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Socio-economic profile and livelihood dynamics of buffalo rearers in Dholpur District, Rajasthan

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Abstract

The livestock sector plays a pivotal role in shaping India's rural economy, with buffaloes serving as the backbone of dairy production. This study was conducted in Dholpur district of Rajasthan to analyze the socio-economic profile of buffalo owners and assess the existing management practices. A total of 240 dairy farmers were selected from four tehsils including Bari, Saipau, Dholpur and Baseri using purposive sampling techniques. Data were collected through personal interviews using a pre-tested interview schedule. The findings revealed that the majority of respondents (48.73%) belonged to the middle age group (26-52 years), with Scheduled Tribes (42.92%) constituting the dominant caste category. Most farmers were literate, with primary and secondary education levels (67.03% combined). Animal husbandry was predominantly practiced as a subsidiary occupation alongside agriculture (40.00%) or labour (37.92%). The majority of farmers possessed medium land holdings (5-10 bighas; 57.08%) and had a middle annual income bracket of ₹1,00,000-₹2,50,000 (62.50%). Herd composition was specialized towards dairy production, with milch buffaloes and heifers predominating and a complete absence of bullocks. The study highlights the need for targeted interventions in feeding, breeding, healthcare and housing management to enhance productivity and sustainability of buffalo rearing in the region.

Keywords: Buffalo management, Dholpur district, socio-economic profile, dairy farming, rural economy, livestock management

1. Introduction

The livestock sector occupies a unique position in India's agrarian economy, serving as a major continuous income-generating activity for rural households and providing sustenance and financial stability to millions of farmers across the country (Thakur *et al.*, 2024) ^[29]. Livestock rearing and crop husbandry are two important components of mixed farming that influence agricultural economy, leading to sustainable agriculture as they are complementary to each other. The livestock and fisheries sector contributes over 4.07% of the total GDP of India as per the Economic Survey 2024-25, with this contribution showing consistent growth over the years. A symbiotic relationship exists between men, land and livestock and India has been graced with the world's largest livestock population.

The livestock sector contributes 4.11% to total GDP and 25.6% to the agriculture sector (Annual Report 2018-19, Department of Animal Husbandry). Among livestock species, buffaloes represent the greatest promise for food security and sustainable development in the twenty-first century, as they are an essential component of India's traditional farming system. In India, buffaloes have been the backbone of the rural economy, serving as the mainstay in the production of butter and ghee, which are integral to Indian culinary traditions and nutritional practices (Mishra *et al.*, 2024; Avinashilingam *et al.*, 2011) ^[13, 1]. The contribution of buffaloes to India's milk pool, while still substantial, has seen a slight shift in recent years, with cattle accounting for about 53.5% of milk output by 2024-25, surpassing buffaloes' contribution of 43.1%.

India is home to some of the world's finest buffalo breeds, each adapted to specific agro-ecological conditions. The Murrah, originating from Haryana and Punjab, is perhaps the most renowned dairy breed, known for its high milk yield and fat content. The Murrah buffalo has been the subject of intensive research at institutions like the ICAR-National Dairy Research

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Institute, Karnal, where scientists have been working to enhance its productivity and resilience. However, recent research highlights that the Murrah breed is highly susceptible to climate-change induced heat stress due to their physiological characteristics, making livelihoods dependent on Murrah-based livestock production systems highly vulnerable even in their breeding tract. Indigenous breeds such as Murrah, Mehsana and Jaffarabadi are uniquely suited to Indian conditions, being acquainted with natural climate adaptation and carrying massive cultural significance (Kumar *et al.*, 2011; Jain *et al.*, 2025) ^[11, 8].

The future of buffalo production in India lies in the judicious integration of traditional knowledge with modern scientific advances (Gupta *et al.*, 2008; Jain *et al.*, 2025) ^[5, 8]. However, few efforts are known to have been made to systematically study buffalo management practices in rural areas. The information available and the notation prevalent on the subject have been based on assumptions, usual observations, experience and reports of some specialists and professional workers. Since management practices vary from one lactation to another, it is necessary to determine the strengths and limitations of rearing systems followed by dairy farmers. The present study was therefore conducted in Dholpur district of Rajasthan to document and evaluate the breeding, feeding, management and healthcare practices of dairy buffaloes, as such studies have not been carried out earlier in the district.

Materials and Methods

Area of the Study

The present study was undertaken in Dholpur district of Rajasthan. The district is bounded by the state of Uttar Pradesh on the east and northeast, by Bharatpur District of Rajasthan on the northwest and Karauli District of Rajasthan on the west. Dholpur district is situated in the eastern part of Rajasthan, located at 26°42'42" North Latitude and 77°54'0" East Longitude. It is the smallest district of Rajasthan state, sitting gracefully on the left bank of the illustrious Chambal River, with an area of 3,043 km². Dholpur has low to high hills of sandstone, with these hills attaining an altitude up to 356.91 meters above sea level in the south-western direction.

Sampling Techniques

The investigation included the selection of district, tehsils, villages and respondents covered under the study.

Selection of District

Dholpur district was purposely selected for the present study because studies on evaluation of breeding, feeding, management and healthcare of dairy buffaloes had not been carried out earlier in the district.

Selection of Tehsils

There is total six tehsils in Dholpur district, out of which four tehsils-Bari, Saipau, Dholpur and Baseri were selected on the basis of the highest buffalo population.

Bari: One of the four administrative subdivisions and six tehsils of Dholpur district, selected due to its high concentration of livestock, indicating that animal husbandry is a prominent occupation in this tehsil.

Saipau: Officially one of the six tehsils comprising Dholpur district. The selection of Saipau for this research, driven by its high livestock numbers, highlights its importance in the district's overall animal husbandry sector.

Dholpur: As the district headquarters, it is one of the four sub-divisions and six tehsils in the district. It is a significant urban center, with 20.51% of the district's population living in urban areas. Its selection suggests a substantial peri-urban and rural interface where animal husbandry is a key livelihood activity.

Baseri: Recognized as one of the key sub-divisions and six tehsils within Dholpur district. Its inclusion points to the tehsil's reliance on and potential for dairy and livestock farming.

Selection of Villages and Respondents

A list of dairy farmers having dairying as their subsidiary occupation was collected from village dairy cooperatives, Sarpanch and Patwari. From each of the four tehsils, five villages were selected, making a total of 20 villages. From each village, 12 respondents were selected based on their herd size categories: 1-2 buffaloes, 3-5 buffaloes and more than 6 buffaloes. Thus, a sample of 240 dairy farmers formed the groups of respondents.

Data Collection

The interview schedule was divided into four major areas covering information regarding socio-economic status, feeding practices, breeding practices, milking practices, health care, housing and marketing. Data were collected by personal interviewing from the selected buffalo farmers using pre-tested schedules.

Socio-Economic Variables Studied

The following socio-economic variables were assessed:

1. **Age:** Recorded to understand the distribution of farmers across different age groups (Young: ≤ 26 years, Middle: 26-52 years, Old: > 52 years)
2. **Caste:** Documented to evaluate influence on access to resources and institutional support (SC, ST, OBC, General)
3. **Education:** Assessed to evaluate awareness of modern practices (Illiterate, Primary: 1st-8th, Secondary: 9th-10th, Senior Secondary & above)
4. **Occupation:** Categorized to determine extent of reliance on buffalo farming (Agriculture + Animal Husbandry, Agriculture + Labour, Agriculture + Business, Labour + Animal Husbandry)
5. **Annual Income:** Assessed economic viability (₹10,000-1,00,000; ₹1,00,000-2,50,000; Above ₹2,50,000)
6. **Family Type:** Noted for labour availability (Nuclear/Joint)
7. **Land Holding Size:** Analyzed for impact on fodder cultivation (Small: 1-5 bighas; Medium: 5-10 bighas; Large: 10-15 bighas)
8. **Type of House:** Indicator of economic condition (Kuccha, Mixed, Pukka)
9. **Herd Size and Composition:** Classification into milch, dry, advanced pregnant, bullock, and heifers

Statistical Analysis

The collected data were analyzed using simple tabular analysis, averages, and percentages. The following statistical techniques were employed:

1. **Percentage and Frequency:** The percentage and frequency distribution of respondents were worked out for categorizing them with regards to personal characteristics and independent variables.

2. **Mean Score:** Obtained by dividing total score of each statement by total number of respondents:
3. Mean score = Total score of each statement / Total number of respondents
4. **Standard Deviation:** Used for categorizing the respondents into different categories and to find out the variability of the dependent and independent variables.
5. **Chi-Square Test:** Used to compare two or more statistical data sets, helping to determine whether the distribution differs from what one would expect by chance.

The data were analyzed using the statistical technique outlined by Snedecor and Cochran (1996).

Results and Discussion

Socio-Economic Profile of Buffalo Owners

The data presented in Table 1 reveal that the majority of buffalo owners (48.73%) belonged to the middle age group (26-52 years), followed by the young age group (33.78%) and the old age group (17.50%). Across all tehsils, the middle age category consistently represented the largest proportion, ranging from 44.07% in Saipau to 53.33% in Bari. The non-significant p-value (0.063) indicates no statistically significant difference in age distribution across the four tehsils.

The predominance of middle-aged farmers is a positive indicator for the adoption of improved management practices, as this age group is typically more receptive to innovations and new technologies. This finding aligns with the observations of Jadav *et al.* (2014) [7], who documented that rural livestock farmer consisted of 57%, 30% and 13% from small, medium, and large families, respectively, in Gujarat's Surat district. Sarita *et al.* (2016) [24] also noted in a Hisar district study that most dairy farmers were middle-aged. Similarly, Pata *et al.* (2018) [15] reported that a large segment of buffalo owners in Gujarat belonged to the middle-age group. Mishra *et al.* (2024) [13] in Katni district also reported a similar profile, with farmers predominantly under 50 years old. Jain *et al.* (2025) [8] noted that the largest proportion of buffalo keepers (63.54%) were aged below 55 years in the Bastar region of Chhattisgarh.

Table 2 shows that Scheduled Tribes (ST) constituted the largest group, accounting for 42.92% of the total respondents, followed by Other Backward Classes (OBC) at 26.90% and General Category at 26.47%. Scheduled Castes (SC) represented only 3.72%. A striking observation was that all 60 respondents from Baseri tehsil belonged to the ST category, while Dholpur tehsil had no OBC respondents and Saipau and Baseri had no General category farmers. This resulted in a highly significant ($p < 0.001$), confirming a strong association between caste and geographical location.

The predominance of Scheduled Tribes in livestock rearing is consistent with the findings of Jain *et al.* (2025) [8], who found that a substantial portion of buffalo farmers (69.79%) were from Scheduled Tribes in the Bastar region of Chhattisgarh. This indicates that livestock rearing is a critical livelihood activity for tribal communities, serving as a source of continuous income and nutritional security. The significant variation across tehsils reflects the demographic composition of the district, with certain areas being predominantly tribal.

The educational status of respondents (Table 3) indicates that the majority were literate, with 30.82% having primary education and 36.21% having secondary education. Only 22.96% were illiterate, while 10.01% had education beyond senior secondary. Baseri tehsil had the highest literacy rate,

with only 11.67% illiterate and 51.67% having secondary education, whereas Saipau had the highest illiteracy rate at 32.20%.

The relatively high literacy rate (77.04% overall) is a positive indicator for the adoption of scientific animal husbandry practices. Literate farmers are generally more aware of modern techniques, veterinary care, and government schemes. This finding supports the observations of Sarita *et al.* (2016) [24] and Pata *et al.* (2018) [15], who found a majority of literate dairy farmers in their respective study areas. However, it contrasts with the findings of Jain *et al.* (2025) [8] in Bastar, where a concerning illiteracy rate of 73.95% was reported, highlighting regional disparities in educational attainment.

The occupational pattern (Table 4) reveals that buffalo rearing was rarely the sole occupation. The largest group combined Agriculture with Animal Husbandry (40.00%), followed closely by Labour with Animal Husbandry (37.92%). A smaller proportion engaged in Agriculture with Labour (15.42%) or Agriculture with Business (6.67%). Baseri tehsil had the highest proportion of farmers combining agriculture and animal husbandry (50.00%), while Dholpur had the highest proportion combining labour with animal husbandry (46.67%). The significant p-value (0.035) indicates significant variation in occupational patterns across tehsils.

This data strongly indicates that livestock rearing is an integral part of a diversified livelihood strategy, serving as a supplementary source of income and a buffer against agricultural risks. The reliance on animal husbandry as a subsidiary occupation is consistent with the findings of Thakur *et al.* (2025) [29], who determined that the economic standing of rural livestock rearers was weak, with traditional husbandry methods being a primary obstacle limiting livestock productivity.

Table 5 shows that the majority of farmers (62.50%) fell within the middle annual income bracket of ₹1,00,000 – ₹2,50,000, with a smaller proportion in the lower (27.08%) and higher (10.42%) income categories. Dholpur tehsil had the highest proportion of farmers in the lower income category (38.33%) and the lowest in the higher income category (5.00%). The non-significant p-value (0.113) suggests similar income levels across tehsils.

This moderate income level may limit the capacity for significant investment in high-cost inputs like quality feed, advanced breeding stock, or improved housing. The findings align with Thakur *et al.* (2025) [29], who characterized the economic standing of livestock rearers in the Mahakaushal region as "weak," with deficiencies in feed and fodder availability being a primary obstacle.

The majority of households (57.92%) were nuclear, while 42.08% were joint families (Table 6). Across all tehsils, nuclear families dominated, ranging from 53.33% in Saipau to 63.33% in Dholpur. The non-significant p-value (0.113) indicates no significant difference across tehsils. The prevalence of nuclear families could imply limited availability of family labour for farm operations, potentially necessitating hired labour, especially during peak seasons. This finding aligns with Sarita *et al.* (2016) [24], who noted a prevalence of nuclear families among dairy farmers in Hisar, and with Jadav *et al.* (2014) [7], who documented that rural livestock farmer consisted of 57%, 30%, and 13% from small, medium, and large families, respectively.

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Land holding size (Table 7) was predominantly medium (5-10 bighas), accounting for 57.08% of respondents, followed by small (1-5 bighas) at 26.67% and large (10-15 bighas) at 16.25%. Saipau tehsil had the highest proportion of medium farmers (68.33%), while Bari had the highest proportion of large farmers (25.00%). This distribution varied significantly across tehsils ($p = 0.0006$).

The possession of medium land holdings provides a reasonable base for fodder cultivation, which is crucial for reducing feed costs and ensuring the nutritional security of the herd. This factor was highlighted by Mishra *et al.* (2024) ^[13] and Thakur *et al.* (2025) ^[29] as a key determinant of livestock productivity. The significant variation across tehsils reflects the different agro-ecological conditions and land availability patterns in the district.

A mix of house types was observed (Table 8): the largest group lived in mixed (kuccha-pukka) houses (42.92%), followed by pukka (35.00%) and kuccha (22.08%) houses.

Dholpur tehsil had the highest proportion of pukka houses (46.67%), while Baseri had the highest proportion of kuccha houses (30.00%). There was no significant difference ($p = 0.092$) across tehsils.

The type of house serves as a proxy indicator of the overall economic condition, with a majority having semi-pucca or pucca houses, suggesting a relatively better economic status compared to those in kuccha dwellings. This economic stratification may influence the capacity to invest in improved animal housing and management practices.

The analysis of herd composition (Table 9) reveals a strong focus on dairy production across all tehsils. The herd is predominantly composed of milch buffaloes and heifers. For instance, in Bari tehsil, the villages of Singroi and Umarah collectively account for 26 milch and 18 heifers, while only 6 dry and 3 advanced pregnant animals are reported. Similarly, in Saipau, milch (15) and heifers (11) are the dominant categories.

A notable observation is the complete absence of bullocks reported across all tehsils. This indicates that farmers are not using their buffaloes for draught power and are likely relying on mechanization or other animals for agricultural operations. This specialization towards milk production underscores the primary economic motivation for buffalo rearing in Dholpur district. The presence of a substantial number of heifers is a positive sign for the future sustainability and growth of the dairy enterprise.

Table 1: Distribution of respondents according to their age (n=240)

S. No.	Category	Bari		Saipau		Dholpur		Baseri		Overall	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1	Young age (≤ 26 years)	22.00	36.67	20.00	33.90	16.00	26.87	22.00	36.67	81.00	33.78
2	Middle age (26-52 yrs)	32.00	53.33	26.00	44.07	30.00	49.18	29.00	48.33	117.00	48.73
3	Old age (> 52 years)	6.00	10.00	14.00	22.03	14.00	23.95	9.00	15.00	42.00	17.50
Total		60	100	60	100	60	100	60	100	240	100
P value	=0.063 (Non-significant ($p > 0.05$))										

Table 2: Distribution of respondents according to their caste (n=240)

S. No.	Category	Bari		Saipau		Dholpur		Baseri		Overall	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1.	SC Schedule cast	0.00	0.00	2.00	3.39	7.00	11.48	0.00	0.00	9.00	3.72
2.	ST Schedule Tribe	43.00	71.67	45.00	76.27	39.00	63.93	60.00	100.00	103.00	42.92
3.	OBC Other backward class	14.00	23.33	12.00	20.00	0.00	0.00	0.00	0.00	65.00	26.90
4.	Gen GeneralCategory	3.00	5.00	0.00	0.00	14.00	24.59	0.00	0.00	63.00	26.47
Total		60	100	60	100	60	100	60	100	240	100
P Value	< 0.001 (Significant ($p < 0.001$))										

Table 3: Distribution of respondents according to their education (n=240)

S. No.	Education Category	Bari		Saipau		Dholpur		Baseri		Overall	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1	Illiterate	15.00	25.00	19.00	32.20	14.00	22.95	7.00	11.67	55.00	22.96
2	Primary 1st to 8 th class	15.00	25.00	20.00	33.90	22.00	36.07	17.00	28.33	74.00	30.82
3	Secondary 9 th to 10 class	22.00	36.67	14.00	23.73	20.00	32.79	31.00	51.67	87.00	36.21
4	Senior Secondary & above 11 th to 12 th class & above	8.00	13.33	7.00	10.17	6.00	8.20	5.00	8.33	24.00	10.01
Total		60	100	60	100	60	100	60	100	240	100
P-value	=0.019 (Significant ($p < 0.05$))										

Table 4: Distribution of respondents according to their main occupation (n=240)

S. No.	Occupation	Bari		Saipau		Dholpur		Baseri		Overall	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1	Agriculture+Animal Husbandry	21	35.00	24	40.00	21	35.00	30	50.00	96	40.00
2	Agriculture+ Labour	11	18.33	12	20.00	8	13.33	6	10.00	37	15.42
3	Agriculture+Business	5	8.33	7	11.67	3	5.00	1	1.67	16	6.67
4	Labour+Animal Husbandry	23	38.33	17	28.33	28	46.67	23	38.33	91	37.92
Total		60	100	60	100	60	100	60	100	240	100
P value	=0.035 (Significant ($p < 0.05$))										

Table 5: Distribution of respondents according to their annual income (n=240)

S. No.	Category	Bari		Saipau		Dholpur		Baseri		Overall	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1	10,000 – 1,00,000	13	21.67	13	21.67	23	38.33	16	26.67	65	27.08
2	1,00,000 – 2,50,000	40	66.67	39	65.00	34	56.67	37	61.67	150	62.50
3	Above 2,50,000	7	11.67	8	13.33	3	5.00	7	11.67	25	10.42
Total		60	100	60	100	60	100	60	100	240	100
P-value	=0.113 (Non-significant ($p > 0.05$))										

Table 6: Distribution of respondents based on their family type

S. No.	Family type	Bari		Saipau		Dholpur		Baseri		Overall	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1	Nuclear	35	58.33	32	53.33	38	63.33	34	56.67	139	57.92
2	Joint	25	41.67	28	46.67	22	36.67	26	43.33	101	42.08
3	Total	60	100	60	100	60	100	60	100	240	100
P - Value	=0.113 (Non-significant ($p > 0.05$))										

Table 7: Distribution of respondents according to their land holding (in bigha) (n=240)

S. No.	Land (in bigha)	Bari		Saipau		Dholpur		Baseri		Overall	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1	1 to 5 Small farmer	20	33.33	16	26.67	17	28.33	11	18.33	64	26.67
2	5 to10 Medium farmer	25	41.67	41	68.33	32	53.33	39	65.00	137	57.08
3	10 to15 Large farmer	15	25.00	3	5.00	11	18.33	10	16.67	39	16.25
Total		60	100	60	100	60	100	60	100	240	100
P- value	=0.0006(Significant ($p < 0.001$))										

Table 8: Distribution of respondents based on their type of house (n=240)

S. No.	Type of House	Bari		Saipau		Dholpur		Baseri		Overall	
		Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1	Kuccha	12	20.00	15	25.00	8	13.33	18	30.00	53.00	22.08
2	Mixed	28	46.67	26	43.33	24	40.00	25	41.67	103.00	42.92
3	Pukka	20	33.33	19	31.67	28	46.67	17	28.33	84.00	35.00
Total		60	100	60	100	60	100	60	100	240	100
P- value	=0.092(Non-significant ($p > 0.05$))										

Table 9: Distribution of buffaloes under different categories

S. No.	Tehsil	Village	Types of Animals	No. of Buffaloes	Total
1	Bari	Singroi	Milch	17	26
		Ahamadpur	Dry	6	11
		Kansotikheda	Advanced pregnant	3	5
		Khorpura	Bullock	0	5
		Umarah	Heifers	9	18
2	Saipau	Sapau	Milch	15	28
		Pathaina	Dry	5	8
		Nagla Harlal	Advanced pregnant	6	8
		Ludhpura	Bullock	0	8
		Tahari	Heifers	11	22
3	Dholpur	Dubati	Milch	15	26
		Bilpur	Dry	5	9
		Dandoli	Advanced pregnant	2	3
		Adalpur	Bullock	0	8
		Sakatpur	Heifers	12	22
4	Baseri	Bhawanpura	Milch	12	23
		Khokhla	Dry	7	13
		Kankrate	Advanced pregnant	2	4
		Rahrai	Bullock	0	7
		Tarwa	Heifers	7	12

Conclusion

The study on management practices of buffalo in Dholpur district of Rajasthan reveals several important findings regarding the socio-economic profile of buffalo owners and existing management practices. The following conclusions can be drawn: The majority of buffalo owners (48.73%) were middle-aged (26-52 years), which is a favourable demographic for adopting improved management practices.

Scheduled Tribes (42.92%) dominated the livestock rearing community, indicating the importance of buffalo farming for tribal livelihoods. With 77.04% of farmers being literate (primary and secondary education), there exists a foundation for extension services and technology dissemination. However, only 10.01% had education beyond senior secondary, limiting access to advanced technical knowledge. Buffalo rearing was predominantly a subsidiary occupation,

with 40.00% combining it with agriculture and 37.92% combining it with labour. This indicates that animal husbandry serves as a supplementary income source and risk mitigation strategy. Most farmers possessed medium land holdings (5-10 bighas) and a middle annual income bracket (₹1,00,000-₹2,50,000), providing a moderate but limited resource base for investment in improved practices. The complete absence of bullocks and predominance of milch buffaloes and heifers indicates a clear commercial orientation towards milk production, rather than dual-purpose use. The prevalence of nuclear families (57.92%) may limit labour availability, while the moderate economic status may constrain investment in quality inputs like feed, healthcare and improved housing.

Conflict of Interest

Not available

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Not available

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