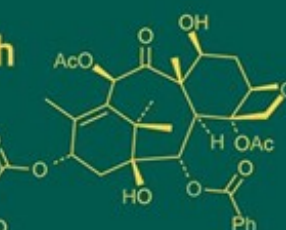


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Socio-economic and personal profile of tribal livestock owners in relation to climate change in Southern Rajasthan

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ABSTRACT

Tribal livestock production constitutes an important component of rural livelihoods in Southern Rajasthan, where households largely depend on agriculture and animal husbandry for income, food security and employment. Understanding the socio-economic and personal characteristics of livestock owners is essential for developing location-specific livestock development and climate-resilient extension interventions. The present study was conducted to assess the socio-economic and personal profile of tribal livestock owners in Southern Rajasthan. An ex-post-facto and exploratory research design was adopted, and a multistage sampling procedure was followed for selection of respondents from Banswara, Dungarpur and Udaipur districts of Rajasthan. Six tehsils, 24 villages and 360 tribal livestock owners were selected for the study. Respondents having at least 10 years of animal husbandry experience and a minimum herd size of five livestock were included. Data were collected through a pre-tested semi-structured interview schedule and analysed using frequency, percentage, mean, mean score and standard deviation.

The findings revealed that a majority of respondents were young (58.89%), male (54.44%), married (89.44%) and belonged to medium-sized families (81.67%). Regarding education, 32.22 per cent of respondents were illiterate, while 22.78 per cent had primary education. More than half (53.61%) belonged to the high annual gross-income category. Agriculture combined with animal husbandry was the predominant occupation (76.67%), while 82.78 per cent had a medium dependency ratio. All respondents belonged to rural backgrounds, and 69.17 per cent possessed marginal landholdings. Most respondents had medium levels of irrigation access (83.61%), animal husbandry experience (69.17%) and herd strength (53.06%). The mean family size, animal husbandry experience and herd strength were 6.71 ± 2.75 members, 22.96 ± 10.69 years and 2.95 ± 1.35 TLU, respectively. The findings highlight the predominantly young, rural and marginal-resource-based nature of tribal livestock households and underscore the importance of strengthening need-based extension, livestock development and climate-resilient livelihood interventions in Southern Rajasthan.

Keywords: Tribal livestock owners, Socio-economic characteristics, Personal profile, Livestock farming, Southern Rajasthan, Livelihood, Climate resilience

Introduction

India is predominantly a rural and agrarian country, where agriculture and allied activities, including animal husbandry, constitute an important source of livelihood for a large section of the population. Livestock production is closely integrated with crop production and contributes substantially to food security, income generation, employment and livelihood support, particularly among rural and resource-constrained households (Anonymous, 2023; Anonymous, 2024; Anonymous, 2026b) [1, 2, 3]. Animal husbandry is also an important component of the rural economy, providing a continuous source of income and contributing to poverty reduction and livelihood security among farming communities.

India has one of the largest tribal populations in the world, with tribal communities accounting for 8.6 per cent of the country's population according to the 2011 Census (Anonymous, 2011) [4]. Tribal populations are predominantly concentrated in rural, hilly and resource-dependent regions, including Rajasthan, where agriculture and livestock rearing constitute important components of household livelihoods. Historically, many tribal communities have experienced socio-economic disadvantages, including limited access to education, productive resources, institutional support and livelihood opportunities. Consequently, livestock assumes particular importance as a readily accessible productive asset and source of income, food and household security.

Rajasthan has a particularly important livestock-based rural economy. The state possesses a substantial livestock population and is among the leading livestock-producing states of India. According to recent state-

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level estimates, Rajasthan had approximately 56.8 million livestock, accounting for about 10.60 per cent of India's livestock population, while livestock contributed substantially to the state's agricultural Gross Value Added (Anonymous, 2025; Anonymous, 2026a) [5, 6]. In rural and tribal areas of Southern Rajasthan, livestock production is closely associated with agriculture and provides an important supplementary livelihood activity for households with limited land and other productive resources.

The socio-economic and personal characteristics of livestock owners are important determinants of the structure and functioning of livestock-based livelihood systems. Characteristics such as age, gender, marital status, education, family size, income, occupation, landholding, dependency ratio, livestock experience and herd size influence household labour availability, resource ownership, decision-making, access to information and adoption of improved livestock management practices. These characteristics are particularly relevant among tribal livestock owners because their livelihood systems are generally characterized by close dependence on agriculture, livestock and natural resources.

The importance of understanding the socio-economic profile becomes even greater in the context of climate variability and climate change. Climate change poses significant risks to agriculture and livestock production through increasing temperatures, altered rainfall patterns, droughts, heat waves, water scarcity, fodder shortages and increased incidence of climate-sensitive diseases (Sahoo, 2019; Anonymous, 2007; Anonymous, 2018) [7, 8, 9]. Small, marginal and tribal livestock owners are particularly vulnerable because of their limited resource base and strong dependence on climate-sensitive livelihood activities. The source material specifically identifies the need to generate empirical information on the socio-personal and socio-economic characteristics of tribal livestock owners in Southern Rajasthan as an important component of understanding their vulnerability and livelihood resilience.

Previous studies have also emphasized the importance of socio-economic characteristics in understanding livestock-based livelihoods among tribal communities. Research on tribal livestock farmers has documented the importance of landholding, livestock ownership, family characteristics, education, income and occupational structure in shaping livestock production systems. Such characteristics influence both the availability of household resources and the ability of livestock owners to respond to changing environmental and economic conditions.

In Southern Rajasthan, where tribal communities depend substantially on agriculture and animal husbandry, understanding the personal and

socio-economic characteristics of livestock owners is therefore essential for designing appropriate livestock development and extension interventions. The present study was accordingly undertaken to document the "Socio-economic and personal profile of tribal livestock owners in Southern Rajasthan", with particular emphasis on their demographic characteristics, educational status, family structure, income, occupation, landholding, irrigation resources, animal husbandry experience and herd strength. Such information can provide a baseline for developing location-specific livestock development, extension and climate-resilient livelihood programmes for tribal communities.

Materials and Methods

The study was conducted in the tribal-dominated districts of Banswara, Dungarpur and Udaipur in Southern Rajasthan. An ex-post-facto and exploratory research design was adopted. A multistage sampling procedure was followed, involving purposive selection of districts and tehsils and random selection of villages and respondents. Two tehsils from each selected district were purposively selected based on the concentration of tribal livestock owners, namely Banswara and Kushalgarh from Banswara, Dungarpur and Sagwada from Dungarpur, and Girwa and Jhadol from Udaipur. Four villages were randomly selected from each tehsil, resulting in 24 villages. From each village, 15 tribal livestock owners having at least 10 years of animal husbandry experience and a minimum herd size of five livestock were randomly selected, resulting in a total sample of 360 respondents.

Data were collected through a pre-tested semi-structured interview schedule administered through personal interviews. The schedule covered socio-personal and socio-economic characteristics, including age, gender, marital status, education, family size, annual gross income, occupation, dependency ratio, family background, landholding, source of irrigation, animal husbandry experience, and herd size and composition.

Education status of respondents was measured with the help of scale developed by Bhuvaneshwari (2005) [10]. Respondents were categorized into six categories according to modified scale of Trivedi (1969) [11] as depicted in table 1. Herd size was expressed in Tropical Livestock Units (TLU) using standard species-wise conversion factors. The conversion factors adopted in the present study were based on FAO (2003) [12] and Chilonda *et al.* (2006) [13], as presented below.

Species	Cattle	Buffalo	Sheep	Goat	Pig	Horse	Camel	Chicken
TLU	0.5	0.5	0.1	0.1	0.25	0.8	1.1	0.01

$$\text{Total TLU} = \Sigma (\text{Number of animals of each species} \times \text{respective TLU conversion factor})$$

The collected data were coded, classified, tabulated and analysed using appropriate statistical techniques. The findings were used to describe the socio-economic and personal profile of tribal livestock owners in Southern Rajasthan.

Result and Discussion

1. Socio-personal characteristics of the tribal livestock owners

Respondents were categorized based on selected socio-personal characteristics. Their distribution is presented in Table 1 and discussed under the following sub-heads.

1.1 Age

Age is an important socio-personal characteristic influencing individual behaviour and decision-making. As shown in Table 1, a majority of the respondents (58.89%) belonged to the young age group (≤ 44

years), followed by the middle age group (45–59 years; 32.22%) and old age group (> 59 years; 8.89%). The respondents' age ranged from 28 to 75 years.

The present findings of the study were in line with findings of Paregi *et al.* (2023) [14], Deshmukh *et al.* (2024) [15], Bag (2025) [16], Chapke *et al.* (2025) [17] and Meena *et al.* (2025) [18] who also reported that majority of the respondents belonged to young age group and where economically active age groups dominated livestock farming and highlighted the increasing participation of tribal youth in livestock enterprises. These findings indicated that livestock farming is primarily driven by younger and middle-aged individuals due to their higher labour / physical capacity, greater risk-taking ability and better adoption of innovations and greater inclination toward adoption of improved practices. Bag (2025) [16] showed a shift toward youth participation, especially in tribal regions due to Government programs (e.g., ARYA) and income opportunities in goat and dairy farming.

However, this contrasts with studies from Africa and other developing regions where middle-aged farmers dominate (Haile *et al.*, 2025; KC *et al.*, 2025) [19, 20] and older age group (Ratakonda *et al.*, 2024) [21], suggesting regional socio-economic and migration-driven variations.

Low participation of older farmers may be due to reduced physical involvement, dependence on younger family members and lower adaptability to modern practices.

Table 1. Distribution of tribal livestock owners according to Socio-Economic and Personal characteristics

S No	Particulars	Mean $\pm$ SD	Group	Total Respondents $n = 360$	
				f	%
1	Age (years)		Young (Up to 44)	212	58.89
			Middle (45 to 59)	116	32.22
			Old (more than 59)	32	8.89
2	Gender		Male (1)	164	54.44
			Female (2)	196	45.56
			Transgender (3)	0	0.0
3	Marital Status		Married (3)	322	89.44
			Unmarried (2)	0	0.0
			Widow / Widower (1)	34	9.44
			Divorced/ Divorcee (0)	6	1.67
4	Education		Illiterate (0)	116	32.22
			Primary (1)	82	22.78
			Middle (2)	56	15.55
			Secondary (3)	61	16.94
			Higher Secondary (4)	23	6.39
			Graduate and above (5)	22	6.11
5	Family Size	6.71 $\pm$ 2.75	Small (less than 4)	22	6.11
			Medium (4-9)	294	81.67
			Large (above 9)	44	12.22
6	Annual gross Income		Low (less than 34000)	45	12.50
			Medium (34000 to 67000)	122	33.89
			High (more than 67000)	193	53.61
7	Major Occupation		Animal Husbandry (1)	00	00
			Agriculture (2)	04	1.11
			Animal Husbandry + Agriculture (3)	276	76.67
			Government job (4)	00	00
			Business (5)	00	00
			Labour (6)	80	22.22
			others (7)	00	00
8	Dependency ratio	3.70 $\pm$ 1.51	Low (less than 2)	15	4.17
			Medium (2 to 5)	298	82.78
			High (more than 5)	47	13.05
9	Family Background		Rural	360	100.00
			Urban	00	0.00
10	Land Holding (In Hactare)		Landless (No Land)	0	0.00
			Marginal (less than 1 ha)	249	69.17
			Small (1 to 2 ha)	50	13.89
			Semi-medium (2 to 4 ha)	48	13.33
			Medium (4 to 10 ha)	13	3.61
			Large (more than 10)	0	0.00
11	Source of Irrigation	6.52 $\pm$ 1.43	Low (less than 5)	6	1.67
			Medium (5 to 8)	301	83.61
			High (more than 8)	53	14.72
12	Experience in animal husbandry	22.96 $\pm$ 10.69	Low (less than 12)	42	11.67
			Medium (12 to 34)	249	69.17
			High (more than 34)	69	19.16
			Medium (19 to 31)	65	18.05
			High (more than 31)	33	9.17

(continued on next page)

S No	Particulars	Mean $\pm$ SD	Group	Total Respondents $n = 360$	
				f	%
13	Herd Strength and composition (TLU)	2.95 $\pm$ 1.35	Small (less than 2)	105	29.17
			Medium (2 to 4)	191	53.06
			Large (more than 4)	64	17.78

1.2 Gender

Gender was recorded as a socio-personal characteristic based on the respondent's reported gender and classified into male, female and transgender categories. In the present study, only male and female respondents were recorded. Males constituted 54.44 per cent of the respondents, while females accounted for 45.56 per cent; no transgender respondent was recorded. This aligns with recent studies (Das and Chowdhury, 2024 [22]; Sahoo and Moharaj, 2024 [23]; Sahu *et al.*, 2024 [24]; Javaid, 2025 [25] and Prabex *et al.*, 2026) [26], which also reported male dominance in livestock ownership and climate-related decision-making and indicated that livestock farming in the tribal regions of Southern Rajasthan involves both men and women almost equally.

The near-balanced ratio reflects joint household participation, common in tribal systems. The marginal difference indicated significant female participation, suggesting that while men predominantly control resources, women contribute substantially to livestock management (including feeding, milking, cleaning and healthcare of animals). This dual structure highlights the need for gender-inclusive climate adaptation policies targeting both male decision-makers and female labour contributors. However, the slightly higher proportion of males suggested that they are more prominently recognized as household heads and primary decision-makers in livestock-related activities. Despite this, the relatively high participation of women highlights their significant but often under-recognized role in livestock management. This dual involvement of both genders has important implications for climate vulnerability and adaptation strategies.

Ningombam *et al.* (2026) [27] observed that men and women perceive climate risks differently due to variations in socio-cultural roles and resource access. The study highlighted that men mainly focus on economic and production-related risks, whereas women are more concerned with household food security, caregiving responsibilities and family survival strategies under climate stress.

This suggests that livestock ownership and decision-making in tribal areas are still male-dominated, but women actively participate in livestock activities. Recent studies have shown that male farmers continue to dominate agricultural decision-making and information-seeking processes, while women often face limited access to extension and climate information services (Das *et al.*, 2024; Sahu *et al.*, 2024) [22, 24]. Access to reliable climate information, ICT tools and extension exposure significantly influences farmers' adaptive behaviour and climate resilience (Chetri *et al.*, 2021) [28].

1.3 Marital status

Marital status is an important socio-demographic characteristic reflecting household and family responsibilities. As presented in Table 1, the majority of respondents (89.44%) were married, followed by widowed/widower (9.44%) and divorced (1.67%), while no unmarried respondent was recorded. The predominance of married respondents indicated that livestock farming in tribal areas of Southern Rajasthan is primarily a family-based livelihood activity requiring collective labour, household responsibility and shared decision-making. Similar findings were reported by Leela Krishna *et al.* (2020) [29], who also observed a higher proportion of married farmers in livestock-based production systems.

The higher participation of married respondents may be attributed to the labour-intensive nature of livestock farming, where family members contribute to routine activities such as feeding, grazing, cleaning, healthcare and shelter management. Under changing climatic conditions, family labour becomes more important for sustaining livestock productivity and implementing adaptation practices. Married households generally possess better labour availability, financial support

and social networks, which enhance their adaptive capacity and resilience against climate-related risks. Yang *et al.* (2022) also reported that household structure and family support significantly influence climate adaptation decisions among livestock farmers.

The presence of widowed/widower (9.44%) and divorced respondents (1.67%) indicated vulnerable household categories that may face reduced labour availability, weaker financial conditions, lower social support and limited access to productive resources. Such constraints can negatively affect their adaptive capacity to climate change and livestock management practices. Therefore, these groups require targeted institutional support, extension services and livelihood interventions to strengthen their resilience and sustainability under changing climatic conditions.

The absence of unmarried respondents suggested that livestock ownership and independent decision-making are strongly associated with household headship and family responsibility in tribal societies. Although younger unmarried individuals may assist in livestock-related activities, they are less likely to function as independent livestock owners or decision-makers. This reflects the traditional social structure characterized by early marriage and strong family dependency prevalent in tribal communities.

1.4 Education

Educational status indicates the formal schooling attained by the respondents and is an important socio-personal characteristic influencing access to information and adoption of improved practices. As shown in Table 1, 32.22 per cent of respondents were illiterate, followed by those with primary (22.78%), secondary (16.94%), middle (15.55%), higher secondary (6.39%) and graduate and above (6.11%) education. The results indicated a low level of formal education among respondents. This finding was consistent with recent studies (Ghosh-Jerath *et al.*, 2021 [30]; Schröder *et al.*, 2024 [31]; Deshmukh and Suradkar, 2024 [15]; Pandey *et al.*, 2025 [32]; Saikia *et al.*, 2025 [33]; Kumar and Mohanasundari, 2026 and Panja *et al.*, 2026) [34], which reported that tribal and smallholder farmers generally possess limited educational attainment, thereby constraining their awareness and adoption of climate-resilient practices. Education plays a crucial role in enhancing perception, knowledge and adaptive capacity toward climate change (Patra *et al.*, 2026) [35]. Therefore, improving literacy and strengthening extension services are essential for promoting climate-resilient livestock management in tribal regions.

The predominance of illiterate and primary-level educated respondents reflected the socio-economic and infrastructural limitations prevailing in tribal areas of Southern Rajasthan. Limited educational opportunities, poverty, remoteness and dependence on traditional livelihoods may contribute to lower literacy levels among tribal livestock owners. Education plays a significant role in improving awareness, information access, decision-making ability and adoption of climate-resilient livestock management practices. Farmers with better education are generally more capable of understanding climate variability, accessing extension services and adopting scientific adaptation strategies. Similar observations were made by Deshmukh *et al.* (2024) [15], who reported that education positively influences climate change awareness and adaptation behaviour among farmers.

The higher proportion of respondents with low educational status may negatively affect adaptive capacity under changing climatic conditions. Illiterate farmers often rely heavily on indigenous knowledge and traditional practices rather than scientific climate information. Although traditional knowledge contributes to resilience, lack of formal education may limit access to improved technologies, institutional support, ICT-based information and climate advisory services. Ghosh-Jerath *et al.* (2021) [30] also emphasized that tribal communi

ties largely depend on indigenous knowledge systems and traditional livelihood practices for coping with climate-related stress.

The comparatively lower percentage of higher secondary and graduate-level respondents suggested limited educational advancement among tribal livestock owners. However, educated farmers may play an important role in promoting climate-resilient livestock practices, improving communication with extension agencies and facilitating adoption of scientific livestock management technologies within the community.

Overall, the findings suggested that education is an important determinant of climate change awareness, adaptation behaviour and resilience among tribal livestock owners. Therefore, strengthening rural education, climate literacy programmes, extension education and ICT-based advisory services is essential for improving adaptive capacity and sustainable livestock-based livelihoods under changing climatic conditions.

1.5 Family size

Family size influences household labour availability, resource use and livestock management. As shown in Table 1, most respondents (81.67%) belonged to medium-sized families (4–9 members), followed by large families (> 9 members; 12.22%) and small families (< 4 members; 6.11%). The mean family size was 6.71 ± 2.75 members. This indicated that livestock farming in tribal areas is primarily supported by moderately large households, ensuring adequate labour availability. The results were consistent with recent studies (Aich *et al.*, 2022; Pandey *et al.*, 2025; Panja *et al.*, 2026) [36, 32, 34], which highlighted family size as a critical determinant of climate change adaptation and livelihood sustainability. Medium-sized households provide an optimal balance between labour availability and resource utilization, thereby enhancing resilience to climate variability. Tribal livestock farming is predominantly carried out by medium-sized households, which provide adequate labour and shared responsibility.

1.6 Annual gross income

Annual gross income indicates the total household income from all sources during the preceding year. As presented in Table 1, a majority of respondents (53.61%) belonged to the high-income group (>₹67,000), followed by the medium-income group (₹34,000–67,000; 33.89%) and low-income group (<₹34,000; 12.50%). This suggested that livestock farming contributes significantly to household income and livelihood security. The results were consistent with recent studies (Behera *et al.*, 2025; Dixit *et al.*, 2026; Panja *et al.*, 2026) [37, 38, 34], which identified income as a key determinant of climate change adaptation and resilience. Higher-income households are better equipped to adopt climate-resilient practices, while lower-income groups remain vulnerable to climate risks.

1.7 Major occupation

Major occupation reflects the principal livelihood activity of the respondent's household. As shown in Table 1, most respondents (76.67%) were engaged in agriculture and animal husbandry, followed by labour (22.22%) and agriculture alone (1.11%). No respondents reported animal husbandry alone, government service, business or other occupations, indicating a predominant reliance on mixed farming for livelihood. The findings were similar with Tripathi, 2024 [39]; Kumar and Mohanasundari, 2025 [40] and Panja *et al.*, 2026 [34], who highlighted the importance of mixed farming systems in enhancing resilience and reducing vulnerability. Livestock plays a crucial role as a supplementary income source, while diversification into labour activities reflects coping mechanisms among economically weaker sections.

1.8 Dependency ratio

Dependency ratio indicates the number of economically dependent household members relative to the economically active members. As shown in Table 1, the majority of respondents (82.78%) had a medium dependency ratio (2–5), with an overall mean of 3.70 ± 1.51 . The results were consistent with recent studies (Dixit *et al.*, 2026 and

Panja *et al.*, 2026) [38], which identified dependency ratio as a crucial determinant of vulnerability and adaptive capacity under climate change. Households with moderate dependency ratios are better positioned to balance labour and consumption needs, thereby enhancing resilience, whereas higher dependency levels increase vulnerability to climate-induced risks.

1.9 Family background

Family background reflects the socio-economic and occupational context of respondents' households. As shown in Table 1, all respondents (100%) belonged to rural backgrounds, indicating the predominantly rural nature of tribal livestock ownership in the study area. This was consistent with recent studies (Ghosh-Jerath *et al.*, 2021; Chapke *et al.*, 2025; Kumar *et al.*, 2025) [30, 17, 40], which reported that tribal populations are predominantly rural and rely heavily on climate-sensitive livelihoods such as agriculture and livestock. The rural setting increases vulnerability to climate variability due to direct dependence on natural resources; however, it also provides opportunities for utilizing indigenous knowledge systems in adaptation strategies.

1.10 Land holding

Landholding reflects the household's agricultural resource base and livestock production capacity. As shown in Table 1, the majority of respondents (69.17%) were marginal farmers (< 1 ha), followed by small (13.89%), semi-medium (13.33%) and medium (3.61%) farmers. No respondent belonged to the landless or large (> 10 ha) categories, indicating the predominance of smallholder farming systems in the study area. The results were consistent with recent studies (Ghosh-Jerath *et al.*, 2021; Chapke *et al.*, 2025; Panja *et al.*, 2026) [30, 17, 34], which reported that tribal farmers typically operate under small and marginal landholdings with limited resources. Small landholding size increases vulnerability to climate change due to dependence on rain-fed agriculture; however, it also encourages diversification into livestock as a coping strategy to enhance livelihood resilience.

1.11 Source of irrigation

Source of irrigation is an important resource influencing agricultural and livestock resilience under climatic variability. As shown in Table 4.1, most respondents (83.61%) had a medium level of irrigation access, followed by high (14.72%) and low (1.67%) levels. The mean score was 6.52 ± 1.43 , indicating partial irrigation availability with continued dependence on rainfall. The findings of the present study were in line with those reported in recent studies (Schröder *et al.*, 2024; Panja *et al.*, 2026 and Sommer *et al.*, 2026) [31, 34], which highlighted irrigation as a critical determinant of climate change adaptation, particularly in tribal regions where rain-fed systems dominate. Moderate irrigation access enhances resilience; however, limited infrastructure and unequal water distribution continue to constrain full adaptive capacity.

1.12 Experience in animal husbandry

Experience in animal husbandry reflects the duration of involvement in livestock rearing and management. As shown in Table 1, the majority of respondents (69.17%) had medium experience (12–34 years), followed by high (> 34 years; 19.16%) and low (< 12 years; 11.67%) experience. The mean experience was 22.96 ± 10.69 years. The predominance of respondents in the medium experience category indicates that livestock rearing is a traditional and well-established livelihood activity among tribal households. Continuous involvement in livestock farming over several years enables farmers to acquire practical knowledge and skills related to feeding, breeding, housing and health care management of animals. This indicates that livestock farming in tribal areas is largely practiced by experienced individuals with substantial practical knowledge.

The current study concurs with the findings of Reddy *et al.* (2022) [41], Mehta (2024) [42]; Kumar *et al.* (2026) [43], and Panja *et al.* (2026) [34], who reported experience as a key determinant of climate change perception and adaptation. While experience enhances re

silience through indigenous knowledge, excessive reliance on traditional practices may limit the adoption of modern climate-resilient technologies.

The presence of 19.16 per cent respondents in the high-experience category indicates that a considerable section of tribal households has been engaged in livestock farming for several decades. Such experienced farmers often serve as local knowledge holders and influence livestock management decisions within their communities. Nevertheless, experience alone may not guarantee the adoption of improved practices unless supported by effective extension interventions and capacity-building programmes.

The findings indicated that tribal livestock owners possess considerable traditional experience in animal husbandry, acquired over generations. However, limited access to scientific information, extension services and training programmes restricts the adoption of improved livestock management practices. Therefore, strengthening extension education and capacity-building initiatives can help utilize their existing knowledge for promoting climate-resilient and scientific animal husbandry practices.

1.13 Herd strength and composition

Herd strength and composition refers to the total livestock owned by a respondent's household, expressed in Tropical Livestock Units (TLU) using standard species-specific conversion factors. As presented in Table 1, a majority of respondents (53.06%) had medium herd size (2–4 TLU), followed by small (< 2 TLU; 29.17%) and large (> 4 TLU; 17.78%) herds. This indicated that tribal livestock systems are predominantly semi-commercial and balanced between subsistence and income generation. A similar trend was reported by Ghosh-Jerath *et al.* (2021) [30], Schröder *et al.* (2024) [31] and Panja *et al.* (2026) [34], who emphasized that livestock asset size played a crucial role in determining adaptive capacity and resilience under climate change. Medium herd size provided an optimal balance between productivity, resource availability and risk management, thereby enhancing livelihood sustainability.

Summary

The socio-economic and personal profile of 360 tribal livestock owners in Southern Rajasthan revealed that the majority (58.89%) belonged to the young age group, while 54.44 per cent were male and 45.56 per cent were female. Most respondents (89.44%) were married and 32.22 per cent were illiterate. A substantial majority (81.67%) belonged to medium-sized families, while 53.61 per cent had high annual gross income. Agriculture-cum-animal husbandry was the predominant occupation (76.67%), and 82.78 per cent had a medium dependency ratio. All respondents belonged to rural backgrounds. Most livestock owners (69.17%) possessed marginal landholdings, while 83.61 per cent had a medium level of irrigation resources. Regarding animal husbandry experience, 69.17 per cent had medium experience, with a mean of 22.96 ± 10.69 years. More than half of the respondents (53.06%) possessed medium herd strength, with an average of 2.95 ± 1.35 TLU. Overall, the profile indicates that tribal livestock production in Southern Rajasthan is predominantly associated with young, married, rural households having medium family size, marginal landholdings and agriculture-cum-livestock-based livelihoods.

Conclusion

The findings indicate that livestock farming forms an integral component of the livelihood system of tribal households in Southern Rajasthan, particularly among families with marginal landholdings. The predominance of agriculture-cum-animal husbandry, medium livestock experience and medium herd strength highlights the importance of livestock as a complementary livelihood resource. However, the relatively high proportion of respondents with low educational attainment and limited land resources suggests the need for location-specific extension interventions, improved access to livestock services, climate-related information, skill development and resource-efficient livestock technologies. Strengthening these areas can support

more resilient and sustainable livestock-based livelihoods among tribal communities in Southern Rajasthan.

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