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Assessment of socio-economic status, farming and breeding practices and major constraints of indigenous sheep farming in Tangail district, Bangladesh

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ABSTRACT

The present study was conducted to assess the socio-economic profile, husbandry practices and challenges of sheep rearing in Tangail District, Bangladesh. The study followed a cross-sectional survey design and data were analyzed using descriptive statistics. Data were collected from 131 sheep-rearing farmers across 13 unions using a pre-tested questionnaire administered through face-to-face interviews. The majority of the farmers were female (82.84%), predominantly Muslim (84.73%), with 71.75% having no formal education. Most farmers (59.54%) primarily relied on agriculture for their livelihoods. Farmers had an average landholding of 73.54 decimals with average annual income of 78,574 BDT. The average sheep rearing experience was 4.83 years, reflecting moderate expertise in sheep husbandry. Farmers reared mainly indigenous sheep with an average flock size of 3.76 animals per household, with ewes comprising 54.60% of the total population. Semi-intensive feeding (76.17%) and natural mating (100%) were the predominant husbandry and breeding practices, with 72.31% relying on neighbours' rams to bred their ewes. Reproductive performance was satisfactory, with a litter size of 2.13 and a service per conception rate of 1.10. Farmers demonstrated limited awareness and adoption of pre- and post-lambing management practices for sheep. Preventive health measures were minimal, as vaccination and deworming coverage were only 1.54% and 10%, respectively. Major health issues included diarrhoea, enteritis, and pneumonia, often linked to shared housing with cattle. These findings underscore the need for targeted extension services, organized breeding programs, farmer training and improved veterinary care to boost sheep productivity and improve the livelihoods of farmers in the region.

Keywords: Breeding, Constraints, Indigenous, Husbandry, Socio-economics

Livestock farming, as a crucial sub-sector, contributes approximately 1.8% to Bangladesh's GDP and over 16.33% to the agricultural sector, with a reported GDP growth rate of 3.15% in FY 2023-24 (DLS, 2024). Approximately 20% of rural livelihoods depend directly on livestock, with an additional 50% relying on it to a lesser extent. Livestock thus provides an essential source of "cash income" a readily accessible source of funds for sale or exchange (Rana *et al.* 2022; DLS, 2024; Hossen *et al.* 2008). Moreover, women are involved in livestock rearing contribute significantly to household income and empower them socially and economically (Bairwa, 2013; Galie *et al.* 2022).

Globally, sheep populations are primarily concentrated in Asia and Africa, with Asia alone accounting for over 25% of the global sheep population, including 233 of the approximately 920 recognized breeds (FAO, 2003). In Bangladesh, sheep serve multiple purposes, including the production of meat, wool and leather. Although wool remains an underutilized by-product within the country, it holds significant demand in international markets and has the potential to be a source of foreign exchange (Imrose *et al.* 2023). Sheep are also recognized for their distinctive characteristics, including high production performance, low feed requirements, adaptability to local climatic conditions and enhanced disease resistance, often earning the reputation of the "bank of the poor man" in some areas of Bangladesh (Rakib *et al.* 2022). In traditional feeding systems, sheep are typically raised on fallow lands, roadsides and the edges of canals, requiring minimal labor and expertise, thus allowing even illiterate men, women and children to engage in sheep rearing (Sultana *et al.* 2010; Islam *et al.* 2021a).

Despite the economic and livelihood importance of sheep farming, the sector in Bangladesh continues to face several challenges, including traditional management

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practices, lack of organized breeding programs, limited access to veterinary services and inadequate farmer training. Although several studies have documented sheep production systems, reproductive performance, and adaptability across different regions of Bangladesh, most have focused on specific agro-ecological zones such as the Barind, the Jamuna basin, and coastal areas (Asaduzzaman *et al.* 2021; Rakib *et al.* 2022). There remains a clear lack of location-specific, integrated studies that simultaneously examine the socio-economic characteristics of sheep farmers, detailed husbandry and breeding practices, reproductive performance, preventive health measures and significant constraints at the household level. Tangail district is an important yet under-studied sheep-rearing area with distinct farming systems, high female participation, and unique management conditions that are not adequately captured in the existing literature.

Therefore, the current study was undertaken to generate comprehensive, up-to-date baseline information on the socio-economic status of sheep farmers, husbandry and breeding practices, reproductive performance, preventive health management, and major constraints of indigenous sheep farming in Tangail District, Bangladesh. The findings are expected to provide region-specific evidence to support targeted extension services, improved breeding strategies, and informed policy interventions aimed at enhancing sheep productivity and improving farmer livelihoods in the study area.

MATERIALS AND METHODS

Ethical considerations: Prior to data collection, verbal informed consent was obtained from all participating farmers after clearly explaining the study's objectives, scope, and voluntary nature. Respondents were assured of confidentiality, and all information was used solely for research purposes.

Thirteen unions in the Tangail Sadar Upazila, Tangail, were chosen for data collection. The locations of Tangail Sadar Upazila can be defined approximately by the coordinates between 24°10′ N to 24°22′ N latitude and 88°46′ E to 89°59′ E longitude. A well-structured survey questionnaire was developed using Participatory Rural Appraisal (PRA) technique. A purposive sampling method was used to select 131 sheep-rearing households from the selected unions, focusing specifically on farmers actively involved in indigenous sheep rearing. Data was collected through face-to-face interviews and frequent visits. Before the interview began, the study's objective was clearly explained to the respondents.

Initially, the collected data were filtered and checked for abnormalities. The data were compiled, tabulated and analyzed using statistical software. To assess the overall socio-economic status, existing livestock breeding, feeding management, disease occurrence, preventive measures and so on, the collected data were analyzed using R software (version R 4.4.1) and Microsoft Excel (2021). The variables in this study were carefully selected based on their relevance to understanding the dynamics of sheep husbandry and their impact on productivity and livelihood outcomes. The independent variables included farmers' socio-economic status, livestock species, feeding and housing practices, breeding policies and costs, marketing channels and health management. The dependent variables were age at first kidding, reproductive and productive performance and disease incidence. These dependent variables were selected as key indicators of sheep productivity because they directly reflect reproductive efficiency, growth performance and overall flock health. Earlier age at breeding and lambing, higher litter size, optimal birth weight and lower service per conception are widely used measures of reproductive and productive performance, while disease incidence serves as an indicator of management efficiency and productivity losses.

RESULTS AND DISCUSSION

The results revealed that the majority of sheep farmers (71.75%) had no formal education, indicating limited access to formal agricultural and veterinary knowledge. Similar educational constraints among small ruminant farmers have been reported in different regions of Bangladesh and neighboring countries, where sheep farming is predominantly practiced by marginal and resource-poor households (Amin *et al.* 2020; Miah *et al.* 2023). Limited education restricts farmers' ability to adopt improved

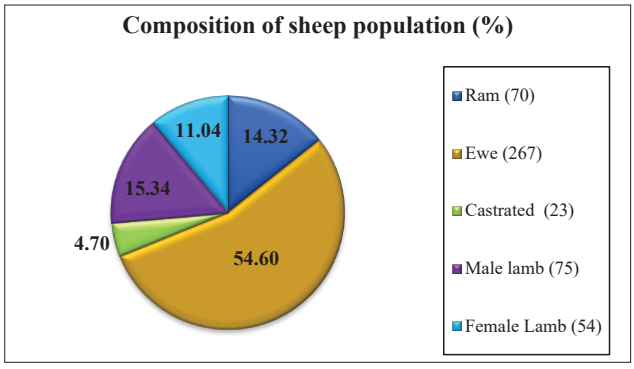

Fig. 1 Composition of sheep population based on their sex, age and purpose of use

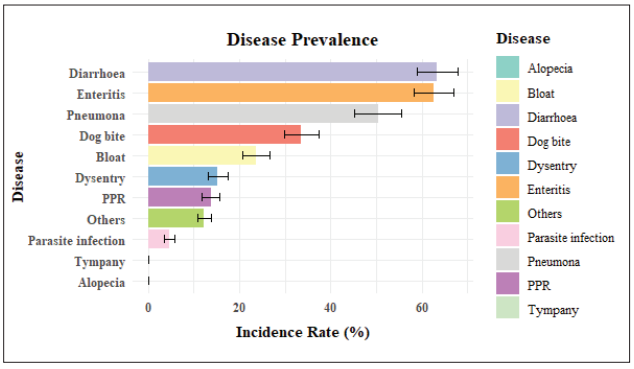

Fig. 2 Prevalence of disease in sheep

Table 1. Socioeconomic status of sheep-rearing farmers and reproductive performance of sheep

Parameter	Values (Mean ± SEM)
Amount of land (Decimal)	73.54 ± 19.45
Annual Income (BDT)	78574.04 ± 9737.15
Family Member (n)	4.89 ± 0.17
Number of Earning Members (n)	1.10 ± 0.02
Experience of sheep rearing (Yrs.)	4.83 ± 0.42
Farmers' occupation (%)	
Agriculture	59.54±5.06
Business	11.45±2.91
Labor	9.92±2.68
Service Holder	4.58±1.90
Shopkeeper	3.82±1.69
Others	10.69±2.77
Breeding Related	
Age at first breeding (month)	6.77 ± 0.08
Age at first lambing (month)	12.80 ± 0.15
Litter size (number)	2.13 ± 0.05
Birth wt. of lamb (Kg)	0.88 ± 0.01
Service per conception (n)	1.10 ± 0.03
Cost of insemination (BDT)	14.52 ± 1.46
Marketing weight (Kg)	10.95± 0.20
Marketing Age (months)	13.26 ± 0.02

*Values are presented as Mean ± SEM, where SEM denotes the standard error of the mean.

feeding, breeding and health management practices, ultimately affecting flock productivity and survival.

Female farmers constituted a substantial proportion (82.44%) of the respondents and exhibited even lower education levels than their male counterparts. This finding highlights the strong involvement of women in sheep rearing and reflects the important role of women in rural livelihoods. Comparable gender roles have been reported in sheep production systems in Bangladesh and South Asia, where women are mainly responsible for daily animal care, feeding and grazing (Haque *et al.* 2020). While sheep farming contributed to household income and women's economic participation, limited access to training, veterinary services and decision-making power may constrain productivity in women-managed flocks, emphasizing the need for gender-sensitive extension services.

The religious composition of respondents closely reflected national population demographics (BBS, 2011). Although most households were male-headed (52.67%), a notable proportion were female-headed (39.60%), indicating increasing participation of women in household-level decision-making. This trend further underscores the importance of empowering women farmers through education, training and access to livestock resources.

Most sheep farmers (59.54%) primarily depended on agriculture for their livelihood, while others were engaged in business, labor, service or small trade. This occupational diversity indicated a semi-diversified livelihood strategy, where sheep farming contributes to income generation and household food security (Table 1). The average landholding size and low annual household income reflected the subsistence-oriented nature of sheep farming in the study area, a pattern commonly observed among smallholder farmers in Bangladesh and India.

The average flock size of 3.76 animals per household confirmed the small-scale nature of sheep production. Nearly all farmers reared indigenous sheep, which can be attributed to their adaptability to local agro-ecological conditions, low feed requirements and minimal capital investment (Haque *et al.* 2020; Rakib *et al.* 2022). Similar production systems, dominated by indigenous sheep, are widely reported across South Asia.

The flock structure showed a predominance of ewes (54.60%), followed by lambs and rams. This structure was consistent with previous studies, which reported that smallholder farmers typically maintained ewes as the breeding base while selling males for meat or religious purposes (Siddiki *et al.* 2015; Rakib *et al.* 2022). Such flock composition supports sustainable reproduction under low-input systems.

Reproductive performance indicators, including age at first breeding, age at first lambing, litter size and service per conception, indicated satisfactory performance of indigenous sheep. The average litter size was slightly higher than that reported in some earlier studies (Rakib *et al.* 2022). In contrast, birth weight was comparable to that reported by Sarder *et al.* (2015), although it was lower than that reported by Rakib *et al.* (2022). Variations in reproductive performance and birth weight may be influenced by season, litter size, dam nutrition and geographical location (Hossain *et al.* 2023). These findings demonstrate the inherent productive potential of indigenous sheep under low-input management conditions.

All farmers in the study relied on natural mating, with the majority using neighbors' rams, indicating communal breeding practices. While this system reduces breeding costs, it increases the risk of inbreeding over time. Management practices related to pregnancy and neonatal care were weak, as only a small proportion of farmers provided additional concentrate during pregnancy or practiced special post-lambing care (Table 2)**.** Limited use of antiseptics and inconsistent colostrum feeding might increase the risk of neonatal infections and mortality, as reported in earlier studies (Haque *et al.* 2020; Asaduzzaman *et al.* 2021).

Most farmers provided housing for sheep, but shared housing with cattle was common, reflecting either a reluctance or an inability to invest in separate sheep shelters (Hossain *et al.* 2018). Mixed-species housing could increase exposure to pathogens and environmental stress, thereby affecting animal health and productivity.

Table 2. Overall husbandry and pregnancy management of sheep

Parameter	Category	Number of farmers	Percentage (%)
Type of breeding	Natural breeding	130	100.00
	Artificial insemination	0	0.00
Source of Ram	Own Ram	36	27.69
	Others Ram	94	72.31
Pregnancy management	Traditional feeding	109	83.8
	Special care with extra concentrate	21	16.2
Post lambing management	Special care	4	3.08
	Traditional management	126	96.92
Cleaning of mucus after birth	Yes	98	75.38
	No	32	24.62
Cleaning of the naval cord	Yes	92	70.77
	No	38	29.23
Use of antiseptic after cutting naval cord	Yes	14	10.77
	No	116	89.23
Feeding of colostrum	Yes	88	67.69
	No	42	32.31
Housing of Sheep	Yes	111	85.38
	No	19	14.62
Use of bedding materials	Yes	36	27.69
	No	94	72.31
Drying of bedding materials in the sun	Yes	29	22.31
	No	101	77.69
Methods of feeding	Extensive	28	21.53
	Intensive	3	2.30
	Semi-intensive	99	76.17
Time of feeding (hour/day)	Field feeding	8.77 ± 0.21	
	Close feeding	13.58 ± 0.37	
Rearing of ewe and lamb	Same pan	116	89.23
	Separate pan	14	10.77
Deworming	Yes	13	10.00
	No	117	90.00
	3 months	7	5.38
	4 months	5	3.85
	6 months	1	0.77
Dipping of sheep	Yes	18	13.85
	No	112	86.15

Semi-intensive feeding systems were predominant (Table 2), which is consistent with management practices reported in other smallholder sheep systems.

Disease prevalence emerged as a significant constraint to sheep productivity. High incidences of diarrhea, enteritis and pneumonia were recorded (Table 2), which were consistent with previous findings from Tangail and other regions (Asaduzzaman *et al.* 2021). These diseases cause significant economic losses through treatment costs, reduced growth rates, delayed marketing and increased mortality. For low-income households, particularly those managed by women, such losses can severely affect household income and livelihood stability. Very low adoption of vaccination and deworming (Table 2) further increases vulnerability to disease outbreaks.

A strong positive correlation between cowshed housing and disease incidence highlighted the role of poor housing hygiene, overcrowding, and stress in disease transmission. Similar associations between housing systems and disease occurrence have been reported in small ruminant production systems in South Asia. Improving housing design, hygiene and preventive health practices could therefore substantially reduce disease burden and associated economic losses.

In conclusion, this study highlights that indigenous

sheep farming in the Tangail District is predominantly small-scale, low-input, and strongly supported by women farmers. Although reproductive performance of indigenous sheep was satisfactory, productivity was constrained by inadequate nutrition, poor housing, limited preventive health care and high disease prevalence. The heavy reliance on neighborhood rams indicated potential risks of inbreeding, while shared housing with cattle was associated with increased disease occurrence. Overall, the findings emphasized the need for targeted farmer training, gender-responsive extension services, improved veterinary support, better housing and organized breeding programs to enhance sheep productivity and farmer livelihoods. The results are relevant to smallholder sheep production systems across South Asia, including India, where similar socio-economic, gender and health-related challenges exist.

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