

**Study on productive and reproductive performances of goats under  
Backyard farming at Northern part of Chattogram, Bangladesh.**



Submitted by

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**Faculty of Veterinary Medicine**

**Chattogram Veterinary and Animal Sciences University**

**Khulshi, Chattogram- 4225, Bangladesh.**

**September, 2022**

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**September, 2022**

## **Biography**

I am Humyra Begum, daughter of Md. Mafizur Rahman and Fatema Begum. I have completed my Secondary School Certificate examination from Maizbhandar Girl's High School, Fatickchari, Chattogram in 2013 (G.P.A-5.00) and Higher Secondary School Certificate examination from Shaheed Bir Uttam Lt. Anwar Girls' College, Dhaka cantonment in 2015 (G.P.A-4.75). I am an intern veterinarian at Chattogram Veterinary and Animal Sciences University, Bangladesh under the Faculty of Veterinary Medicine. I am very interested in veterinary medical research and want to serve the nation through my knowledge and creativity so that we can conquer the current challenges in this field.

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## Abbreviations

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BCS	Body Condition Score
AI	Artificial insemination
VS	Versus
SE	Standard error

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## Abstract

The study is carried out to know and compare the productive and reproductive performances of the Black Bengal, Jamnapari, Crossbred and Haryana goats reared under backyard system in the northern part (Fatickchari upazila) of Chattogram district. For this study, data on productive and reproductive traits were collected randomly from 102 female goats (doe) by using a questionnaire. These data were collected over 2.5 months from 15<sup>th</sup> February to 30<sup>th</sup> April, 2022. In this study, mainly data were collected for body weight, flock size with sex ratio, litter size in different parity with sex ratio. Other traits such as rearing system, feeding system, milk production, disease condition, management system, breeding system were also analyzed. In backyard system goats were mainly reared under semi-intensive system with mix feeding. Haryana breeds were kept rarely, so it was quite difficult to compare the performances of this breed. Mean flock size was 5.02 with min. 1 and max. 10. Male and female ratio was 1:1.14 (adult animal). Mean age was  $22.16 \pm 1.35$  months. Average BCS was  $2.85 \pm 0.03$ . Highest body weight (Mean  $\pm$  SE) was found in case of Haryana breed ( $40.00 \pm 0.00$ ) and lowest in Black Bengal ( $15.12 \pm 0.44$ ). For Jamnapari body weight (Mean  $\pm$  SE) was ( $20.85 \pm 1.25$ ) and ( $24.56 \pm 1.24$ ) for Crossbred with overall ( $19.24 \pm 0.68$ ). Litter size were highest for Crossbred. In case of Black Bengal litter size was highest in second parity ( $1.62 \pm 0.11$ ). Overall litter size was highest in first parity ( $1.90 \pm 0.06$ ) and lowest in third parity ( $1.53 \pm 0.11$ ). Also, litter size was highest in first parity ( $2.11 \pm 0.11$ ) for natural breeding rather than AI. Kid sex ratio were almost equal for natural breeding and AI. Overall male and female ratio in first, second and third parity were 1:1, 1:1.17 and 1:0.84, respectively. The findings of this study would be the future solution of poverty in the study area as well as in Bangladesh.

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**Key words:** productive, reproductive, backyard, parity, litter size, semi-intensive.

# **CHAPTER-I**

## **Introduction**

Goat is one of the oldest domesticated species of animal. According to archaeological evidence its earliest domestication occurred in Iran at 10,000 years ago. Bangladesh has the fourth highest population of goats among the Asiatic countries, which accounts for about 26.38 million heads (BER, 2020). The old saying “the goat is the poor man’s dairy cow” still holds true for developing countries such as Bangladesh. The ability to survive, reproduce and produce goats in extreme environmental conditions has been attributed to acclimation, as they provide multiple products and services and make valuable contributions especially to the marginal and landless poor in the rural areas. Compared to beef, goat products like meat (chevon) and milk do not have any religious taboo and are highly approved for consumption worldwide. The World Health Organization reported that over 70% of the total population has some hypersensitivity to cow’s milk (Tayeb et al., 2020), including skin rash, gas and stomachache, while no such sensitivity has been reported for goat’s milk.

The Black Bengal goat is the only recognized breed of Bangladesh, which covers 90% of the goat population. Black Bengal goats are smaller in size and reared primarily for meat production but also reputed for their prolificacy, fertility, fecundity, higher resistance, early sexual maturity, the delicacy of meat and superior skin quality (Devendra and Burns, 1983).

Jamnapari goats are multi-purpose animals producing meat, milk, skin and hair. They are one of the giant breeds with a pair of the very long ear. They are also known as Ram Chagol, Jamunapari and Pari. In India, this goat breed is considered the best dairy goat. The number of Jamnapari in Bangladesh is not clearly identified, but most are found in Chuadanga, Meherpur, Kushtia, Jhenidah, Pabna and Jessore districts (Faruque and Khandokaer, 2007).

Crossbred goats are being popularly day by day due to their high production efficiency. However, previous studies evaluating the productive parameters of goats in the northern part of the Chattogram are limited. Therefore, it seems rationale to evaluate these criteria of goats resulting in enhanced productivity, which will contribute to reducing poverty in our country. The present study was therefore designed to study the productive performance of Jamnapari, Black Bengal, crossbred and Haryana goats under semi-intensive conditions in the northern part of the Chattogram.



## **CHAPTER- II**

### **Materials and Methods**

#### **2.1. Study period and area**

The study was carried out for 2.5 months from 15<sup>th</sup> February, 2022 to 30<sup>th</sup> April, 2022 at Fatickchari upazila, Chattogram. Fatickchari is located in the northern part of Chattogram, with an area of 773.1km<sup>2</sup>. I have chosen this area for my study as most rural people are involved in rearing livestock, especially goats.

#### **2.2. Selection of animals**

A total of 102 does were randomly selected for this study including 50 Black Bengal, 28 Jamnapari, 22 crossbred and 2 Haryana goats to evaluate and compare their productive and reproductive performances. In villages goats are mainly reared under semi-intensive conditions.

#### **2.3: Collection of data**

The study was conducted randomly in the different villages of Fatikchari Upazila, Chattogram. In order to collect data a random door-to-door survey was conducted in the goat-owner's households. Data associated with live goats, such as body weight, coat color, BCS were collected directly from the goats in the farmer's premises. Information from the farmers was collected by face-to-face interviewing using a pre-designed questionnaire. The questionnaire included information about goat farmers, number of total goats, male-female ratio, number of additional animals, breed, age, physiological status, parity, breeding system, litter size with male-female ratio, milk production, housing system and feeding system.

#### **2.4: Statistical analysis**

The obtained data was stored in Excel-2016 and descriptive statistics (Mean, median, standard error mean) were calculated to compare the different variable. The age, male female ratio, body weight, litter size and kids ratio were manifested as mean. Standard error of mean was also calculated to see how representative the sample is for the population and also to make valid conclusions.

## CHAPTER- III

### Results

#### 3.1 Population structure

##### 3.1.1. Breed distribution

The number of Black Bengal, Jamnapari, crossbred and Haryana does are shown in the Table 1. Proportional distribution of available breeds and verities are depicted in the Figure 1.

Phenotypic characteristics of available breeds and verities are presented in the Figure 2.

**Table 1:** Number-wise distribution of available breeds and verities in the study population.

Breed	Count
Black Bengal	50
Jamnapari	28
Crossbred	22
Haryana	2
Total	102
Black Bengal	50

The number of total doe was 102 including 50 Black Bengal, 28 Jamnapari, 22 crossbred and only 2 Haryana.

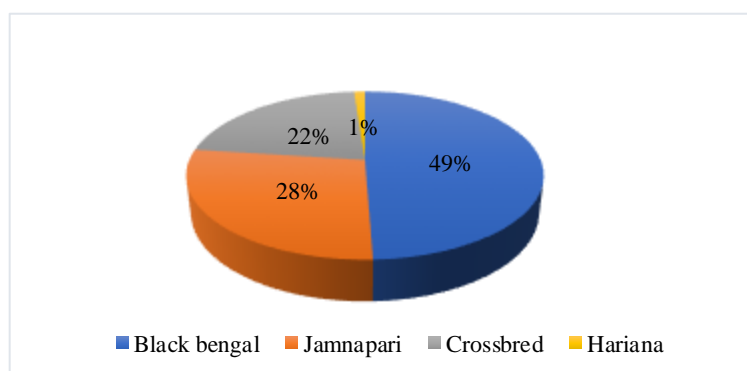


Figure 1: Proportional distribution of available breeds and verities in the study population.



A: Black Bengal



B: Jamnapari



C: Crossbred



D: Haryana

Figure 2: Available goat breed/genotypes in the northern part of Chattogram.

### 3.2. Flock size

**Table 2:** Flock size statistics for backyard goat farming in the northern Chattogram district.

Parameter	Count
Mean	5.02
Standard Error	0.25
Median	5
Minimum	1
Maximum	10

The flock size statistics for every farmer in case of backyard farming of goat is given in the Table 2. Minimum number of goats in backyard farming in Northern Chattogram was one and maximum was 10.

### 3.3. Male female ratio:

The mean male female ratio in each flock was 1:1.40 in backyard goat farming in the northern Chattogram district.

### 3.4. Age distribution

The mean age for the selected does was  $22.16 \pm 1.35$  months in backyard goat farming.

### 3.5. Body weight

Average Body condition score (BCS) for the adult female goats was  $(2.85 \pm 0.03)$ . Mean body weight for different breed is shown in the Table 3.

**Table 3:** Body weight of goats in backyard goat farming in the northern Chattogram district

Breed	Body weight (Mean $\pm$ SE)
Black Bengal	15.12 $\pm$ 0.44
Jamnapari	20.85 $\pm$ 1.25
Crossbred	24.56 $\pm$ 1.24
Haryana	40.00 $\pm$ 0.00
Overall	19.24 $\pm$ 0.68

The overall body weight (Mean $\pm$  SE) was  $(19.24 \pm 0.68)$ . Highest body weight was found in Haryana ( $40.00 \pm 0.00$ ) and lowest in Black Bengal ( $15.12 \pm 0.44$ ).

### 3.6. Litter size

Litter size in each parity for different goat breeds is given in the Table 4.

**Table 4:** Parity wise litter size in different goat breeds reared in backyard goat farming in the northern Chattogram district.

Breed	Parity1	Parity2	Parity3
Black Bengal	1.1 $\pm$ 0.01	1.62 $\pm$ 0.11	1.29 $\pm$ 0.14
Jamnapari	1.96 $\pm$ 0.12	1.64 $\pm$ 0.13	1.57 $\pm$ 0.20
Crossbred	1.82 $\pm$ 0.12	2.00 $\pm$ 0.10	2.10 $\pm$ 0.17
Haryana	1.00 $\pm$ 0.00	-	-
Overall	1.90 $\pm$ 0.06	1.71 $\pm$ 0.07	1.53 $\pm$ 0.11

The overall litter size in 1st, 2<sup>nd</sup> and 3<sup>rd</sup> parity was  $(1.90 \pm 0.06)$ ,  $(1.71 \pm 0.07)$  and  $(1.53 \pm 0.11)$ , respectively. In case of Black Bengal the litter size was highest in 2<sup>nd</sup> parity ( $1.62 \pm 0.11$ ),

whereas for Jamnapari the litter size was highest in 1<sup>st</sup> parity (1.96±0.12). And for crossbred the highest litter size was found in 3<sup>rd</sup> parity (2.10±0.17).

**Table 5:** litter size for AI VS natural breeding in backyard goat farming in the northern Chattogram district.

<b>Breeding system</b>	<b>Parity1</b>	<b>Parity2</b>	<b>Parity3</b>
AI	1.79±0.08	1.69±0.08	1.76±0.13
Natural breeding	2.11±0.10	1.70±0.14	1.42±0.29

The litter size was highest in 1<sup>st</sup> parity for both Artificial (1.79±0.08) and natural breeding (2.11±0.10) system. For AI the litter size in 2<sup>nd</sup> and 3<sup>rd</sup> parity was (1.69±0.08) and (1.76±0.13), respectively. The litter size in 2<sup>nd</sup> and 3<sup>rd</sup> parity was (1.70±0.14) and (1.42±0.29) for natural breeding.

### 3.7. Male and female kid ratio

**Table 6:** Male and female kid ratio for AI VS Natural breeding in backyard goat farming in the northern Chattogram district.

<b>Breeding system</b>	<b>Parity1</b>	<b>Parity2</b>	<b>Parity3</b>
AI	1:1	1:1.29	1:0.88
Natural breeding	1:1	1:1.07	1:0.80
Overall	1:1	1:1.17	1:0.84

The male and female ratio was same (1:1) in 1<sup>st</sup> parity and almost similar in 3<sup>rd</sup> parity for both AI (1:0.88) and natural breeding system (1:0.80). In 2<sup>nd</sup> parity the ratio was (1:1.29) for AI and (1:1.07) for natural breeding system.

## CHAPTER - IV

### Discussion

At Fatickchari upazila, in the backyard system, mostly goats are reared under semi-intensive conditions as those rural people cannot provide suitable housing with intensive facilities. As well as goats, farmers who are financially better off than others kept 2-3 cattle. In the backyard system, the goats are usually kept in an open area having no shed close to the farmers' house from morning to evening. The farmers practiced both natural and artificial insemination. Quacks primarily treat animals in case of diseases. Although when they went to the Upazila Livestock Office, they went there without patients to save transportation costs. Goats were allowed to graze on agricultural land or roadside area for the day and returned home at noon. They provide mostly concentrate feeds, especially the rice polish due to availability and low cost. Grass feeding and cultivation were rarely noticed. The owners did not practice routine vaccination and deworming. In the case of Black Bengal goats, milk production was too low due to their genetic factors. They produce milk only for the nourishment for their kids. Some farmers said that sometimes the produced milk is also not enough for their kids. In this situation, they have to provide milk from another. In the case of Jamnapari and crossbreds average of 0.5-1L milk was found when milking after nourishment of their kids. The leading cause of low milk production was feeding management and nutrition provided. In the case of Haryana, it is difficult to compare their production performance due to the lack of availability of this breed in the studied area.

#### 4.1. Population structure:

The numbers of total doe with breeds distribution studied are listed in the Table 1. A Total of 102 does were selected randomly for this study. Among this 50 were Black Bengal, 28 were Jamnapari, 22 were Crossbred and only 2 were Haryana. The reason for rearing Black Bengal primarily its small size and prolificacy. The numbers of Jamnapari and crossbreds was almost the same. These two breeds number was relatively low may be due to their larger size and more feed requirements. The Haryana breeds were rare due to low breeding efficiency and less adaptability.

The flock size statistics for backyard goat farming are listed in the Table 2. The mean flock size for the goat was 5.02, standard error 0.25, median 5, minimum 1 and maximum 10. The flock size may vary due to the economic condition of the farmers. The male female ratio was 1:1.14. The mean age was  $(22.16 \pm 1.35)$  months for selected does. The does that gave birth at

least once were selected for the study as the main purpose was to evaluate the productive performances of goats.

#### **4.2. Body weight:**

The average body condition score was  $2.85 \pm 0.03$ . The body weight (Mean  $\pm$  SE) for each breed is listed in the Table 3. The adult body weight (Mean  $\pm$  SE) of Black Bengal, Jamnapari, Crossbreds and Haryana were  $15.12 \pm 0.44$ ,  $20.85 \pm 1.25$ ,  $24.56 \pm 1.24$  and  $40 \pm 0.00$ , respectively and they were slightly higher than the findings of (Bhowmik et al., 2014), except Haryana. Overall body weight (Mean  $\pm$  SE) was  $19.24 \pm 0.68$ . The body weight of Black Bengal goats was relatively lower than the other breeds.

#### **4.3. Litter size:**

Parity wise litter size in different goat breeds is listed in the Table 4. The litter size in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> parity for Black Bengal, Jamnapari and Crossbreds were  $1.00 \pm 0.01$ ,  $1.62 \pm 0.11$  and  $1.29 \pm 0.14$ ,  $1.96 \pm 0.12$ ,  $1.64 \pm 0.13$  and  $1.57 \pm 0.20$  and  $1.82 \pm 0.12$ ,  $2.00 \pm 0.10$  and  $2.10 \pm 0.17$ , respectively. The litter size for Haryana in 1<sup>st</sup> parity was  $1.00 \pm 0.00$ . The litter size of Black Bengal goats are almost similar to the findings of (Hossain et al., 2004). In case of Jamnapari (Paul et al., 2014) and (Uz Zaman, 2017) reported that the average litter size is  $1.50 \pm 0.19$  and  $1.5 \pm 0.6$ , respectively. The litter size in all parity were highest for the Crossbred goats. Overall litter size in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> parity were  $1.90 \pm 0.06$ ,  $1.71 \pm 0.07$  and  $1.53 \pm 0.11$ , respectively.

The litter size for AI vs Natural breeding in three parity are listed in the Table 5. The litter size for AI in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> parity were  $1.79 \pm 0.08$ ,  $1.69 \pm 0.08$  and  $1.76 \pm 0.13$  and for Natural breeding  $2.11 \pm 0.10$ ,  $1.70 \pm 0.14$  and  $1.42 \pm 0.29$ , respectively.

#### **4.4. Kid sex ratio:**

The male and female kid ratio for AI vs natural breeding in three parity for all breeds are listed in the Table 6. The kids (male: female) ratio for AI in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> parity were 1:1, 1:1.29 and 1:0.88 and for natural breeding 1:1, 1:1.07 and 1:0.80, respectively (Hassan et al., 1970), reported that in the case of Jamnapari kids 53.2% were male and 46.7% were female. Overall kids ratio were 1:1, 1:17 and 1:0.84 in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> parity, respectively. There were no significant differences between the kids ratio for AI vs the natural breeding system.

## **CHAPTER- V**

### **Conclusion**

Improved feeding with good management practices under semi-intensive conditions may help in higher productive and reproductive performances of Black Bengal, Jamnapari and crossbred goats. More studies on the performance of crossbreds and Haryana would help choose a suitable exotic breed for improving goats' productive and reproductive performances of goat in the Chittagong region and in Bangladesh.



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