

Assessment of smallholder agrarian systems and the adoption of veterinary services and government schemes in Mirzapur, Uttar Pradesh

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ABSTRACT

Livestock sustains rural livelihoods in Vindhyan region's Mirzapur District, UP, where dairy dominates over secondary goats, sheep, and poultry, whose contributions to income, nutrition, and risk mitigation remain underexplored despite South Asian smallholder patterns. This survey of 576 households assesses their structure, management, inputs, and veterinary/government service adoption via structured data on ownership, breeds, production, feeding, and breeding, analyzed descriptively. In the study Vindhyan region's Mirzapur District reveal dairy as the primary livestock pillar (52% priority), with goats (20% owners, mostly 1-2 indigenous animals for meat/milk at low yields of 0.5-2L/day sold Rs.40-60/L), sheep (>92% none, small flocks for meat/wool Rs.50-200/kg), and poultry (>90% none, backyard desi birds with sporadic eggs/meat) as marginal, subsistence assets amid high data gaps. Management relies on low-input feeds (berseem 30%, straws 36%, grazing 8.5%), mixed breeding (AI 31%, natural 23%), but veterinary use splits (29% formal, 46% informal/self), and government schemes remain low (<5% for insurance/credit/Kamdhenu yojna). These patterns emphasize needs for breed/feed/health upgrades and outreach to elevate small ruminants/poultry productivity and resilience. Based on these findings, improved smallholder livestock management—through breed enhancement, better feeding/health practices, and expanded veterinary/insurance access—can boost productivity, nutrition, and resilience, playing a crucial role in achieving sustainable development goals in Vindhyan region's rural livelihoods.

Key words: Livestock breeding practices, livestock management, rural livelihoods, smallholder agriculture, veterinary care adoption

INTRODUCTION

Mirzapur district in Uttar Pradesh—one of the state's seven most drought-prone and among its 17 backward districts—has a largely rural population of 1,788,203, marked by a 25.18% decadal rise and significant Scheduled Caste (554,102) and Scheduled Tribe (1,302) communities (Krishi Vigyan Kendra, IAS, BHU, Mirzapur). Its agrarian structure is dominated by small and medium farmers: 36.4% own less than 2 acres (<0.8 ha), 43.9% hold 2–10 acres (≈0.8–4 ha), and only 16.4%

possess more than 10 acres (Kumari *et al.*, 2025). This mirrors national trends in farmland fragmentation, where marginal (≤ 1 ha) and small (1–2 ha) holdings comprise 68.6% and 18% of total operational land, driven by inheritance-led subdivision, demographic pressure, and continued dependence on agriculture (Kaur *et al.*, 2021). Located in the UP East (Vindhyan) agro-climatic zone, Mirzapur faces additional ecological constraints: of its 1,312 thousand hectares, only about 30% is cultivable, with over 80% lying in the undulating

Vindhyan ranges and just 20% in the fertile alluvial tract, restricting the crop opportunities (Singh *et al.*, 2025).

In Uttar Pradesh, cereal-based farming—dominated by paddy in *kharif* and wheat in *rabi*—continues to prevail. Narrow crop portfolios, fragmented landholdings, and diverse agro-ecological conditions intensify both economic and climatic risks, a persistent structural challenge noted in recent assessments (Singh *et al.*, 2019). In this context, integrating small-scale livestock and poultry rearing has become essential, providing regular cash flow, nutritional support, and a vital risk buffer for resource-poor households.

Uttar Pradesh lags behind the better-performing states in animal husbandry development; as farmer literacy in Maharashtra is 71.6% compared to 65.8% in UP, and with limited capacity to invest in productivity-enhancing technologies (Potdar *et al.*, 2020). Within UP, Mirzapur exhibits an additional layer of disadvantage, as evidenced by its goat population of 126,877, which is approximately 34% lower than the state's per-district average of around 193,067, although this moderate base remains higher than that of more urbanised districts and thus suitable for expansion of small ruminant-based livelihood programmes, particularly among tribal and marginal households in the Vindhyan terrain (Tripathi, 2020).

The transformative potential of livestock is constrained by multiple systemic and technical bottlenecks in Uttar Pradesh. Farmers report irregular access to extension services, limited incentives and weak policy or programme support for the adoption of animal welfare and improved management practices, and recurrent non-availability or delays in veterinary care, underscoring the need to strengthen dairy and livestock extension and to build the capacity of field-level personnel and veterinarians (Gupta *et al.*, 2020). Deficiencies in veterinary infrastructure and low awareness of vaccination and deworming further contribute to only medium-level adoption of recommended practices among most farmers (Singh and Chauhan, 2009).

MATERIALS AND METHODS

The study was conducted in the Vindhyan

region of Mirzapur District, Uttar Pradesh, India. This area features the hill contour with elevations between 300 and 400 meters above sea level and experiences a semi-arid to subtropical climate. The environmental conditions of the region support a farming system that combines crop cultivation with livestock rearing, which is central to the livelihoods in the region.

To better understand livestock management and socio-economic conditions, a structured questionnaire survey was conducted among 576 farming households selected using stratified sampling. The survey collected detailed data on livestock and poultry, including the number and breed of sheep and goats, their purpose, daily goat milk yield and its price, poultry numbers and breeds, as well as consumption habits related to poultry meat and eggs. In addition, questions addressed veterinary care adoption, feeding and breeding practices, sources of livestock, use of livestock sector facilities, and participation in government programs supporting livestock farmers.

Data collection was carried out through face-to-face interviews by trained enumerators familiar with the local language, ensuring clear communication and reliable responses. A structured questionnaire prepared in Google Forms was administered to the selected farmers, and the responses were automatically captured in Google Sheets for systematic cleaning, verification, and standardization before analysis. The survey timing was set in pleasant weather of February and March, coincided with the post-harvest period, allowing respondents to provide current and comprehensive information on their farming activities.

After collection, the data underwent careful cleaning and standardization. This process included correcting inconsistencies and harmonizing spelling variations of locations. Descriptive statistical analyses were performed using statistical software of Microsoft Excel. These cleaned and analyzed datasets were then organized into tables to reveal important patterns in livestock and poultry ownership and preferences, management practices, and institutional engagement among farming households across the study area. These analyses provide the empirical basis for understanding the rural agrarian determinants for their

socio-economic structure and the livestock and poultry management practices and their acceptability for the upliftment cues.

RESULTS AND DISCUSSION

In present survey, ownership of goats is limited, with nearly 80% of respondents reporting no goats, reflecting either low preference or resource constraints for small ruminant husbandry. Among the 20% of the goat farmers, herd sizes are generally small; 10.8% of farmers own 1-2 goats, while only a negligible fraction exceeds 5 units. Breed distribution is dominated by indigenous or nondescript types (8.3%), supplemented by modest populations of Jamunapari (2.1%), Black Bengal (1.4%), Sirohi (1.7%), Barbari (1.6%), Jakhrana (0.7%). The primary purposes for goat rearing are meat production (11.5%) and milk (5.9%), with a small fraction engaged in both or

progeny sales—underscoring goats' role as multipurpose livelihood assets rather than solely dairy producers. Correspondingly, goat milk yields are very low or nonexistent for most respondents (over 84% report zero milk yield), with typical yields among producers ranging from 0.5 to 2 liters per day. Milk pricing data indicates that small-scale goat dairy producers receive mostly Rs. 40–60 per liter, with a limited selling at higher rates reflecting niche market potentials (Table 1). The substantial missing data in production and pricing fields suggests a limited formal dairy market and possible underreporting. These statistics collectively highlight that goat rearing in the study area serves primarily as a secondary or supplementary income source, oriented more toward meat and small-scale milk production for household consumption rather than large-scale commercial goat farming practices.

Table 1. Goat rearing practices and production attributes among surveyed farmers

Parameter	Category/purpose	Number of respondents	Percentage (%)
Goat Number	0	459	79.7
	1-2	62	10.8
	3-5	29	5
	5-10	18	3.1
	>10	4	0.7
	Missing/Blank	4	0.7
Goat Breed	Desi/Nondescript	48	8.3
	Jamunapari	12	2.1
	Black Bengal	8	1.4
	Sirohi	10	1.7
	Barbari	9	1.6
	Jakhrana	4	0.7
	Crossbreds/hybrid/mixed	6	1
	Missing/Blank	479	83.2
Purpose of Rearing	Milk	34	5.9
	Meat	66	11.5
	Milk and Meat both	17	3
	Selling progeny to others	11	1.9
	Income generation	5	0.9
	Not specified/Missing	443	76.9
Goat Milk Yield (lit/day)	<0.5	486	84.4
	0.5 - 1	36	6.3
	>1 - 2	20	3.5
	>2 - 5	15	2.6
	>5	2	0.3
	Missing/Blank	17	3
Goat Milk Rate (Rs/litre)	<40	4	0.7
	40-60	45	7.8
	61-100	10	1.7
	101-200	5	0.9
	Missing/Not applicable	512	89

The herd size of goats among the surveyed farmers was predominantly small, with nearly four-fifths reporting no goats and only a minor proportion maintaining more than two animals. Previous studies similarly highlight the smallholder nature of goat production in India. Majority of households maintained 5–10 goats (Meena *et al.*, 2024), while Pouchepparadjou *et al.* (2024) documented average flock sizes ranging from 3.23 in small farms to 13 in larger units. In Vindhyan Zone it was observed that large flocks (>15 goats) were owned by only 5.83% of respondents, whereas medium (11–15) and small (6–10) flocks accounted for 42.50% and 34%, respectively (Yadav *et al.*, 2020). Collectively, the evidence indicates that goat farming in India remains largely a subsistence-oriented enterprise with limited herd expansion.

The breed composition recorded in the present study was dominated by desi/nondescript goats (8.3%), with comparatively lower proportions of recognized breeds and crossbreds. This pattern mirrors national trends reported in the Breed-wise Survey (2022), which shows that of India's 148.88 million goats, 63.5% are nondescript, 27.4% are indigenous purebred registered animals, and 9.1% are graded. It was noted that only 12 high-merit indigenous breeds account for ~45.5 million goats, while widespread crossbreeding threatens their purity (Pathak *et al.*, 2020). It was also reported that village flocks in semi-arid Uttar Pradesh were dominated by nondescript goats (~60%), with Barbari at ~27% (Mohan *et al.*, 2012). Our findings follow this national pattern, reaffirming the dominance of nondescript populations.

Most respondents reported rearing goats primarily for meat production, followed by milk and dual-purpose. This trend is consistent with the national scenario, where goat husbandry is predominantly meat-oriented due to the strong domestic demand for chevon, regarded as a preferred meat in India (Singh *et al.*, 2020). In agreement with present finding, Kumar and Deoghare (2002), observed that returns from sale of kids formed the major component of gross returns, followed by value of milk which accounted for around 70 and 28 per cent, respectively.

In the present study, a substantial proportion

of goats (84.4%) produced less than 0.5 L of milk per day, which is consistent with reported yields of indigenous breeds such as Black Bengal and Sirohi, typically ranging from 0.2 to 0.63 L/day under smallholder production systems (Singh and Ramchandran, 2007). Milk marketing data in our study was largely unavailable, with 89% of respondents not selling goat milk, indicating its limited commercial relevance in the Vindhyan region. This pattern aligns with findings by Hegde and Deo (2017), who reported that only 29% of goat keepers in Uttar Pradesh milked their goats, primarily for kid rearing rather than market sale. Among the small proportion of farmers who sold milk (8% of total farmers), prices ranged from Rs 40–60/L, reflecting informal and inconsistent market channels. These values are comparable to national observations, where the absence of structured goat milk markets with low prices (Rs 25–35/L) constrain the economic viability of dairy goat farming (Singh *et al.*, 2023).

The results from 576 respondents indicate that sheep rearing is a marginal activity in the study area, as over 92% of households reported no sheep ownership. Among the few sheep keepers, mostly maintaining very small herds (1–2 animals), confirming that sheep husbandry is largely non-commercial and plays a supplementary role in household livelihoods in Mirzapur district (Table 2). This pattern contrasts sharply with major sheep-producing regions such as Andhra Pradesh, where average flock sizes exceed 60 animals, reflecting commercially oriented systems (Punuru *et al.*, 2025).

Breed information was largely absent in our study, with nearly 95% of respondents unable to specify breed, while the few identified animals were predominantly desi/nondescript, with very limited presence of recognized breeds such as Marwari. This reflects poor breed awareness and unorganized breeding practices, consistent with national observations that widespread genetic admixture limits the productivity gains in Indian sheep rearing systems. Similar constraints related to lack of breed knowledge and ineffective breeding management has been reported by Singh *et al.* (2018). Kumar *et al.* (2021) also highlighted the importance of Marwari along with Chokla, Jaisalmeri, Malpura, Muzaffarnagari, Nali,

Patanwadi, Sonadi, Munjal, Kajali and other breeds in arid and semi-arid regions.

Sheep were mainly reared for meat (5.4%), followed by wool production (3%), while no respondent reported sheep milk production, reflecting traditional livestock utilization practices in northern India. Studies from Rajasthan similarly identify meat production and supplementary wool income as the primary economic motivations for sheep and goat ownership (Meena *et al.*, 2024). Although wool marketing was poorly recorded in the present study, available data indicated low production and market prices ranging from Rs. 50 to Rs. 200 per kg, confirming weak economic returns from wool in the region. National benchmarks further illustrate the productivity gap, as average annual wool yield per sheep in India is approximately 0.9 kg compared to the global average of 2.4 kg (Kumar *et al.*, 2021). Regional price variations range from Rs. 40/kg for coarse wool to Rs. 350/kg for carpet-grade wool (Suresh *et al.*, 2008). Additionally, degradation of grazing lands

has been linked to an 18% decline in wool yield and 20% reduction in body weight, further constraining productivity (Suresh *et al.*, 2010). In Uttar Pradesh, Gangatiri-Fatehpuri sheep, known for mutton potential and coarse wool, is distributed around the Fatehpur district (Verma *et al.*, 2024); however, its contribution remains limited due to poor breed recognition and negligible promotion in the study area.

The survey conducted in Mirzapur district of the Vindhyan region revealed very low participation in poultry rearing among respondents. A large majority (90.6%) did not keep any poultry, while only 4% are maintaining small backyard flocks of 1–10 birds. Larger flocks were rarely observed, with less than 1% of respondents owning more than 50 birds, indicating that poultry farming is neither a primary nor a supplementary livelihood activity for most households in the study area (Table 3).

Among the few poultry-keeping households, indigenous or desi birds were the most commonly

Table 2. Sheep rearing practices and production attributes among surveyed farmers

Parameter	Category/purpose	Number of respondents	Percentage (%)
Sheep number	0 / No Sheep	532	92.4
	1-2	22	3.8
	3-5	12	2.1
	6-10	6	1
	>10	2	0.3
	Missing/Blank	2	0.3
Sheep breed	Desi/Nondescript	26	4.5
	Marwadi	3	0.5
	Other named breeds	2	0.3
	Not specified/Missing	545	94.6
Purpose of rearing	Meat	31	5.4
	Wool	17	3
	Milk	0	0
	Wool and Meat (both)	9	1.6
	Income generation	5	0.9
	Selling surplus/progeny	7	1.2
	Not specified/Missing	507	88
Sheep wool rate (Rs/kg)	<50	1	0.2
	50-100	17	3
	101-200	15	2.6
	>200	2	0.3
	Not specified/Missing	541	94
Sheep wool yield (kg/sheep)	<0.5	6	1
	0.5-1.0	9	1.6
	1.01-2.0	5	0.9
	>2.0	2	0.3
	Not specified/Missing	554	96.2

reported (4.9%), followed by Kadaknath, Rhode Island Red and broiler/commercial birds. However, breed information was missing for 93.6% of respondents, reflecting limited awareness or low importance given to breed identity. This finding is consistent with earlier studies which reported that backyard poultry in Uttar Pradesh is dominated by small flocks managed under extensive systems, with birds kept mainly for home use or small-scale production (Mandal *et al.*, 2006). The preference for indigenous birds is also in agreement with previous reports that highlight their adaptability and disease tolerance under rural conditions (Haunshi and Rajkumar, 2020). Constraints such as poor access to quality chicks, credit facilities, and extension services may further limit poultry adoption in rural areas (Wong *et al.*, 2017; Chawker *et al.*, 2021).

Consumption of poultry products was extremely low, with only 2.6% of respondents consuming poultry meat weekly and just 0.3% consuming eggs daily. More than 93% of respondents did not specify consumption patterns, suggesting limited intake or low priority given to poultry produce consumption in rural household diets. These findings align with national evidence that rural per-capita consumption of eggs and poul-

try is considerably lower than in urban areas (Kumar and Mittal, 2002). India's overall per-capita poultry consumption remains low by global standards and rural households continue to face economic, cultural, and accessibility barriers (Devi *et al.*, 2014). A small proportion of respondents identified as vegetarian or reported not consuming poultry meat due to economic reasons (1.4%), indicating that poultry production in the area is often oriented toward sale rather than household nutrition, as reported by earlier studies (Thammi Raju and Suryanarayana, 2005).

Overall, the findings demonstrate that poultry farming in the Vindhyan region of Mirzapur remains underdeveloped, characterized by minimal ownership, lack of breed awareness, and low dietary utilization of poultry products.

Analysis of livestock data from 576 farmers highlights the central role of animal husbandry in rural livelihoods. About 52% rear animals primarily for milk production, underscoring dairying's importance for household nutrition and income (Table 4). This aligns with India's position as the world's largest milk producer and reflects dairying's significance for small and marginal farmers. In Uttar Pradesh, buffalo-based dairying is especially prominent due to low-cost feed-

Table 3. Poultry rearing practices and production attributes among surveyed farmers

Parameter	Category/value	Number of respondents	Percentage (%)
Poultry number	0 or No Poultry	522	90.6
	1–10	23	4
	11–50	15	2.6
	51–100	4	0.7
	>100	2	0.3
	Missing/Blank	10	1.7
	Poultry breed	Indigenous/Desi	28
Kadaknath		4	0.7
Rhode Island Red (RIR)		3	0.5
Broiler/Commercial		2	0.3
Not specified/Missing		539	93.6
Poultry meat consumption	Once a week	15	2.6
	Twice a week	6	1
	Once a month	11	1.9
	No/Purely for sale	8	1.4
	Not specified/Missing	536	93.1
Poultry egg consumption	Daily	2	0.3
	Once a week	12	2.1
	Twice a week	5	0.9
	No consumption	16	2.8
	Not specified/Missing	541	94

ing systems using crop residues and sugarcane by-products, supported by strong milk marketing networks that ensure steady cash flow (Singh *et al.*, 2007). Beyond milk, livestock also contributes through income generation (7.6%), manure production (5.9%), and meat production (5.6%), while 9% of farmers rear animals for multiple purposes—demonstrating the integrated, multifunctional role of livestock in mixed-farming systems. This multifunctionality helps families recycle resources, manage risks, and strengthen overall livelihood resilience (Dey *et al.*, 2025).

The findings further indicate a gradual decline in the use of livestock for draught power, mirroring broader mechanization trends. Yet for farmers with small and financially constrained landholdings, animal traction remains a cost-effective and energy-efficient option (Alex *et al.*, 2013). Region-specific practices, such as using male buffaloes for transport in western Uttar Pradesh, show

how livestock functions continue to adapt to local agro-economic needs rather than being fully replaced by machinery (Rangnekar, 2006). Indirect benefits—such as manure, draught power, and efficient use of crop by-products—often contribute more to household sustainability than market income alone, reinforcing livestock's pivotal role in productivity, resilience, and livelihood security (Singh and Singh, 2023).

The findings show that 30% of farmers obtained livestock from their own farms, indicating strong herd-retention and self-replacement practices. Local markets and livestock fairs were the next major sources (16.7–17%), highlighting their continued role in animal exchange and informal price setting in rural Uttar Pradesh (Table 4). By contrast, private breeders (5%) and government schemes (2.6%) contributed little, pointing to limited outreach and weak penetration of formal breeding programs. Livestock acquired through

Table 4. Adoption of livestock management practices among surveyed farmers

Parameter	Category	Number of respondents	Percentage (%)
Purpose of rearing livestock	Milk production	297	51.6
	Income generation	44	7.6
	Manure	34	5.9
	Meat production	32	5.6
	Sales/Progeny/Surplus	28	4.9
	Draught power	6	1
	Multiple (Milk, Meat, Manure etc.)	53	9.2
	Not specified / Missing	82	14.2
Livestock source	Own farm	173	30
	Local Market/Fairs	96	16.7
	Private breeders	27	4.7
	Government Institutions (Schemes)	15	2.6
	Gift/Inheritance	7	1.2
	Multiple sources	14	2.4
	Not specified / missing	244	42.4
	Livestock feeding	Berseem	173
Wheat straw		134	23.3
Paddy straw		76	13.2
Grazing only		49	8.5
Dry fodder/Chana		18	3.1
Sorghum/millet		14	2.4
Multiple feed types		48	8.3
No/Minimal feeding reported		13	2.3
Livestock breeding	Not specified / missing	51	8.9
	Artificial Insemination (AI)	178	30.9
	Natural service	133	23.1
	Both	41	7.1
	Private breeder/Village Bull	14	2.4
	No breeding (only male / not applicable)	24	4.2
Not specified / missing	186	32.3	

inheritance was minimal, suggesting a shift toward market-based purchases. Compared with higher organized market use reported in Punjab (Gill *et al.*, 1998), the lower participation observed here may stem from seasonal fairs, the dominance of informal traders (Singh and Verma, 2007), and constraints such as limited credit access, intermediaries, and high animal prices (Beohar *et al.*, 2007).

The results show that livestock feeding is largely based on traditional fodder, with berseem (30%) and wheat straw (23%) being the most commonly used resources. Paddy straw (13%) and grazing (8.5%) also contribute, while 8% of farmers rely on multiple feed sources and a small share (2%) follow minimal feeding practices (Table 4). These patterns reflect the low-input feeding systems typical of smallholder farms, which can limit livestock productivity. The findings align with earlier studies from Uttar Pradesh reporting heavy dependence on crop residues and limited use of improved fodder (Sinha *et al.*, 2009; Singh and Shukla, 2017). Regional studies further highlight structural fodder shortages: eastern Uttar Pradesh shows low cultivation of green fodder (Kumar *et al.*, 2018), while other parts of the state exhibit higher—but still insufficient—adoption (Kumar *et al.*, 2020). Continued fodder scarcity, linked to stagnant fodder cultivation areas, further reinforces farmers' reliance on agricultural by-products (Gulati *et al.*, 2021).

The results show that 31% of farmers adopted artificial insemination (AI), indicating growing awareness of genetic improvement practices, although natural service remains widely practiced (23%). A small proportion of respondents used both methods or relied on village bulls and private breeders (Table 4). A substantial proportion of missing or unspecified responses (32%) suggests gaps in breeding awareness and absence of breeding animals. The level of AI adoption corresponds with national estimates of approximately 30%, reflecting limited institutional coverage and uneven access to breeding infrastructure (DAHD, Annual Report 2022–23). Studies in Uttar Pradesh have shown that AI use is more common in cross-bred cattle while natural service predominates in buffaloes, whereas higher adoption has been reported in other regions such as central Gujarat and urban areas (Khadda *et al.*, 2017; Bachan *et al.*, 2025).

Analysis of data from 576 farmers reveals a mixed pattern in the use of veterinary services. About 29% relied on qualified veterinary hospitals, while a similar proportion depended on informal care—25.2% consulted unqualified practitioners and 20.7% used self-treatment or traditional remedies. Only 3.5% reported not accessing any care, and around 22% did not report usage or did not require services at the time (Table 5). Overall, the findings show partial adoption of formal veterinary services alongside continued

Table 5. Adoption of veterinary care and government sponsored schemes among surveyed farmers

Parameter	Category / Response	Number of respondents	Percentage (%)	Notes/interpretation
Veterinary care adoption	Contact to veterinary hospital	167	29	Most cited formal vet care option
	quacks (Unqualified practitioners)	145	25.2	Significant use of informal treatment
	Self / traditional treatment	119	20.7	Reliance on indigenous/traditional knowledge
	No Veterinary Care	20	3.5	No vet care accessed
Government sponsored schemes adoption	Missing / Not specified	125	21.7	Non-respondents or inapplicable
	Kamdhenu Yojna	26	4.5	Popular but limited reach of this government scheme
	Veterinary health camp	89	15.4	Moderate participation in health camps
	Farmers visits	57	9.9	Visits possibly for extension or treatment
	Farmers training programme	48	8.3	Agricultural education and training
	Livestock insurance	20	3.5	Limited insurance penetration
	Bank loan for livestock	9	1.6	Low uptake of credit facilities
	Bakri palan yojna	3	0.5	Very limited awareness or participation
Missing / not specified	367	63.7	Majority did not report use or participation	

reliance on informal and indigenous practices.

The continued reliance on informal and traditional treatments highlights persistent gaps in the reach and effectiveness of formal veterinary services. Similar trends have been reported elsewhere, where high treatment costs and poor access drive farmers toward indigenous practices (Fabusoro *et al.*, 2007), which also remain popular due to cultural acceptance and affordability (Bharati and Sharma, 2010). A strong indigenous knowledge base in Uttar Pradesh (Kumar and Bharti, 2013), along with systemic issues such as shortages of veterinary manpower (NAVS, 2018).

Adoption of government livestock facilities was also low. Veterinary Health Camps had the highest participation at 15.4%, indicating better access to basic curative and preventive services. Farmer visits (9.9%) and training programmes (8.3%) showed moderate engagement, while uptake of major schemes—such as Kamdhenu Yojna (4.5%), livestock insurance (3.5%), bank loans (1.6%), and *Bakri Palan Yojna* (0.5%)—remained minimal. Notably, 63.7% of respondents did not use any livestock-related scheme, reflecting limited awareness, poor access, and low integration with formal institutional support systems.

The low adoption of government schemes is consistent with earlier findings that highlight major gaps in awareness and information dissemination among livestock farmers. NSSO (2005) reported that only 5% of farm households accessed animal husbandry information, compared with 40% for crop farming, underscoring livestock as a largely neglected extension area. Similar challenges—poor availability, limited accessibility, and untimely delivery of information—were documented in Tamil Nadu by Babu *et al.* (2011). In Uttar Pradesh, dissatisfaction with livestock service delivery (Kareem *et al.*, 2017) likely contributes further to the weak participation in formal programmes.

Insurance coverage was especially weak, with most farmers never insuring their animals. This aligns with earlier studies showing farmers' reluctance due to high premium costs (Sathisha, 2018) and barriers such as procedural delays, low animal valuation, and complex claim processes (Singh and Chandel, 2020). Women livestock

keepers face additional challenges, including limited scientific training, time constraints, and low awareness of schemes (Yadav *et al.*, 2017). Extension officials are similarly constrained by heavy workloads and inadequate mobility support, further limiting outreach (Smitha *et al.*, 2019).

CONCLUSION

The centrality of livestock in sustaining rural livelihoods in the district, where animal ownership significantly enhances income stability, reduces poverty, and provides a crucial buffer against climatic and economic shocks. Despite these contributions, livestock production systems remain constrained by small flock sizes, widespread use of nondescript breeds, and limited market integration, particularly in the case of sheep and goat, where underdeveloped production systems and weak wool and milk marketing channels continue to restrict economic returns.

Improving productivity and profitability will require strengthening management practices, promoting scientific breeding, and expanding genetic improvement programs, especially for indigenous breeds that remain valuable but vulnerable. The predominance of residue-based feeding systems and irregular green fodder supplementation highlights an urgent need to improve fodder availability. At the same time, the reliance on own-farm sourcing and only moderate market participation point to the continued importance of informal channels, while emphasizing the weak penetration of institutional services and livestock development schemes.

Veterinary services also exhibit major gaps, with many farmers turning to informal or traditional care due to cost, delays, limited manpower, and poor accessibility. Strengthening veterinary infrastructure, improving medicine availability, and expanding mobile and doorstep services are essential to increase the adoption of formal animal healthcare. Furthermore, despite the presence of many national and state initiatives their impact at the grassroots remains limited. Enhancing extension outreach, simplifying procedures, improving scheme awareness, and providing stronger field-level support can significantly increase participation in livestock development programs.

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