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Performances of cattle and goats in some selected areas of Gaibandha district in Bangladesh

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ABSTRACT

The survey was conducted to represent the livestock production scenario and to know the performances of cattle and goats in few selected rural areas of Gaibandha district. The data on productive and reproductive performances of cattle and goats were collected from 102 household within four selected village under Gobindaganj Upazila of Gaibandha district with a pretested survey questionnaire. The collected data were compiled, tabulated and analyzed by student t test. In the study area, about 59% were indigenous cattle and 41% were crossbred cattle. A total of 113 goats were found in the study area of which 82% belongs to Black Bengal goat and the remaining 18% belongs Jamunapari goat. All the livestock (100%) were managed intensively during the spring and rainy seasons. Similarly, almost all livestock (100%) are confined in shed at night, and 45.9% and 54.09% of the livestock population are confined in shed and paddock at day time, respectively. Artificial insemination (AI) is the preferred breeding method for cattle, whereas goats primarily rely on natural mating. Milk yield and lactation period of cow, and mature body weight of both male and female were significantly ($P<0.05$) higher in crossbred than indigenous cattle. Similarly, age at first kidding, lactation period and kidding interval of does, and mature body weight of buck and does were significantly higher in Jamunapari goats than Black Bengal goats. However, the conception rate and number of kids per kidding were higher in Black Bengal goats than Jamunapari goats. In conclusion, from our results, crossbred cattle and Jamunapari goats are performing better in rural conditions, whereas Black Bengal goats are efficient in producing more offspring at a given time.

Introduction

Livestock serves as a vital contributor to Bangladesh's food security and nutrition while also playing a key role in addressing the country's unemployment challenges through the creation of self-employment opportunities, earning foreign exchange, increasing the fertility of agricultural land, and empowering women (Hasnath, 1999). Statistics shows that, the contribution of the livestock industry in Bangladesh is rapidly growing and has become a significant contributor to the country's economy. In the fiscal year 2021-22, it contributed approximately 2% (1.90%) to the country's GDP and over 16% (16.52%) to the agriculture sector. Livestock population is currently estimated to comprise 24.7 million cattle, 1.508 million buffalo, 26.774 million goat, and 3.752 million sheep (DLS, 2022). In Bangladesh, a vast majority of households, approximately 80–85%, keep livestock in the rural areas (Hossain et al., 2004). About 85% of cattle of Bangladesh are of non-descript and indigenous in origin with

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low productivity compared to other existing exotic breeds and their crosses, but they are well adapted in the tropical harsh environment have the ability to maintain their body condition on poor quality feedstuffs and are well resistant to local diseases (Majid et al., 1992).

Goat occupies a significant position as an animal genetic resource in the pre-dominantly agro-based farming system in Bangladesh (Hossain, 2006). Goats are preferred livestock for rearing especially in small holding farming system due to its unique ability to adapt and maintain them in harsh environment. Goat rearing is becoming an attractive activity mainly among the poor women of villages (Choudhury et al., 2012). Bangladesh has only one goat breed of its own, known as the Black Bengal goat which covers more than 90% of goat population of the country (Amin et al., 2001). The native breed Black Bengal has some reputed features: early sexual maturity, high prolificacy, adaptability to hot and humid environment and yields superior quality skin and meat (Devendra and Burns, 1983). Black Bengal goat is more or less evenly distributed throughout the country. The concentration is relatively higher in the north-western areas of Bangladesh and it belongs to the high Gangas river flood plain agro-ecological zone. Jamunapari, another bigger size goat breed is popularly known as Ram Chhagal. They are found in a limited scale in urban and peri-urban areas of Bangladesh in the form of pure or Jamunapari x Black Bengal cross with varying degrees of inheritance (Hamid, 2022).

Gaibandha district, located in the northern part of Bangladesh, is known for its fertile agricultural lands and favorable climatic conditions, making it conducive for livestock production. Only a limited work has been done on livestock production scenario in this district. Therefore, this study aims to delve into the livestock production scenario in selected rural areas of Gaibandha district, exploring the types of livestock commonly raised, the husbandry practices employed by farmers, and their production parameters.

Materials and Methods

The productive and reproductive data of cattle and goats were collected from 102 household within four selected village (Bongram, Bunatola, Palpara and Fulpara) under Gobindaganj Upazila of Gaibandha district with a pretested survey questionnaire. The original questionnaire was prepared to fulfil the objectives of the study. Data were collected through direct interview and frequent personal visit. Necessary consent was taken from the owners before data collection. Objectives of the study were explained clearly to the farmers before making interview. The questions were asked in a simple manner with explanation whenever necessary. The survey was conducted from March to April 2022. The collected data were compiled, tabulated and analyzed by student t test.

Results

Cattle Population

The household survey conducted in the selected areas revealed that the total number of cattle was 326, of which 59% were indigenous cattle and 41% were crossbred cattle.
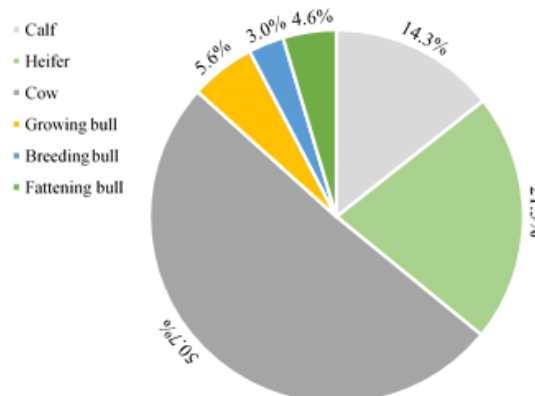

Figure 1: Composition of local cattle population depending on their sex, age and purpose of use. The number of each type of animals were counted in number and expressed as percentage basis. The color with each legend represents percentage of respective percentage.

According to the survey result, the local cattle population was composed of 14.3% calf, 21.5% heifer, 50.7% cow, 5.6% growing bull, 3.0% breeding bull, and 4.6% fattening bull (Figure 1). Whereas 27.0% calf, 16.5% heifer, 50.3% cow, 3.7% growing bull, 1.5% breeding bull, and 0.7% fattening bull belonged to the crossbred cattle population (Figure 2).

Goat Population

Goats with an erected ear, absence of long thigh hair, and other typical characteristics that match the Black Bengal goat were categorized as Black Bengal goats, whereas characteristics like a dropping ear, long thigh hair, and parrot-shaped noses were categorized as Jamunapari goats.
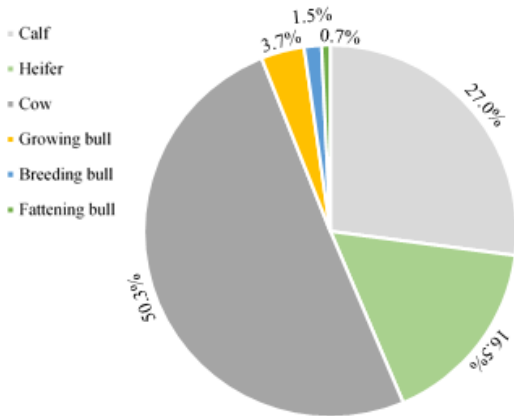
Figure 2: Composition of crossbred cattle population depending on their sex, age and purpose of use. The number of each type of animals were counted in number and expressed as percentage basis. The color with each legend represents percentage of respective percentage.

Figure 3: Composition of Black Bengal goat population depending on their sex, age and purpose of use. The number of each type of animals were counted in number and expressed as percentage basis. The color with each legend represents percentage of respective percentage.
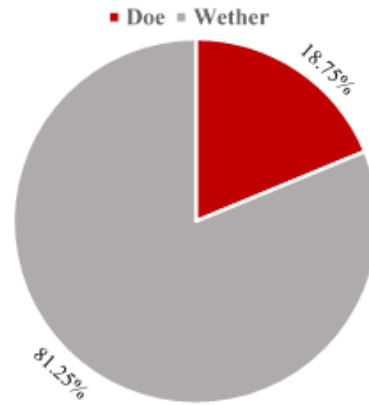
A total of 113 goats were found in the study area, of which 82% belong to Black Bengal goats and the remaining 18% to Jamunapari goats. In Black Bengal goats, wethers constituted the largest portion at 47.4%, with does making up 36.0%, followed by kids at 14.4%, and immature male goats at 2.0%. (Figure 3). On the other hand, no kid was observed in Jamunapari goats, whereas 18.75% were does and the vast majority, 81.25%, were wethers(Figure 4).

Management and Housing Practices

The management system and housing of livestock in the survey area are shown in Table 1. The management system was categorized as intensive and semi-intensive, while the housing system was classified as free range, confined in sheds, confined in paddocks, and confined in fences.

Figure 4: Composition of Jamunapari goat population depending on their sex, age and purpose of use. The number of each type of animals were counted in number and expressed as percentage basis. The color with each legend represents percentage of respective percentage.
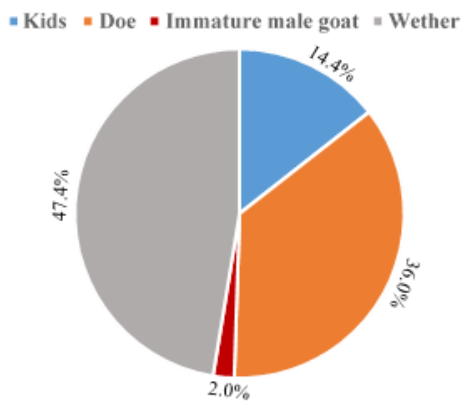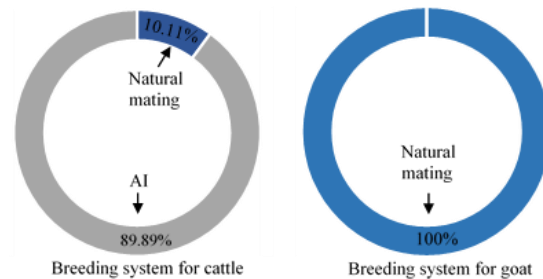

Figure 5: Breeding system for livestock. The number of each type of animals were counted in number and expressed as percentage basis. The value with each legend represents percentage of respective breeding system.

The result indicates that during the spring and rainy seasons, all the livestock (100%) were managed intensively. Whereas, 69.1% and 72.35% of the livestock were managed intensively during the summer and winter seasons, respectively. Similarly, 30.89% and 27.64% of the livestock were managed semi-intensively during the summer and winter seasons, respectively. In case of housing system, almost all livestock (100%) were confined to sheds at night. Whereas, during the daytime, 45.9% and 54.09% of the livestock population were confined in sheds and paddocks, respectively. However, there was no existence of free-range and confined in fence housing system in the study area.

Breeding System

The breeding system for cattle and goats is shown in Figure 5. In the case of cattle, 10.11% were used for natural mating, and the remaining 89.89% used artificial insemination (AI). This suggests that AI is the more prevalent breeding method employed in cattle reproduction compared to natural mating. On the other hand,

for goats, 100% of the breeding instances used natural mating, and there were no instances of AI. This indicates that natural mating is the exclusive breeding method employed for goats.

Performances of Cattle

The age at first calving of indigenous and crossbred cows were 39.53±2.23 and 28.45±3.5 months, respectively (Figure 6).
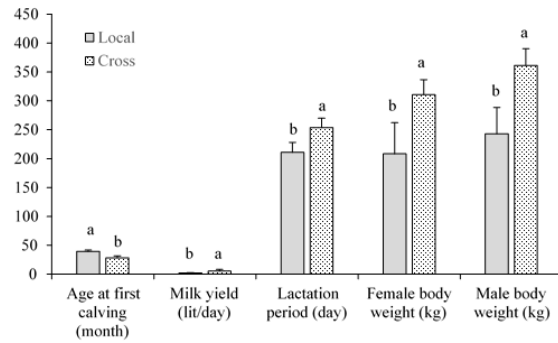

Figure 6: Performances of indigenous and crossbred cattle. Data are presented as mean±SEM. Values with different superscripts (a,b) within the same parameter differed significantly (P<0.05).

Table 1: Management system and housing practices in the study area.

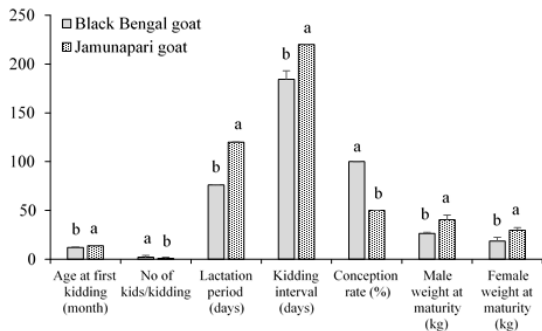| Category	Type	Season/Time	Frequency	Percentage
Management system	Intensive	Spring	123	100
		Summer	85	69.1
		Rainy	123	100
		Winter	89	72.35
	Semi-intensive	Spring	0	0
		Summer	38	30.89
		Rainy	0	0
		Winter	34	27.64
Housing system	Free range	Day	0	0
		Night	0	0
	Confined in shed	Day	56	45.9
		Night	122	100
	Confined in paddock	Day	66	54.09
		Night	0	0
	Confined in fence	Day	0	0
		Night	0	0

Figure 7: Performances of Black Bengal and Jamunapari goat. Data are presented as mean±SEM. Values with different superscripts (a, b) within the same parameter differed significantly (P<0.05).

The age at first calving of the indigenous cows was significantly (P<0.05) higher than that of crossbred cows. The milk yield per day for indigenous and crossbred cattle was 2.2±0.72 and 5.46±3.07 liter, respectively. Similarly, the lactation length of indigenous and crossbred cattle was 210.84±17.42 and 253.87±16.07 days, respectively. The milk production per day and lactation length of crossbred cattle were significantly (P<0.05) higher than those of indigenous cattle. The mature body weight of

indigenous and crossbred females was 208.22±53.76 kg and 310.65±25.85 kg, respectively. Similarly, the mature male body weight of indigenous and crossbred cattle were 242.94±45.38 kg and 361.46±28.77 kg, respectively. The mature body weight of crossbred cattle was significantly (P<0.05) higher than that of indigenous cattle.

Performances of goats

The performances of goats in the study area are shown in Figure 7. The Black Bengal goats exhibited an average age at first kidding of 12.18±0.54 months, while the Jamunapari goat exhibited a slightly higher average age at first kidding of 14±0 months. The age at first kidding of Black Bengal goats was significantly (P<0.05) lower than that of Jamunapari goats. Black Bengal goats gave birth 2±0.36 kids per kidding, which was significantly (P<0.05) higher than Jamunapari goats (1±0 kid per kidding). The kidding interval for Black Bengal goats was 184.37±8.73 days, while for Jamunapari goats it was 220±0 days. The lactation period for Black Bengal goats was 76.25±0.32 days, while for Jamunapari goats it was 120±0.36 days, indicating a longer lactation period in Jamunapari goats compared to Black Bengal

goats. The mature body weight of Black Bengal and Jamunapari bucks and does were 18.73±4.63 kg and 29.75±2.7 kg, and 26.43±1.19 kg, 40.55±4.40 kg, respectively. The kidding interval and lactation period of does, and mature body weight of bucks and does were significantly (P<0.05) higher in Jamunapari goats than Black Bengal goats. However, the conception rate in Black Bengal goats (n=35) was 100%, while in Jamunapari goats (n=03) it was 50%. The conception rate was significantly (P<0.05) higher in Black Bengal goats than Jamunapari goats.

Discussion

Among the livestock species available in Bangladesh, cattle and goats are the most versatile components in relation to the existing integrated agricultural farming system. These cattle and goats are of multipurpose in providing milk, draught, meat, and dung as fuel and organic fertilizer, and are strongly linked with the livelihood of people (Hasnath, 1999). Our result suggested that indigenous cattle and Black Bengal goats comprises the major percentage of these species. It has been found that, about 85% of cattle are indigenous in Bangladesh (Hamid et al., 2017). Similarly, previous report demonstrated that Black Bengal goat covers more than 90% of goat population of the country (Amin et al., 2001). Our study showed that half of the cattle population consist of cow both in indigenous and crossbred cattle. Cow provides calf and milk as a source of income which might encourage farmer to keep more cow than others. Whereas, wether consisted most of the goat population both in Black Bengal goats and Jamunapari goats. As the milk production form goat is low and there is a higher demand for goat meat which might fortified the farmers to raise goat for meat purpose.

In the present study, it has been found that artificial insemination (AI) in cattle and natural mating in goats are most popular in the study area. In Bangladesh, the AI in cattle has been used for about fifty years, and every year this program is extended. Both government and non-government organizations like the Department of Livestock Services (DLS), MilkVita, BRAC, Lal Teer Livestock Limited, Pran Dairy and Gentech International, American Dairy Limited (ADL) and EJAB Group started dairy breed improvement program through frozen semen production and marketing across the country. Frozen semen from Holstein Friesian, Jersey, Sahiwal, and Friesian and Sahiwal cross breed are easily available in Bangladesh at a comparatively reasonable price (Hamid and Hossain, 2014). Thus, farmers get semen from high producing bull without the cost of rearing them. This AI system of cattle boosts milk and meat production in Bangladesh. Therefore, AI of cattle is the most popular breeding system for

cattle in Bangladesh. On the other hand, all farmers used natural mating system to inseminate their does. Like present findings, several studies reported that almost all farmers (100%) depended on natural mating to serve their does (Islam et al. 2016; Majumder et al., 2017) but 12% farmers of Mymensingh district depended on artificial insemination in goat (Khandoker et al., 2011). The lack of availability of frozen semen from buck and difficulty of performing AI in goat prevents this system being popular among the rural farmers in Bangladesh.

The present study showed that the age at first calving usually lower in crossbred cattle than that of indigenous cattle. We also found that crossbred cattle show higher milk yield, lactation period, and mature body weight of male and female cattle than indigenous cattle. It has been found that the age at first calving varies from 28 months to 32 months depending on the breed of animals used for crossing (Miazi et al., 2007). Paul et al. (2013), reported that the age at first calving for indigenous usually 37.6 months. The milk yield in indigenous cows was reported to be 1.7 lit/day, in contrast to the milk yield in crossbred cows was reported to be 6.3 lit/day (Alam et al., 2008). The average lactation period for indigenous cow is 207 days, whereas crossbreeding increases the lactation period of cattle to 283 days (Hossain et al., 2005). The average body weight of indigenous cattle increases after crossbreeding (Hossain et al., 2016). Cross breeding is the process of crossing the recessive traits with the dominant ones to yield the best possible traits and produce an animal with hybrid vigor. In addition, the crossbred cattle get better management, feeding and housing facilities than the indigenous cattle. In the present study, it appears that cross breeding produced hybrid vigor, and better management of these cattle ensures improved productive and reproductive performances.

Our study showed that the Jamunapari goats had a comparatively later age at first kidding. Similarly, the lactation period and kidding interval of does, and mature body weight of buck and does were higher in Jamunapari goats. However, the conception rate and number of kids per kidding were higher in Black Bengal goats. The study conducted by Hassan et al. (2007) found that Black Bengal goats had an average age at first kidding of 12 months. On the other hand, Jamunapari goats had a higher average age at first kidding of 18 months (Hassan et al., 2010). The average kidding interval, lactation period and body weight of Black Bengal goat is reported 179 days, 65 days and 20.25 kg, respectively (Hassan et al., 2007). It has been found that the kidding interval, lactation length and mature body weight are 229 days (Rout et al., 1999), 135

days (Hassan et al., 2010) and 32 kg (Ahmed et al., 2020), respectively. Study conducted by Moni and Samad (2019) found that Black Bengal goats typically give birth to an average of two kids per kidding. Black Bengal goat is a well-known for its prolificacy. Many authors suggested the prolific particularities to be controlled by different genes in goat breeds (Chu et al., 2007; Ran et al., 2009; Abdel-Rahman et al., 2013); in sheep breeds (Hanrahan et al., 2004; Davis, 2005), and in cattle breeds (Oztabak et al., 2010). Thus, in the present study it was thought that the genes associated with prolificacy express in Black Bengal goats and ensure higher kids per kidding (litter size).

Conclusion

Indigenous cattle and Black Bengal goats comprise majority of the livestock population among the species in Bangladesh. Black Bengal goat is an efficient small ruminant to produce more than one kids per kidding. Artificial insemination is the preferred breeding method for cattle, whereas goats primarily rely on natural mating. Milk yield and lactation period of cow, and mature body weight of both male and female were higher in crossbred than indigenous cattle. Similarly, age at first kidding, lactation period and kidding interval of does, and mature body weight of buck and does were significantly higher in Jamunapari goats than Black Bengal goats. However, further study is needed to examine the persistence of performances of crossbred cattle and Jamunapari goats in rural condition of Bangladesh. The findings from this study will provide valuable insights for implementing targeted technical interventions aimed at improving livestock productivity.

Authors Contribution

The study was conceptualized and designed by Md. Abul Bashar and Md Hasanur Alam. Data collection and analysis were carried out by Md. Abul Bashar, S.P. Mukta, M.T. Hasan, and S.F. Bhuyan. Collaboratively, Md. Abul Bashar, Md Hasanur Alam, and M.A.M. Yahia Khandoker worked on drafting the manuscript. The manuscript was reviewed, revised, edited, and approved by Md. Abul Bashar, Mst. Mahomudha Akhtar, and Md Hasanur Alam.

Data Availability

The research data are available from the corresponding author.

Conflict of interest: The authors declare no conflict of interest.

Consent to Participate

All the authors agreed to participate and would be happy for any further clarification needed from this paper.

Consent for Publication

All the authors agreed and provide their consent for the publication of this manuscript in the Bangladesh Journal of Animal Science.

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