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Article

Socio-economic dynamics and goat husbandry practices in Zanjira upazila of Shariatpur district, Bangladesh

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Abstract: Goat husbandry is an essential component of many farming systems in Bangladesh, particularly for rural and poor households, due to its role in income generation, food security, and poverty alleviation. To evaluate the socio-economic status and husbandry methods of backyard goat farmers, a study was conducted in Zanjira upazila of Shariatpur district, Bangladesh, from March to May 2023. A total of 50 goat-raising farmers were selected at random from eight different unions in the Zanjira upazila. Data were collected using a pre-tested standard questionnaire, in-person visits and observations, formal and informal conversations, and farm records. The results reveal that the majority of farmers rear Black Bengal goats (70%) under a semi-intensive system (82%). Most farmers are landless (58%), middle-aged (62%), and primarily educated (52%), with many being housewives or males who started raising goats with their own money (50%) and without formal training (84%). While only 36% of goat owners engage in summer bathing, night shelter is provided in a goathouse (64%), cattle house (22%), or home (14%). Additionally, 80% of goat owners use bedding materials throughout the winter, and green grass and concentrates are provided by the majority of farmers (98%). A tube well serves as a significant source of water for 82% of the farmers. All farmers (100%) employed natural breeding, with 98% using a hired breeding buck. While a significant portion (68%) frequently used anthelmintics, very few (14%) provided regular vaccinations to their goats. The most common diseases and disorders in the assessed area include myiasis (30%), PPR (28%), dog bites (22%), and abscesses (20%). This study also revealed that goat owners face challenges related to housing, feeding, healthcare, and limited grazing access. Addressing these issues could significantly improve livelihoods and contribute to the national economy. The present study will be helpful for farmers, scientists, and policymakers in making decisions to enhance productivity and sustainability through better feed management, improved healthcare practices, and organic goat production.

Keywords: goat farming systems; rural livelihoods; smallholder livestock management; production constraints; animal health practices

1. Introduction

Goat farming significantly impacts poverty reduction, income generation, food and nutrition security, and job creation. Compared to other livestock species, raising goats offers distinct management and financial advantages due to their early sexual maturity, higher prolificacy, minimal input requirements, and ease of marketing (Ahmed, 2017). Bangladesh is home to an estimated 23.27 million goats, which has increased to about 26.26 million, making it the fourth most goat-populated country in Asia (Ali *et al.*, 2020; Rakib *et al.*, 2022; Sobur *et al.*, 2024). Goats are the most common livestock species in Bangladesh (Paul *et al.*, 2020). To combat poverty, the government has launched a national goat program with a focus on its development. One key factor influencing a goat's productivity is its reproductive performance (Hossain *et al.*, 2017). Despite the widespread distribution of goats, there is a lack of reliable information regarding their potential and actual contributions to rural development. Before initiating any development activities in rural areas, it is essential to assess goat production, its challenges, and its future prospects (Nath *et al.*, 2014).

The demand for animal protein has outpaced supply due to rapid population growth and rural-to-urban migration (Sobur *et al.*, 2025). Consequently, optimizing rural goat production requires advancements in breeding, technology, nutrition, and husbandry techniques (Islam, 2023). The Black Bengal goat is among the most economically viable breeds for goat husbandry in the country, excelling in reproductive performance, meat quality, and skin quality (Hossain, 2021). The government promotes Black Bengal goats through development farms and subsidized rates, as well as programs aimed at enhancing goat rearing, alleviating poverty, and improving the economic status of rural women. However, despite the introduction of various training and extension programs, the needs of rural farmers remain inadequately addressed (Rahman *et al.*, 2017).

Despite the high potential of goat rearing, productivity and profitability in Zanjira upazila of Shariatpur district remain suboptimal due to a limited understanding of how farmers' socio-economic characteristics—such as education, access to credit, landholding size, market access, and decision-making dynamics—influence the adoption of improved goat husbandry practices, including scientific feeding, disease prevention, housing, and breeding management. Existing studies largely present generalized findings and fail to capture local realities, particularly how context-specific constraints such as limited financial resources, inadequate veterinary services, and entrenched traditional practices hinder the uptake of modern goat production technologies. This absence of localized empirical evidence restricts the effective design and targeting of government and NGO interventions, resulting in low productivity, high mortality rates, inefficient resource use, and unrealized income potential among goat-rearing households. Consequently, the core research problem lies in the insufficiently quantified relationship between farmers' socio-economic attributes and their adherence to recommended goat husbandry practices in Zanjira upazila.

To address this research gap, the present study is guided by a set of clearly defined research questions that seek to clarify the current state and limitations of goat farming in the study area including, what are the prevailing feeding, housing, breeding, and health management practices adopted by goat farmers in Zanjira upazila? what are the key socio-economic characteristics of goat-rearing households in the study area? what major production constraints limit the efficiency and profitability of goat farming in this locality? and is there an association between farmers' socio-economic attributes and their adoption of improved goat husbandry practices? Based on these research questions, the study tests the hypotheses that goat farmers with higher education levels, better access to credit, and greater exposure to training programs are more likely to adopt improved goat husbandry practices. Limited access to veterinary services and quality feed resources significantly increases disease prevalence and mortality in goats; and prevailing socio-economic constraints are significantly associated with low productivity and suboptimal management of goat farming systems in Zanjira upazila. Accordingly, the study aims to characterize the socio-economic status of goat farmers, document existing husbandry and health management practices, and identify the key economic, technical, and institutional constraints affecting goat production, with the expectation. The findings will generate evidence-based insights to support policymakers, extension services, and development agencies in designing targeted, location-specific interventions to enhance the sustainability and socio-economic impact of goat farming in rural Bangladesh.

2. Materials and Methods

2.1. Ethical approval

No ethical approval is required to conduct this research.

2.2. Study area and periods

Eight unions in the Zanjira upazila of Shariatpur district, Bangladesh, were included in this study: Bara Krishnagar, Sener Char, Purbo Nawdoba, Paler Char, Zanjira, Mulna, Borokandi, and Boro Gopalpur (Figure 1).

This region is located along the Padma River and was selected for research due to its high number of goat producers. A three-month descriptive cross-sectional survey was conducted from March to May 2023.

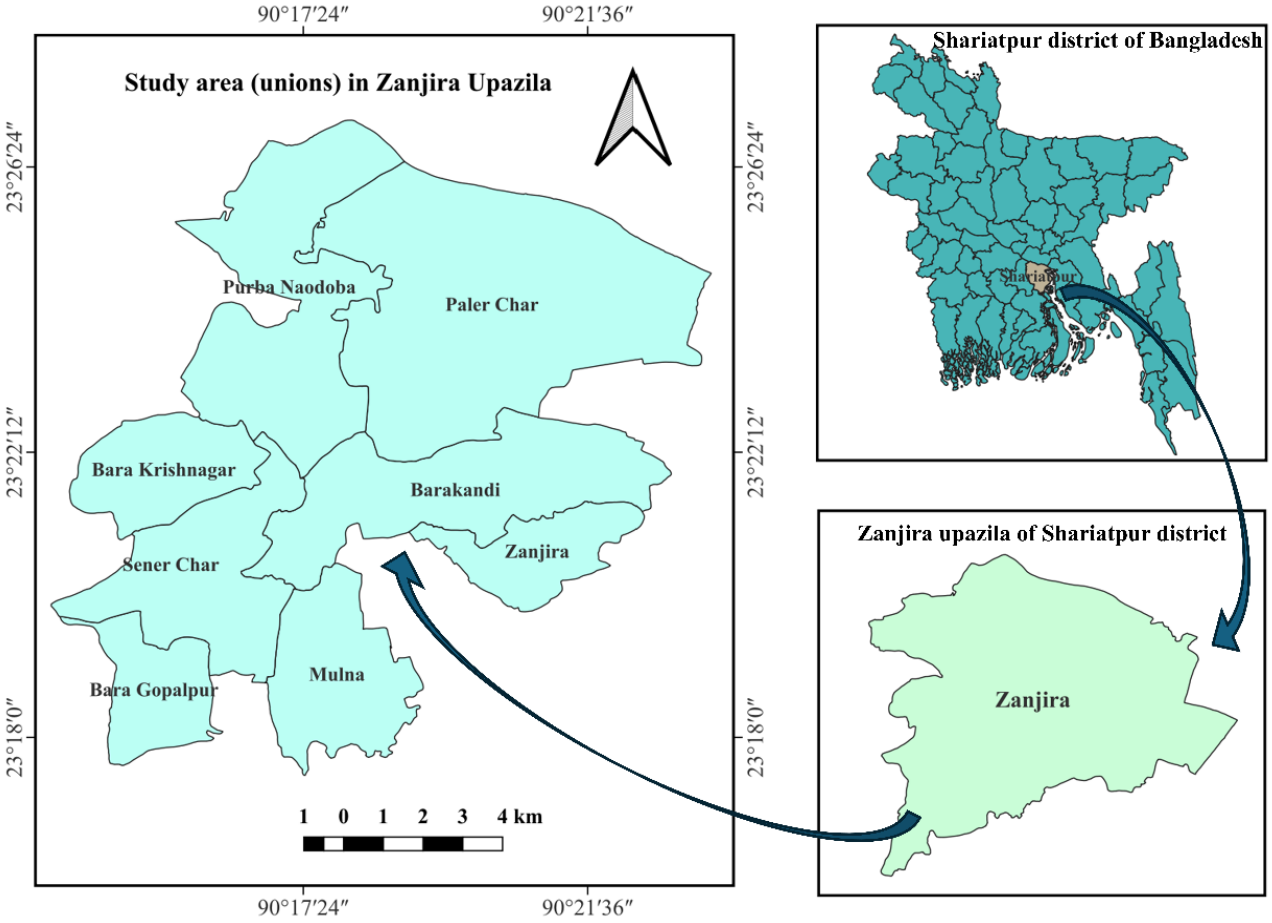

Figure 1. The study was conducted in the Zanjira upazila, Shariatpur district, Bangladesh.

2.3. Sampling technique and data collection

The standard interview schedule was prepared according to the procedure outlined by Haque *et al.* (2023). A total of 50 traditional goat farmers were randomly selected from various parts of the upazila. Data were collected following the protocol established by Prank *et al.* (2023). A wide range of primary data was systematically gathered through random, direct interviews using a structured questionnaire. This questionnaire comprehensively covered farmer socio-demographics, detailed goat rearing practices, and disease management, with validation from visual observations of goat shed conditions. Supplementary information was also gathered from published government documents and available online literature.

2.4. Data analysis

A standardized questionnaire was employed to gather the farm dataset, and all information was recorded in a Microsoft Excel spreadsheet. MS Excel 2010 was used to compile, tabulate, and analyze the collected data. Descriptive statistics, specifically frequency and percentage, were calculated for interpretation. The study area map was prepared using QGIS 3.44.5 software.

3. Results and Discussion

3.1. Goat farmers' socioeconomic characteristics

3.1.1. Gender

Of the goat farmers surveyed, approximately 54% were men and 46% were women (Table 1). Nearly all respondents involved in goat farming were male (95.83%), while female participation was minimal (4.17%), a pattern consistent with the findings reported by Gamit *et al.* (2020). Goat farming is the most prevalent occupation for women in the Mymensingh district (Naim and Ahmed, 2021). However, Sivachandiran *et al.*

(2020) and Prank *et al.* (2023) reported a different outcome, noting that the majority of goat raisers were female, which may be due to regional differences. In the morning, most men take the goats out of the house, while female family members assist with parturition. Male members typically handle the sale and marketing of goats and arrange for breeding. Female members are responsible for caring for sick goats, while male members call a practitioner and purchase medication from the local veterinary pharmacy.

3.1.2. Age

The majority of goat farmers (62%) were middle-aged, with ages ranging from 36 to 50. This was followed by elderly farmers (22%) and young farmers (16%, aged up to 35) (Table 1). Consistent with this study, Islam *et al.* (2018) and Naim and Ahmed (2021) also found that most goat farmers were middle-aged, followed by older and younger farmers. In contrast, youth engagement was notably low in the findings of Bashir and Venkatachalapathy (2017) and Gamit *et al.* (2020).

Table 1. The socioeconomic characteristics of goat farmers (n=50).

Attributes	Attributes	Frequency (n)	Percentage (%)
Sex	Male	27	54
	Female	23	46
Age	Young (up-to 35)	8	16
	Middle (35 to 50)	31	62
	Old (above 50)	11	22
Education level	Illiterate	11	22
	Primary	26	52
	Secondary	12	24
	Higher secondary	1	2
Occupation	Farmer	18	36
	House wife	21	42
	Business	3	6
	Service	4	8
	Labor	4	8
Size of land (acre)	Landless (< 0.02)	29	58
	Marginal (0.02 to 0.2)	20	40
	Small (0.21 to 1)	1	2
Training in goat farming	Trained	8	16
	Not trained	42	84

3.1.3. Education level

Survey results indicate that goat farmers in the rural areas of Zanjira have poor educational backgrounds. Approximately 22% of farmers in the study region are illiterate, while 52% have completed only primary education (Class 1–5). A total of 24% have finished secondary school, and only 2% hold advanced secondary credentials (Table 1). This study aligns with Shoshe *et al.* (2019), which reports that most goat keepers have only completed primary school. However, other research conducted by Islam *et al.* (2018) and Naim and Ahmed (2021) reveals that the majority of goat keepers lack literacy. Most goat keepers are primarily engaged in agriculture and maintain goat rearing as a secondary livelihood activity (Kumar *et al*., 2018).

3.1.4. Occupation and size of land

Most of the goat keepers in this study were housewives (42%), farmers (36%), laborers and service workers (8%), and business owners (6%) (Table 1), which aligns with findings from other regional studies (Naim and Ahmed, 2021). Around 10% of goat farmers are engaged in small businesses, 20% are involved in fishing, and 30% are active in agriculture (Shoshe *et al*., 2019). In the area studied, only 3% of service workers are engaged in goat farming. Land size is a primary determinant of management practices and economic success in goat rearing in Bangladesh. The majority of respondents were landless (58%), owning less than 0.02 acres, followed by marginal farmers (38%) who owned 0.03 to 0.2 acres. This is consistent with findings that goat rearing is predominantly practiced by landless and marginal groups (Rahman *et al.*, 2017; Islam *et al.*, 2018; Naim and Ahmed, 2021). These results mirror those of Hossain *et al.* (2017) and Haque *et al.* (2023), who found that the families of farmers were among the poorest, often illiterate, and had little to no land for farming.

3.1.5. Training in goat farming

A significant majority of goat farmers (84%) in the Zanjira region keep goats without prior formal training, believing it unnecessary. In contrast, the remaining 16% attended a one-day training session organized by the Upazila Livestock Office and Veterinary Hospital (Table 1). These findings support the claim made by Prank *et al.* (2023) that none of the goat owners in the study area received any official or scientific training in goat rearing. Methodical training can help students develop the skills and knowledge necessary for successful and effective goat farming after the program concludes. Additionally, the years of farming experience among goat producers significantly influenced their production outcomes. As farmers gained expertise and understanding of goat rearing, their productivity also increased (Nwachukwu and Berekwu, 2020). Experience can impact various aspects of the production process, including management skills, record-keeping practices, and market access.

3.1.6. Source of capital

Due to the low initial investment costs, half of the goat farmers started their businesses using their own funds (50%). The other half relied on loans from non-governmental organizations (NGOs) (20%) or private lenders (28%), with only 2% utilizing bank loans due to their complicated legal requirements (Figure 2). This preference for NGOs over banks aligns with findings from previous regional studies (Islam *et al.*, 2018).

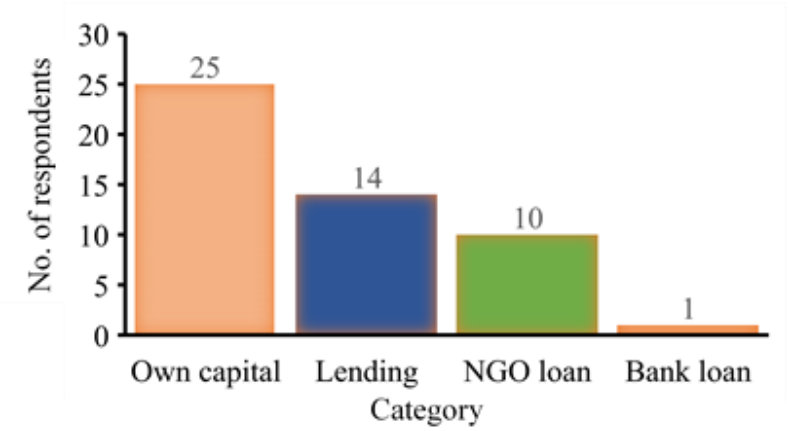

Figure 2. Distribution of capital sources used by goat farmers at Zanjira upazila, Shariatpur district, Bangladesh.

3.2. Approaches to husbandry

3.2.1. Housing system

Reflecting their predominantly landless status, most farmers constructed their goat sheds using natural or low-cost materials (Figure 3). The majority (68%) utilized tin roofs supported by bamboo and jute poles, while 32% built their sheds entirely from bamboo, straw, and sun grass (Table 2).

Table 2. Housing characteristics of goat sheds, including construction type, use of Macha, ventilation status, and cleaning practices.

Traits	Category	Frequency (n=50)	Percentage (%)
Type	Tin shed	34	68
	Bamboo straw made	15	32
	Soil and others made	1	2
Macha	Yes	7	14
	No	43	86
Ventilation	Sufficient	9	18
	Insufficient (poor)	41	82
Shed cleaning regularly	Yes	45	90
	No	5	10

This aligns with other regional studies that emphasize the durability of tin (Jana *et al.*, 2014; Islam *et al.*, 2018; Prank *et al.*, 2023). Among the families surveyed, 82% of farmers constructed their goat sheds with paddy straw

and bamboo, featuring a mud floor (kacha), while 18% opted for brick with a cemented floor (paka). Approximately 61% of farmers build separate homes for their goats, whereas 4% and 18% keep their goats at night in their living rooms and verandas, respectively. Additionally, Shoshe *et al.* (2019) found that 17% of farmers house their goats in their cattle sheds at night. Currently, goats are extremely rare, and marginal or landless farmers are unable to construct independent shelters for them.

Figure 3. Goat shelter at night in the study area.

3.2.2. Macha and ventilation

In Zanjira, however, only 14% of goat keepers use elevated platforms (Macha) in their sheds, while 86% do not. The bamboo floors are slightly elevated above the ground, providing a luxurious environment that keeps the house dry, which is beneficial for goat health. These platforms are easy to clean, have low odor, and do not become dirty quickly. Macha is an indigenous platform made of wood or bamboo, designed for sitting or sleeping above the ground. It allows for the quick drainage of urine and excrement, which helps keep the body clean and reduces the herd's susceptibility to illnesses such as colds, coughs, pneumonia, and skin conditions (Sah *et al.*, 2021). Additionally, although adequate ventilation is crucial for goat comfort, many sheds lack proper ventilation due to poor design planning. Only 18% of sheds had sufficient ventilation, while 82% had inadequate ventilation (Table 2). Furthermore, Islam *et al.* (2018) noted that a lack of knowledge about goat farming has resulted in most sheds in Sylhet also lacking adequate ventilation facilities and elevated platforms (Macha).

3.2.3. Regular cleaning

A total of 90% of goat keepers clean their sheds daily, which includes removing urine and excrement, while the remaining 10% clean infrequently (Table 2). Similarly, Islam *et al.* (2018) found that 79% of goat owners frequently clean their sheds. Farmers typically clean their sheds in the morning at 6:00 AM when the goats are taken out. Regular shed cleaning is crucial for reducing the risk of illness, improving respiratory health, and creating a calm atmosphere that encourages productivity and reproduction, as well as for effective waste management and the prevention of pest infestations (Prank *et al.*, 2023).

3.2.4. Rearing system

Around 82% of farmers adopt the semi-intensive goat-rearing method, while only 18% choose the confinement system (Table 3). The free-range upbringing method was not reported. Current research indicates that 80.5% of farmers raise goats using a semi-intensive system, 7.3% employ a confinement system, and 12.2% utilize a free-range system. These findings are somewhat comparable to those of Hossain *et al.* (2015) and Bari *et al.* (2020), which also suggested that the majority of goat keepers use the semi-intensive technique. In the study area, the lack of land among most individuals makes the free-ranging method impractical. Additionally, the absence of knowledge about scientific goat rearing and the high initial costs may explain why intensive rearing methods have not been widely adopted. Research by Panth *et al.* (2021) shows that goats fed through grazing and home supplements, rather than solely at the sheds, can enhance income and productivity. Shoshe *et al.* (2019) and Islam *et al.* (2016) found that all goat farmers in their surveyed regions used semi-intensive systems, which are better suited to rural areas with limited grazing facilities.

After harvesting, owners often spend part of the day with their goats by the roadside, along the river, next to fields, or on vacant land. If this is not feasible, goats may be tethered during the day and fed concentrated feed, grass, and tree leaves at home. To prevent cold stress in winter, nearly 80% of goat producers use bedding materials. During summer, about 36% of goat farmers regularly bathe their goats, while 64% do not. In a different study, Hossain *et al.* (2015) reported that 78% of goat raisers used bedding, 75.6% kept goats in shelters at night, and 100% provided their goats with summer baths. Most farmers use straw and dry leaves as bedding materials due to their availability. These materials can be sun-dried and are more recyclable, contributing to animal health and welfare. Inadequate bedding can lead to uncomfortable winter conditions, reducing livestock productivity and increasing vulnerability to various illnesses and parasite infestations (Antil *et al.*, 2019).

Table 3. Goat rearing systems and associated management practices (bedding, bathing, and night shelter) in the study area.

Traits	Category	Frequency (n=50)	Percentage (%)
Rearing system	Intensive	9	18
	Semi-intensive	41	82
	Confined	0	0
Bedding material during winter	Yes	40	80
	No	10	20
Summer bath	Yes	18	36
	No	32	64
Night shelter	Goat house	32	64
	Cattle house	11	22
	Household	7	14

3.2.5. Record keeping

Maintaining accurate herd records is essential for successful goat farming. Only 21% of farmers kept herd records, while the majority (79%) did not (Figure 4). Goat farmers typically maintained records related to birth, feeding, breeding, and health. Sarker (2018) found only 10% of goat ranchers kept records. Additionally, Kumar *et al.* (2018) found that 60% of organic goat farmers maintained herd records, whereas Hossain *et al.* (2015) reported that only 3% did. Record keeping significantly enhances goat rearing by enabling informed decision-making, better disease management, improved breeding practices, and increased profitability. However, its adoption is not universal, particularly among small-scale farmers. Introducing simple, possibly technology-aided solutions (e.g., mobile apps or straightforward forms) and locally relevant record-keeping systems can help integrate this practice into existing farming routines.

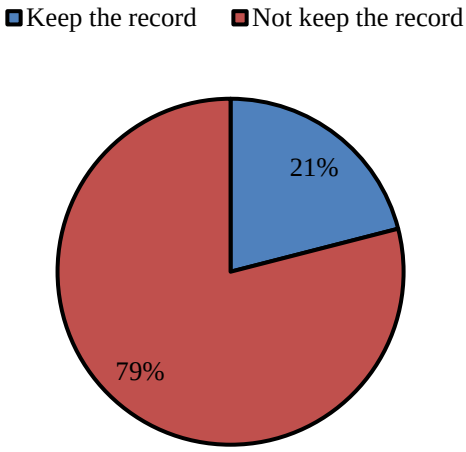

Figure 4. Number of owners keep record of their goat.

3.2.6. Grazing

Only 16% of goat farmers can let their goats graze on roadside grass or pasture land, while a significant 84% are unable to do so due to a lack of pasture land (Figure 5). This finding aligns with Islam *et al.* (2018), who state that most farmers lack adequate grazing land. Farmers typically graze their goats from dawn to noon (96.60%) or separately in the morning and afternoon (3.40%). The inadequate availability of feed, including limited grazing opportunities, significantly hampers the profitability of goat husbandry (Panth *et al.*, 2021). Grazing plays a crucial role in goat rearing in Bangladesh, serving as the primary and most cost-effective feed source for many small-scale farmers. However, its seasonal availability and quality present major challenges to goat health and productivity.

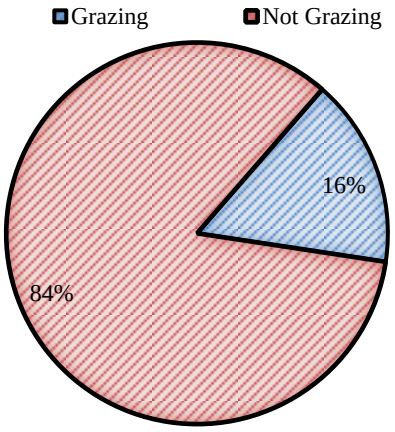

Figure 5. Proportion of goat farmers practicing grazing and non-grazing management systems in the study area.

3.2.7. Feeding system and management practices

The majority of farmers (98%) feed their goats green grass in addition to concentrate (Table 4), which primarily consists of roadside grass, tree leaves, crop weeds, and cultivated fodders (Figure 6). While 46% of farmers use agricultural weeds and roadside grass, the majority (54%) opt for cultivated fodder. The main ingredients of the concentrate feed include broken maize, rice polish, and wheat bran. Farmers report that goats prefer wheat bran or rice polish when mixed with rice gruel. Although 9% of goat farmers do not use a specific feeder, 82% utilize a feeder for the concentrate mixture. In contrast, research by Prank *et al.* (2023) indicates that only 15.1% of farmers provide grass along with tree leaves, offering tree leaves only when the goat's stomach is not full of grass. The most common tree leaves come from bananas (*Musa paradisiaca*), jackfruit (*Artocarpus heterophyllus*), mangoes (*Mangifera indica*), dumurs (*Ficus hispida*), and bamboo (*Bambusa vulgaris*). During the rainy season, tree leaves account for roughly 48% of the supply, while wheat bran constitutes about 14%. Only 38% of farmers manage green grass in any systematic way when growing fodder. Kumar *et al.* (2018) reported that a very small percentage of farmers use planted fodder, which is not recommended in this study, while 49% utilize roadside grass and tree leaves. Conversely, Soodan *et al.* (2020) noted that feeding concentrates improved the goats' physical condition and had a highly significant impact on goat farming revenue. Every respondent reaffirmed their commitment to ensuring consistent access to water. Each farmer provided their goats with rice gruel, salts, and rice washing water. Approximately 94% of goat owners sourced their water from tube wells, while the remaining 6% opted for ponds.

Table 4. Goat management practices and feeding systems in the study area.

Traits	Category	Frequency (n=50)	Percentage (%)
Feeding	Only green grass	1	2
	Green grass + concentrate	49	98
Fodder	Cultivated	28	56
	Roadside grass + crop weed	22	44

Table 4. Contd.

Traits	Category	Frequency (n=50)	Percentage (%)
Particular feeder for concentrate feeding	Yes	41	82
	No	9	18
Source of water	Tube well	47	94
	Pond	3	6
Raining season feed	Tree leaves	24	48
	Tree leaves + wheat bran	7	14
	Green grass	19	38

Figure 6. Goat feeding system in the study area.

3.3. Breed

The distribution of goat breeds shows that 70% were Black Bengal, 18% were crossbred, and the remaining 12% are Jamunapari (Figure 7). Black Bengal goats are particularly popular among farmers due to their high reproductive potential and strong consumer demand for their meat, and they are commonly crossed with Jamunapari goats to produce crossbred animals. In line with this study, Islam *et al.* (2018) found that 74% of the goats used by farmers were Black Bengals. Conversely, Rashid *et al.* (2016) reported that over 90% of all goats are Black Bengal, with Jamunapari and various crossbred goats accounting for the remaining 10% (Bhowmik *et al*., 2014). In the study of Rahman *et al.* (2022), approximately 84% of the goats were Black Bengal, 9% were crossbred, and 7% were Jamunapari. Black Bengal goats are renowned for their exceptional skin quality, flavorful meat, early maturation, fertility, prolificacy, resistance to common diseases, seasonal adaptability, and strong tolerance to harsh environmental conditions (Jalil *et al.*, 2018).

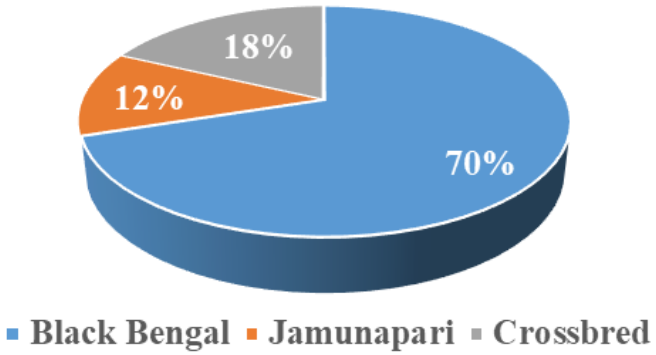

Figure 7. Goat breeds available in Shariatpur's Zanjira upazila.

3.4. Breeding system

Due to the unavailability of artificial insemination (AI) services, all farmers relied on natural breeding. The vast majority (98%) chose to hire bucks, while most farmers castrated male newborns to enhance meat quality and

profitability (Table 5). Naim and Ahmed (2021) suggested inbreeding occurs because 88% of bucks are hired and 12% are borrowed. This finding aligns with reports from Kumar *et al.* (2018) and Naim and Ahmed (2021), which indicate that 100% of farmers employed natural breeding. In another study, Islam *et al.* (2018) found that most farmers used village bucks, with 96.6% relying on natural breeding. Overall, goat breeding in Bangladesh predominantly occurs through natural methods. The survey revealed that only 2% of farmers used AI, with the remaining 98% of breeding conducted naturally (Rahman *et al.*, 2022).

Table 5. Breeding system in the study area.

Traits	Category	Frequency (n=50)	Percentage (%)
Breeding	Natural breeding	50	100
	Artificial	0	0
Keep buck	Yes	1	2
	No	49	98
Source of buck	Hired	49	98
	Own buck	1	2

3.5. Disease prevalence

Myiasis (30%) was the most prevalent disease among the 50 goat producers surveyed, followed closely by Peste des Petits Ruminants (PPR) (28%), dog bites (22%), and abscesses (20%) (Figure 8). Myiasis, characterized by an infestation of fly larvae, has the highest prevalence in this region due to specific environmental factors that promote the breeding of these insects. The high incidence of PPR is associated with infrequent vaccination. This study aligns with the findings of Naim and Ahmed (2021) indicating that skin diseases and PPR are more common in the Mymensingh district. Additionally, Rahman *et al.* (2022) found that 24% of goats had PPR, making it the second most common cause of death in the area studied. Victor *et al.* (2017) noted that the prevalence of PPR in Nigeria is significantly correlated with locality, raising system, housing, vaccination status, and seasonal factors. To effectively prevent and control diseases, it is essential to assess the risk factors associated with husbandry (Prank *et al.*, 2023).

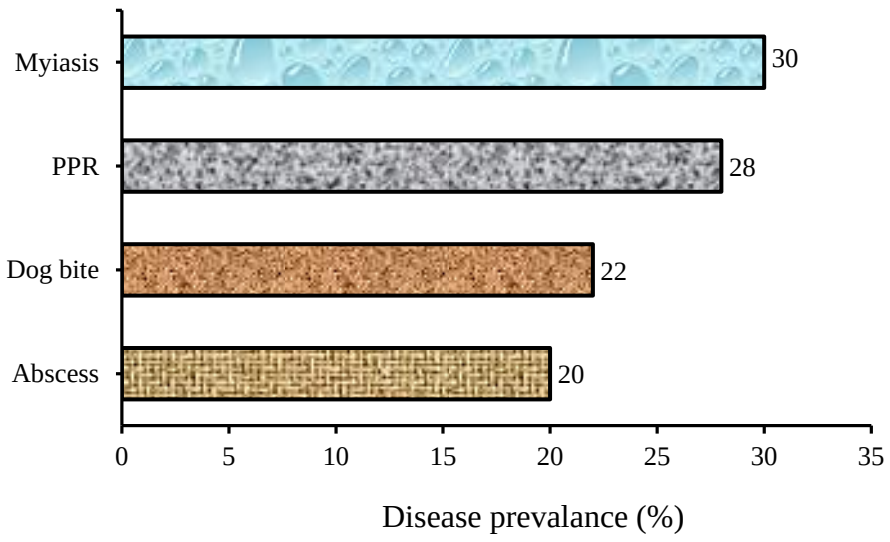

Figure 8. Disease prevalence of goats in the study area.

3.6. Vaccination and deworming

Vaccination is the most reliable method for disease prevention. A significant majority of farmers (86%) do not regularly vaccinate their goats (Figure 9), while a higher proportion (68%) follow regular deworming schedules in the studied areas (Figure 10). These findings closely align with those of Islam *et al.* (2016), who reported that 58% of farmers did not regularly vaccinate their goats, in contrast to 18.67% who did. Naim and Ahmed (2021) also noted that most farmers do not routinely vaccinate their goats. In a similar study, Sivachandiran *et al.* (2020) found that only 22% of farmers vaccinated their goats. Additionally, Rahman *et al.* (2022) reported that

92% of farmers dewormed their goats. Furthermore, many farmers did not consistently use anthelmintics or vaccinations and often refrained from seeking technical assistance from veterinarians due to misconceptions about disease prevention (Islam *et al.*, 2018).

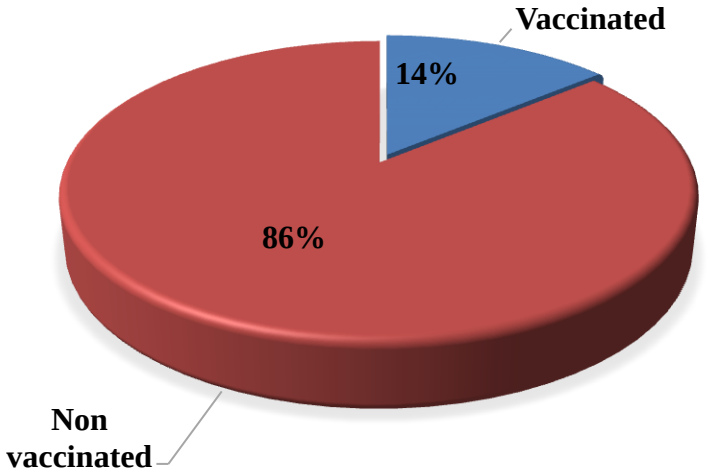

Figure 9. Vaccination profile of goats in the study area.

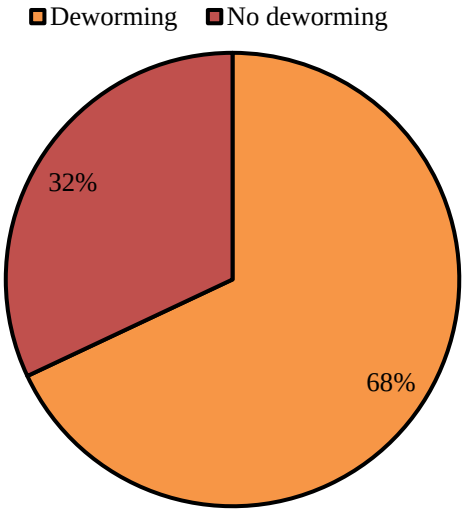

Figure 10. Deworming profile of goats in the study area.

3.7. Problem faced by the goat farmers

Goat farmers face several challenges, including disease and malnutrition, a lack of knowledge about modern farming techniques, inadequate veterinary services, and limited access ssto quality feeds. Additional issues include poor breeding practices, difficulties in accessing markets, and fluctuations in feed prices. The key challenges reported by goat farmers were predominantly high feed costs (98%), lack of veterinary services (90%), and scarcity of both forage cultivation land and training (86%). Significant proportions also cited problems with feed availability (80%), the complexity of NGO and bank loans (80%), as well as diseases and dog bites (66%) (Table 6). These issues align with previous studies highlighting the importance of feed costs, unavailability, and insufficient support services (Kumar *et al.*, 2018; Prank *et al.*, 2023). Singh *et al.* (2020) reported that 70.40% of goat producers faced constraints related to feed and fodder. There is not enough grass to meet the year-round demand for goats, and the costs of other concentrate feeds are also relatively high. Kid mortality rates are alarmingly high (around 70%) due to diseases and malnutrition. Furthermore, there is a

shortage of trained veterinarians and adequate animal health services in rural areas. Unplanned breeding practices contribute to low productivity and hinder genetic improvement.

Table 6. Problem faced by goat farmers at study area.

Problems	No. of respondents (n=50)	Percentages
Disease and dog bite	33	66
Unavailability of feed	40	80
High feed cost	49	98
Lack of land for forage cultivation	43	86
Lack of motivation and awareness	35	70
Complexity of NGO and bank loan	40	80
Lack of training	43	86
Lack of veterinary services	45	90

4. Conclusions

Goat husbandry in Zanjira upazila plays an important role in poverty alleviation and income diversification for landless and marginal farmers; however, its productivity is limited by traditional management practices, inadequate adoption of vaccination and deworming, and gaps in scientific knowledge. Strengthening access to micro-credit, farmer training on disease management, and localized veterinary extension services is essential to enhance sustainability and profitability. The findings provide context-specific evidence to support policymakers, extension workers, and development agencies in designing targeted interventions to improve goat production and rural livelihoods in the study area.

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Data availability

All relevant data are presented within the manuscript.

Conflict of interest

None to declare.

Authors' contribution

Sydur Rahaman: designed the study, collected data from the field and performed analysis, methodology, preparation of original draft manuscript; Raquibul Hasan Raquib: input data, analysis, writing-original draft; Md. Anamul Haque: investigation, methodology; writing-review; Monir Hossain: writing draft, few analyses; Gous Miah: supervision, provided technical support, final editing. All authors have read and approved the final manuscript.

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