Management practices, disease prevalence and constraints in Black Bengal goat farming under tropical conditions

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Abstract

This study was conducted to understand the characteristics, management practices, constraints faced by farmers along with disease prevalence in black Bengal goats (BBG). A sample size of 30 randomly selected farmers per block were interviewed personally through pre-formulated questionnaire was considered in this study leading to total of 120 farmers from 4 selected blocks of Nadia district. This study laid down important information related to socio-economic condition, animal husbandry practices, disease prevalence and constraints faced by Black Bengal goat farmers under tropical climate. Poor knowledge about management practices and high prevalence of diseases indicated the need of training of farmers regarding improved management and health maintenance practices in goats. Further, there is a need of monetary provisions to meet credit needs of BBG farmers. Additionally, this study also highlighted the issue of poor availability of labours. Altogether, this study is expected to assist various stakeholders of BBG in formulating different management practices and policies for BBG farmers of this region.

Keywords: Tropics, management, constraints, diseases, Black Bengal goats

Introduction

Lower Gangetic region comes under tropical climatic condition (Singh et al., 2025a). Farmers of this region rely heavily on weather situations (Jatav et al., 2024) however; abrupt climatic change scenario accelerates the potential of heavy losses due to the farmers (Mandal et al., 2025). As a result of which, the farmers of this region prefer goat farming as major subsidiary farming enterprise (Maiti et al., 2014; Monda, 2024). Predominant breed in this region is Black Bengal goat (Hossain, 2021; Mandal et al., 2022; Das et al., 2024; Singh et al., 2025b). This breed is one of the major livelihood supporters of agrarian community of this region (Mandal et al., 2022). Moreover, BBG is highest populated goat breed of India and Bangladesh (Hossain, 2021; Das et al., 2024). BBG is characterised by high prolificacy, excellent quality meat and skin suitable to provide handful profits to its rearers (Singh et al., 2025a; Singh et al., 2026).

With rapidly increasing goat meat demand in world (Lalhriatpuii and Singh, 2021), the price of goat meat is increasing with each advancing day (Devendra, 2015; Lalhriatpuii and Singh, 2021). This gives opportunity to several youth and other age farmers to generate considerable income from goat farming. Management practices in goats are directly linked with their performances (Mandal et al., 2022). Recent studies showed that poor management conditions in BBG lead to high mortality during neonatal stage of life (Das et al., 2024; Singh et al., 2025b). Socio-economic background of farmers may effect significantly on overall profitability of the farm (Hossain et al., 2021; Bhattacharjee & Dhara, 2023). Recent studies have indicated that understanding major constraints faced by farmers in goat husbandry practices in a particular region becomes helpful in combating such issues (Marino et al., 2016). Such climatic conditions offer suitable tract for pathogenic bacteria for spread of several diseases in farm animals (Hossain et al., 2021; Singh, 2022; Jayasekara et al., 2024; Das et al., 2024) that may retard income from goat farming along posing risk to the wellbeing of goats. Hence, it becomes inadvertent to understand the socio-economic profile of BBG goat farmers of this tropical region along with their followed management practices, disease prevalence and constraints faced in order to formulate development policies for them (Maiti et al., 2014; Marino et al., 2016; Monda, 2024).

Fewer studies have been conducted to understand the background, management practices, disease occurrence and constraints faced by Black Bengal goat farmers. Therefore, in light of above points, this study was structured to elucidate the characteristics, management practices, disease prevalence and constraints faced by Black Bengal goat farmers of tropical conditions.

Materials and Methods

Location and methodology of study

This study was conducted through a multi-staged random sampling technique in 4 selected bocks of Nadia district of West Bengal, India that comes under tropical climatic condition. A total of 120 farmers were interviewed in this study. This study was conducted from August, 2021 to February, 2022. Before conducting the interview, the consent of farmers was taken regarding different questions. Sampling was performed in blocks namely, Kalyani, Chakdah, Ranaghat and Santipur as shown in figure (1). Three villages were considered from each block and 10 farmers were interviewed from each village. A pre-formulated questionnaire was utilised for conducting personal interview of selected farmers in these blocks.

Statistical analysis

Multi staged random sampling technique was adopted in this study. Data was collected in questionnaire sheets and then entered into MS excel (2007 version) sheets. Descriptive statistics including frequency, percentage and 95% confidence interval of variables were performed. Graphical presentation was performed using MS excel (2007 version).

Results and Discussion

Socio economic profile of the goat farmers

The results from the survey (Table 1) revealed that majority gender of Black Bengal farmers was female (73.33 %) and only 26.66% of the goat farmers were male. This indicated that in the survey area, males usually preferred for other nature of jobs such as labour work, small business etc. to earn their livelihood whereas females in the homes devoted their time to perform the household tasks, taking care of children as well as the animals. The findings are in agreement with the study of Tudu et al. (2015), Roy and Tiwari (2016), Shoshe et al. (2019) who also reported that majority of Black Bengal goat farmers were female. Similar results were found in the study conducted by Gamit et al. (2020) who reported 44.17% of goat farmers in his survey were aged in between 31 to 50 years old. This finding is in contrast with the study of Salahuddin et al. (2017) which shows that majority of Black Bengal goat farmers had primary education (42.50%) in northern Bangladesh. While, the primary occupation of majority (54.16 %) of the goat farmers was found to be labour work. In line with present findings, Shoshe et al. (2019) also found that Black Bengal goat farmers mostly had low annual income below 10000 Bangladeshi takas. Furthermore, Tudu et al. (2015) reported that majorly (60%) Black Bengal goat farmers' annual income lied in

Table 1: Socio-economic characteristics of Black Bengal goat farmers (n=120)

Variables	Category	Frequency	Percentage (%)	95% CI
Gender	Female	88	73.33	66.9-79.9
	Male	32	26.66	23.1-30.4
Age	Middle (31-60 years)	78	65	59.2-71.1
	Young (up to 30 years)	29	24.16	21.2-27.2
	Old (above 60 years)	13	10.83	8.9-13.6
Education	Middle School	43	35.83	32.6-39.7
	Primary	31	25.83	22.4-28.3
	High school	26	21.66	18.6-25.1
	Illiterate	11	9.16	7.3-11.2
	Graduate	9	7.5	4.4-10.9
Occupation	Labour	65	54.16	49.3-59.8
	Agriculture	34	28.33	24.5-32.4
	Others	13	10.83	8.3-14.0
	Business	8	6.66	4.6-8.9
Annual Income received from goat farming	112.80-212.01 USD (INR 10000-25000)	69	57.50	52.7-62.6
	<112.80 USD (INR 10000)	48	40.00	35.8-44.7
	>212.01 USD (INR 25000)	3	2.50	1.3-3.8
Category of farmers	ST	64	53.33	49.9-57.1
	SC	30	25.00	22.6-27.7
	General	19	15.83	13.8-18.0
	OBC	7	5.83	4.6-7.2
Family Size	Small (<5)	62	51.66	47.0-56.3
	Medium (5-8)	49	40.83	37.9-43.8
	Large (>8)	9	7.50	5.4-9.8
Family Type	Nuclear	83	69.16	66.0-72.6
	Joint	37	30.83	27.9-34.1
Experience in goat farming	Medium(8-15 years)	82	68.33	64.23-69.2
	Less (<=7 years)	22	18.33	16.4-20.5
	High (>15 years)	16	13.33	11.5-15.4
Flock size	Medium (5-8)	86	71.66	66.6-77.0
	Small (<=4)	27	22.50	19.9-25.6
	Large (>8)	7	5.83	3.5-8.4

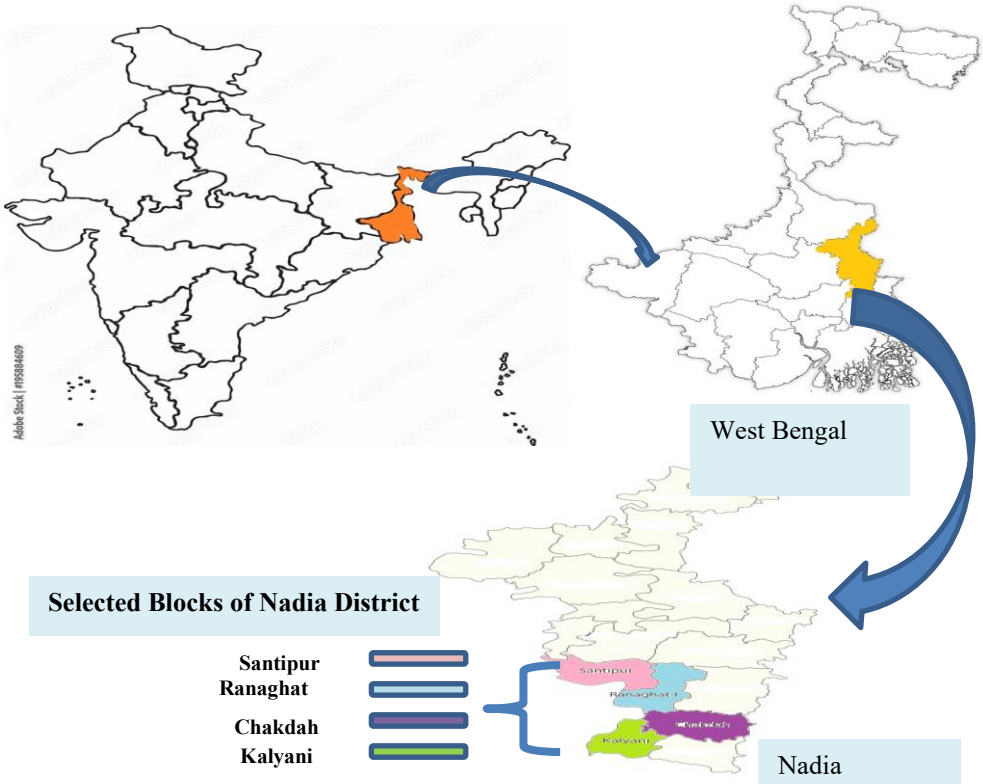


Figure 1: Graphical representation of surveyed blocks of Nadia district on map

below 169.20 USD in West Bengal of India. Here, it can be remarked that with smaller flock size majority of the goat farmers had low to medium annual income.

It was observed from the present study that the majority (53.33 %) of the farmers belonged to the category of scheduled tribe (ST), and 25% of the farmers belonged to scheduled caste (SC) category. This shows that goat farming is more popular among the ST and SC category of farmers in this region. This finding is in line with the study of Tudu et al. (2015) who reported that majority of Black Bengal goat farmers (48.5%) belonged to ST category. It was also found that most of the farmers (51.66 %) had small family size with up to 5 members in the family. Majority of the goat farming families belonged to nuclear family (69.16 %) and 30.83 per cent were joint families. It can be inferred that the concept of joint families are decreasing over the years in these farming communities. This finding is in line with the study of Singh et al. (2021) who reported that 62.61% goat farmers belonged to nuclear family.

Management practices followed by BBG goat farmers

It was revealed (Table 2) that most (52.50 %) of the goat farmers followed intensive system of rearing goats while 47.50% of the goat farmers followed semi-intensive system of goat rearing. This finding is in disagreement with the study of and Islam et al. (2016) and Shoshe et al. (2019) who reported that 100% goat farmers practised semi-intensive system of rearing. In the case of housing pattern, majority of the goat farmers were having same housing for goats with other animals followed by 42.50% of the respondents had separate housing for goats. This finding is nearer to the observation of Tudu et al. (2015) who reported that around 35% farmers provided separate housing to goats and Nandi et al. (2011) reported 32.9% Black Bengal goat farmers provided separate housing to goats. It was revealed from the data (Table 2) that most of the respondents (32.50 %) had roofing material with metallic sheet while 30% of the goat farmers were using bamboo based roofing material.

Table 2: Management practices followed by Black Bengal goat farmers

Particulars	Categories	Frequency	Percentage	95% CI
System of rearing goats	Intensive	63	52.50	48.7-56.7
	Semi-intensive	57	47.50	43.4-52.1
	Same housing with other animals	69	57.50	52.9-62.5
	Separate housing	51	42.50	38.8-46.5
Roofing material	Metallic sheet	39	32.50	29.6-36.1
	Bamboo based	36	30.00	25.8-34.4
	Tiles	32	26.66	23.8-29.8
	Asbestos	9	7.50	5.4-9.8
	Concrete	4	3.33	2.2-4.5
Floor material	Soil	77	64.16	59.1-69.5
	Brick paved	19	15.83	13.8-17.9
	Concrete	16	13.33	11.9-14.9
	Wood based	8	6.66	5.4-7.9
	Gunny bags	22	18.33	17.1-19.8
	No Bedding	82	68.33	62.1-74.7
Type of bedding material used	Straw	9	7.50	6.4-8.7
	Dry leaves	4	3.33	2.8-4.0
	Clothes	3	2.50	1.4-3.8
Feeding material	Only grazing	71	59.16	53.7-64.9
	Grazing with concentrate	38	31.66	28.3-35.3
	Fodder and concentrate	11	9.10	8.0-10.6
Grazing period	5-8 (hrs)	67	55.83	49.8-62.3
	1-4 (hrs)	44	36.66	32.8-40.7
	>8 (hrs)	9	7.50	6.3-8.8
Fed herbs to animals	Yes	74	61.67	55.0-68.7
	No	46	38.33	34.7-42.2
Water source	Tube well	98	81.66	74.3-89.3
	No	75	62.50	55.7-69.4
	Pond & Lake	15	12.50	10.2-14.7
	River	7	5.83	3.6-8.2
	Yes	45	37.50	33.2-42.0
Deworming	Yes	62	51.66	46.0-57.6
	No	58	48.33	43.6-53.2
Foot dip provision at entrance	No	117	97.50	87.3-109.8
	Yes	3	2.50	1.4-3.8

Table 3: Diseases encountered by Black Bengal Goat farmers

Particulars	Occurrence	Frequency	Percentage	95% CI
PPR	Yes	100	83.33	75.6-90.8
	No	20	16.67	14.3-18.8
Bloat	Yes	108	90.00	81.1-98.7
	No	12	10.00	8.5-11.5
FMD	Yes	102	85.00	76.4-92.6
	No	18	15.00	13.6-16.8
Respiratory disease	Yes	90	75.00	68.5-81.3
	No	30	25.00	23.5-27.0
Kid diarrhoea	Yes	83	69.17	64.5-73.5
	No	37	30.83	28.2-33.6

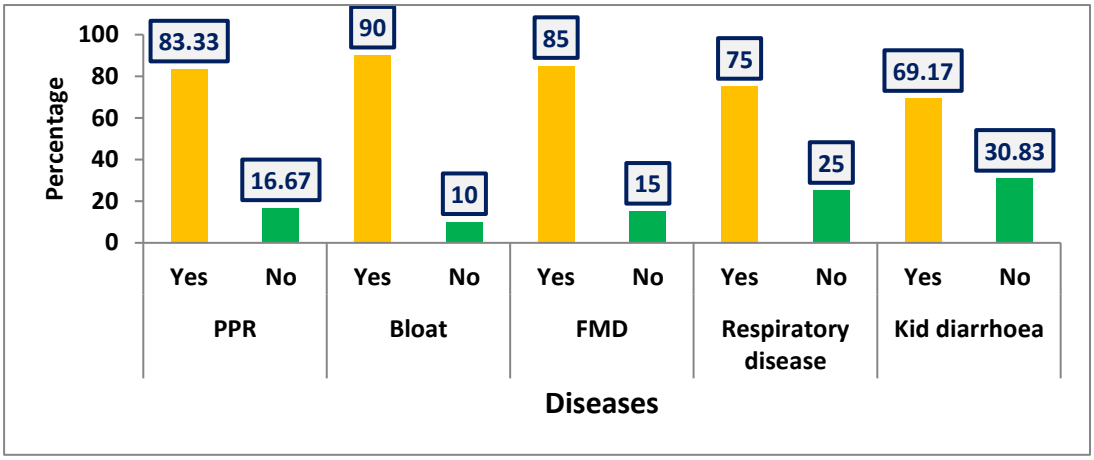


Figure 2: Diseases encountered by farmers in Black Bengal goats

This finding is in contrast with the study of Jana et al. (2016) who had found more (12.67%) Black Bengal goat farmers opted pucca roofing. In the present study, 55.83% of the farmers spent 5-8 hours as grazing period. It is also revealed from the data that majority (81.66%) of the farmers were using tube wells as the water source for their goats whereas 12.50% and 5.83% used pond & lake and river respectively. The finding is in contrast with the study of Tudu et al. (2015) who observed that majorly (43.50%) Black Bengal goat farmers relied on ponds for their goats.

Interestingly, it was observed in this study that 61.67% of surveyed farmers had used herbs once or more for treatment, growth and as reproduction aid in BBG. Major herbs that were used by farmers included *Curcuma* longa, *Ocimum* sanctum, *Allium sativum*, *Azadirachta indica, Moringa olifera, Nigella sativa, Zingiber ooficinale, Azadirachta indica* oil etc. This finding is similar to the reporting of Mohammad and Chatterjee (2020) who showed that farmers of this region use their traditional knowledge regarding feeding of various herbal preparations for animal's growth and health maintenance aspects. Vaccination and deworming is considered as one of the most important health management practices (Thorat et al., 2017; Ali et al., 2025) and provision of foot dip is considered as first line of bio-security maintenance of a livestock farm (Panda et al., 2024). These three methods show the potential knowledge of farmers regarding basic health management practices of the farmers or the unavailability of drugs and vaccines in this region (Ali et al., 2019). Interestingly, majority of farmers were deworming their goats. The reason behind this may be awareness regarding regular ecto and endo-parasitic load in goats due to hot and humid environmental conditions.

Occurrence of diseases in Black Bengal goats

Occurrence of various diseases has been reported in figure 2 and table (3). Farmers reported a total of five major ailments in BBG including PPR, Bloat, Kid diarrhoea, FMD and Respiratory diseases. It was observed that 83.33% of surveyed farmers expressed that they have encountered PPR disease in goats once. PPR is considered as one of the most fatal diseases of goats in which severe diarrheal condition along with lesions all over body (Khan et al., 2018). However, Bloat (89.58%) was reported highest by the BBG farmers. Bloat generally happens due to improper fermentation pattern in rumen of goats leading to accumulation of gasses in rumen (Raghuvanshi et al., 2024). About 75% and 68.75% farmers had encountered respiratory diseases and kid diarrhoea. These diseases could be prevented through vaccination against them. However, in present study the occurrences of PPR and FMD were on higher side which might be due to very low follow of vaccination in BBG (Mansoor et al.,

2018). Further, follow of very low bio-security measure (foot dip provision at entrance of goat farm) might had increased the chances of occurrence of ailments in goats (Panda et al., 2024). In this study, majority of farmers practiced deworming which was reflected in comparatively less occurrence of kid diarrhoea (Panda et al., 2024; Ali et al., 2025).

Constraints faced by BBG goat farmers

A detailed study about various constraints faced by BBG farmers were conducted in this study. In the Breeding constraints (Table 4), it was found that out of the total respondents, majority (80.83%) of the goat farmers faced breeding related constraints of non-availability of superior Germplasm whereas 72.50% of farmers had poor knowledge of breeding practices and 52.50% of the farmers had problems of repeat breeding. This finding is in line with the study of Rajkumar et al. (2014) who also showed that non availability of superior Germplasm was ranked first in breeding constraint. While, findings from the study conducted by Patbandha et al. (2018) highlighted that majorly (42.90%) the availability of superior bedding Germplasm was not a major problem. Among the feeding constraints, lack of knowledge of feeding formulation was experienced by majority (85.83%) of the goat farmers followed by high feed and fodder cost (70.83%) and 65.83% faced the problem of non-availability of green fodder. In corroboration with present investigations, Raja et al. (2018) observed that lack of knowledge regarding feed formulation was major feeding constraint. In present study majority of farmers had intensive rearing pattern, knowledge of proper feed formulation shall be helpful in cutting unwanted and extra cost of goat production and improve profitability through goat farming (Singh, 2018; Kisku and Singh, 2022).

From this study (Table 4), it is depicted that, in general management constraints, 40.83% of the goat farmers had poor sanitary conditions whereas 14.16% respondents lacked proper housing i.e. wrong orientation, poor ventilation, etc. Data from the table (4) depicts the various health care constraints experienced by the goat farmers in which it is revealed that 76.66% of the goat farmers reported high occurrence of diseases in their flock and 70.83% reported lack of knowledge about deworming. These findings are in partial agreement with the study of Rajkumar et al. (2014) who reported that high kid mortality was major health challenge followed by lack of knowledge about diseases (Das et al., 2022). In the case of marketing constraints**,** it was found from the data that among the marketing constraints, middleman indulgement was the most experienced constraints by majority (86.67%) of the goat farmers.

Table 4: Constraints faced by Black Bengal goat farmers

Particulars	Categories	Frequency	Percentage	Ranking
Breeding constraints	Non-Availability of superior Germplasm	97	80.83	**I**
	Poor knowledge of breeding practices	87	72.5	**II**
	Repeat breeding problem	63	52.50	**III**
Feeding constraints	Lack of knowledge of feed formulation	103	85.83	**I**
	High feed and fodder cost	85	70.83	**II**
	Non availability of green fodder	79	65.83	**III**
	Less grazing land	74	61.66	**IV**
	Non availability of dry fodder	71	59.16	**V**
	Water problem	46	38.33	**VI**
General management constraints	No bio-security measures	117	97.5	**I**
	Poor sanitary conditions	49	40.83	**II**
	Lack of proper housing (wrong orientation, poor ventilation, etc.)	17	14.16	**III**
Health care constraints	High occurrence of disease	92	76.66	**I**
	Lack of proper knowledge about deworming	85	70.83	**II**
	Lack of proper knowledge of goat diseases	82	68.33	**III**
	High kid mortality	70	58.33	**IV**
	Lack of proper knowledge about importance of vaccination	55	45.83	**V**
	High treatment cost	51	42.50	**VI**
	Lack of veterinary expert facilities	21	17.50	**VII**
Marketing constraints	Middleman indulgement	104	86.67	**I**
	Non uniform rates of live goats	69	57.50	**II**
	No uniform market infrastructure	50	41.66	**III**
	Long distance markets	22	18.33	**IV**
Other important constraints	Lack of money	89	74.16	**I**
	Inadequate space for housing	77	64.16	**II**
	Lack of information	46	38.33	**III**
	Predator attacks	43	35.83	**IV**
	Unavailability of labour	17	14.17	**V**
	Theft	14	11.67	**VI**
	Accidents occurred to animal	8	6.67	**VII**

Note: Questions from each category variable were asked to every respondent (n=120) hence, frequency and percentage were calculated out of 120 respondents**.**

Conclusion

This study laid down important information related to socio-economic condition, animal husbandry practices, disease prevalence and constraints faced by Black Bengal goat farmers under tropical climate. Interestingly, this study reported higher usage of herbs and deworming in BBG goats. However, other poor knowledge about management practices, high prevalence of diseases indicated the need of training of farmers regarding improved management and health maintenance practices in goats. Further, there is a need of supply monetary provisions to meet credit needs of BBG farmers. Additionally, this study also highlighted the issue of problem of availability of labours for BBG farming. Altogether, this study is expected to assist various stakeholders of BBG in formulating different management practices and policies for betterment of BBG farmers of this region.

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Author contribution

AKS, CB and UK conceptualised and designed this study. AKS performed the study, performed data analysis and drafted this manuscript. MK and AC edited the manuscript and guided during data collection while surveying. Each author contributed considerably in this study.

Animal Ethics and Consent to Participate declarations: Compliance to animal ethics and consent of participants were taken in this study.

Data Availability: Data may be made available upon considerable request to Dr. Amit Kumar Singh, email-amitkumarsingh5496@gmail.com

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