairy farmers and association of the socio-demographic background with knowledge and adoption of animal husbandry practices.

2. MATERIALS AND METHODS

The present study was carried out in Banda district of Uttar Pradesh, which was purposively selected due to its prominence in milk production and the presence of active livestock-keeping communities. From this district, two blocks Badokhar Khurd and Mahuva were chosen based on their high level of dairy farming activity. Subsequently, ten villages from each block were selected purposively, and from each village, four dairy farmers were chosen randomly. A total of 80 dairy farmers participated in the study. Data were collected through personal interviews using a pre-tested interview schedule. An ex-post facto research design was adopted for the study. Knowledge level of dairy farmers consist multiple questions based on binary structure and covering major aspects of dairy management, feeding and watering practices, calf rearing practices, breeding practices, milk practices and health care practices. The total knowledge score of each respondent was obtained by summing up the individual scores. On the basis of the cumulative scores, farmers were categorized into low, medium, and high knowledge groups using mean and standard deviation as the class interval (Dayal, et al, 2015).

While Adoption of animal husbandry practices was measured by preparing a comprehensive list of recommended practices which are mentioned above. Respondents were asked to indicate whether they had fully adopted, partially adopted or not adopted each practice. Scores of 3, 2 and 1 were assigned respectively. The adoption index for each respondent was calculated by summing the scores across all practices. Similar to knowledge level, respondents were then classified into low, medium, and high adoption categories based on mean and standard deviation values. Further the appropriate statistical tools such as frequency and chi-square test were used to interpret the findings and draw meaningful conclusions.

3. RESULTS AND DISCUSSION

3.1 Socio Economic Status of Dairy Farmers

Socio demographic data of dairy farmers was recorded at the investigation period and Table 1 shows those findings. Half of the dairy farmers (52.50%) involved in dairy business belonged to middle age (36-50) while 27.50% were young (<35 years) and 20.00% were of old age (>50

years). The dairy farmers received additional classification according to their academic achievement. The results showed that 6.25% of farmers were Illiterate while 8.75% of the farmers had education at primary school level, 16.25% had junior high school level education, 41.25% reached high school level education and 22.50% were intermediate educated. The level of graduate studies and above was only 5.00%. Approximate half of the respondents (47.50%) maintained medium-sized family arrangements followed by large family size (37.50%) and small family size (15.00%) respectively.

In case of annual income, 48.75% of the respondents found to be under high family income category, whereas 27.50% and 23.75% belonged to medium and low family income category respectively. The results revealed that the additional income from dairying has probably contributed much to the total income. In land holding criteria, 32.50% of the respondents had marginal size of land holding, whereas small size and medium size land holder were 30.00% and 21.25% respectively. The percentage of land less and large land farmers was observed very low (6.25% and 10.00%). In dairy experience condition 52.50% of the respondents had moderate experience in dairying followed by 26.25% and 21.25% of them had moreand less experience in dairying, respectively. The reason for these results may be that in the study area, the middle aged farmers are forced to start dairying as a subsidiary occupation due to unemployment problem for educated youth (Mishra et al., 2025). In the study of dairy farmers, 31.25% had medium exposure to the media, 41.25% had low media exposure, and only 27.50% had high media exposure of communication. In social participation, the engagement of respondent was found in low category (47.50%) followed by medium (37.50%) and high (15.00%) respectively.

Table 1 revealed that 51.25% of the respondents belonged to medium level of herd size while 21.25% and 27.50% comes under large and small category respectively. As per training undergone by the dairy farmer revealed that approximately two third of the respondents (66.25%) did not attend any training programme and 33.75% of the respondents attended training programmes organized by co-operative societies and KVK's etc. In case of risk orientation, 11.25% had low risk orientation, 36.25% dairy farmers had a medium risk orientation and 52.50% had a high risk orientation. It might be

because dairy farmers with small and marginal land holdings were less financially stable than economically sound dairy farmers, making them less able to handle risk orientation.

3.2 Knowledge Level of Dairy Farmers on Animal Husbandry Practices

Table-2 revealed that, 63.75% of respondent possessed medium, 21.25% respondents had high and 15.00% respondent had low level of knowledge on animal husbandry practices. The extent or knowledge level of the respondents was limited to animal husbandry processes and they were highly familiar to adopt these things easily. Most of the farmers had medium to high level of knowledge. It is an effect of supply chain management which played a significant role in the enhancement of the level of knowledge among the farmers on the husbandry practices of the animals. Similar results were seen in the study of Biswas et al., (2012) and Rahman and Gupta (2015).

3.3 Adoption of Animal Husbandry Practices by the Respondents

The results of Table-3 showed that 61.25% respondents had medium form of adoption of recommended practices of animal husbandry followed by 21.25% respondents under high category whereas, 17.50% respondents having low adoption level. It is possible that the level of adoption of the respondents could have been higher owing to their experience of dairy business with co-operative society and better supply chain management pattern of dairy farming. These results are not contradictory to Rahman and Gupta (2015) who showed the medium adoption level (47.96-54.45) of improved dairy farming practice (IDFPs) among the members (47.00%). The findings of Panchbhai et al. (2017) revealed that 72.00 % respondents had medium knowledge and 67.50% had adoption level of dairy animal husbandry practices. The reason of higher percentage may be higher average income, larger herd sizes, or better market access, enabling them to invest more in scientific dairy practices.

3.4 Association Between Selected Independent Variables and Knowledge Assessment

The association analysis (Table-4) showed a couple of significant associations between socio-

demographic factors and the state of knowledge about animal husbandry practices. Out of 10 variables, 5 variables were statistically significant. Education was found to be moderately positive and statistically significant relationship with the knowledge level about animal husbandry practices. The dairy farming experience also had a close positive relationship with knowledge level. There was also a high association between social participation, herd size (significant at 5% level) and risk orientation (significant at 5% level), which pointed out that the farmers who tend to be social, maintain larger herds and those who take risks are more knowledgeable towards modern practices. Conversely, age, size of family, annual income, landholding and exposure to mass media and training exhibited weak and statistically non-significant associations which implies that, these factors can affect knowledge in a more or less degree, but it is not strong or constant through the sample. Generally, the results support the significance of education and experience, social participation and incremental mentality in enhancing scientific methods of animal farming adoption.

Table 1. Socio economic status of dairy farmers

S. No.	Characteristics	Classification	Frequency	Percentage
1.	Age (years)	Young (<35)	22	27.50
		Middle (36-50)	42	52.50
		Old (>50)	16	20.00
2.	Education	Illiterate	05	6.25
		Primary School	07	8.75
		Junior High School	13	16.25
		High School	33	41.25
		Intermediate	18	22.50
		Graduation & Above	04	5.00
3.	Family Size (Numbers)	Small (< 4)	12	15.00
		Medium (5-8)	38	47.50
		Large (> 8)	30	37.50
4.	Annual Income (Rs.)	Low (< 100000)	19	23.75
		Medium (100000-300000)	22	27.50
		High (> 300000)	39	48.75
5.	Land Holding (Acre)	Land less (0)	05	6.25
		Marginal (< 2.5)	26	32.50
		Small (2.5-5.0)	24	30.00
		Medium (5.0-10.0)	17	21.25
		Large (> 10.0)	08	10.00
6.	Dairy Experience (Years)	Less (< 5 years)	17	21.25
		Moderate (5-10 years)	42	52.50
		More (> 10 years)	21	26.25
7.	Mass Media Expoxure (Numbers)	Low (<8)	33	41.25
		Medium (8-12)	25	31.25
		High (>12)	22	27.50
8.	Social Participation (Numbers)	Low (<3.0)	38	47.50
		Medium (3.0-4.5)	30	37.50
		High (>4.5)	12	15.00
9.	Herd Size (Numbers)	Small (<4)	22	27.50
		Medium (4-8)	41	51.25
		Large (>8)	17	21.25
10.	Training	Attended	27	33.75
		Not Attended	53	66.25
11.	Risk Orientation	Low	09	11.25
		Medium	29	36.25
		High	42	52.50

Table 2.Distribution of respondents according to their knowledge level of respondents

S. No.	Knowledge level	No. of respondent	Frequency
1.	Low (<30)	12	15.00
2.	Medium (31-40)	51	63.75
3.	High (>40)	17	21.25
	Total	**80**	100.00

Mean = 35.06, SD = 5.04

Table 3. Distribution of respondents according to their adoption of dairy animals' management practices

S. No.	Adoption Level	No. of respondent	Frequency
1.	Low (<70)	14	17.5
2.	Medium (71-80)	49	61.25
3.	High (>80)	17	21.25
	Total	**80**	**100**

Mean = 74.89, SD = 5.02

Table4. Association between selected independent variables and Knowledge

S. No.	Variables	Association (χ^2)	p value
1.	Age (years)	8.015	0.091
2.	Education	26.61	0.003
3.	Family Size	4.598	0.331
4.	Annual Income	9.003	0.061
5.	Land Holding	11.893	0.156
6.	Dairy Experience	13.057	0.011
7.	Mass Media Exposure	6.210	0.184
8.	Social Participation	10.025	0.040
9.	Herd Size	13.518	0.009
10.	Risk Orientation	14.860	0.005
11.	Training	2.930	0.231

Table 5. Association between selected independent variables with adoption of animal husbandry practices

S. No.	Variables	Association (χ^2)	p value
1.	Age (years)	2.420	0.659
2.	Education	23.514	0.009
3.	Family Size	7.094	0.131
4.	Annual Income	12.339	0.015
5.	Land Holding	10.218	0.250
6.	Dairy Experience	8.015	0.091
7.	Mass Media Exposure	9.003	0.061
8.	Social Participation	7.094	0.131
9.	Herd Size	11.787	0.019
10.	Risk Orientation	16.014	0.003
11.	Training	4.605	0.101

3.5 Association Between Selected Independent Variables with adoption of Animal Husbandry Practices

Association analysis of the socio-demographic variables and adoption of animal husbandry practices showed some interesting results. The strongest and statistically significant positive correlation was observed with risk-oriented variable indicating the positive effect of high risk orientation on the adoption of modern practices by farmers. The other factors such as education, annual income and herd size also showed a

significant positive correlation implying that well educated farmers with higher financial concerns and bigger herds tend to be scientifically oriented in their dairy practice. On the one hand, dairy experience, mass media exposure, social participation, and family size were positively, yet not statistically significantly associated. On the one hand, the effect seems minimal or indirect. Weak non-significant relationships were observed between training, age and landholding and adoption levels indicating an insignificant or no relationship between the two. In general, the findings point out that educated financially stable farmers with large herds, and progressive nature will embrace better animal husbandry practices more.

4. CONCLUSION

The research concludes that the dairy farmers in the area of study are mostly middle-aged with moderate education and family sizes. Mostly lies between marginal and small landholdings. Their level of income reflected that dairying was the significant contribution to the household incomes, especially in high-income groups. The majority of farmers were of average experience in dairying yet exhibited low media exposure and social involvement, which, perhaps, may limit their access to information and innovations. Despite the fact that herd sizes were usually medium, response to training programmes was poor, and more institutional support and capacity building should be provided. Intriguingly, farmers were relatively high risk oriented with limited resources given that they had embraced dairying as a source of livelihood. Altogether, the results provide an idea that training, media exposure and social interaction should be targeted in order to enhance the socio-economic status and sustainability of the dairy farming in the area.

Dairying is an important component of Indian agro based economy and it gives a livelihood in terms of employment to the poor and the weaker groups in the society. A survey was conducted to assess knowledge level and adoption of animal husbandry practices among dairy farmers in Banda district. The adoption of scientific animal husbandry practices should be done using many approaches. The extension agent would need to work on the social participation of the dairy farmers which directly affect the knowledge and adoption of animal husbandry practices to enhance farmer's income. There is the very much relation being experienced between education and sources of information and this can be capitalized well on by the extension agent

in trying to spread the better dairy farming techniques in the rural locations. There should be increase in awareness and capacity-building programs about the advantages and techniques of modern practices not only agricultural content but also specific and practical information on dairy management.

Lack of financial capability and limited credit denies the farmers opportunity of making some investments such as quality feed, veterinary services and better infrastructure. So farmers should be given easy access to institutional credit, subsidies and be allowed to invest in improved infrastructure, quality inputs, and veterinary care. It is also important that there should be quality fodder, vaccines, and breeding services available at a reasonable price. The enhancement of public-private relations in the development of livestock has the potential to enhance the delivery of services and supply of inputs.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://pr.sdiarticle5.com/review-history/144097