

# Comparative Study on Productive and Reproductive Traits of Black Bengal and Jamnapari Goats under Semi-Intensive Condition

## Gous Miah

Department of Genetics and Animal Breeding  
Chittagong Veterinary and Animal Sciences University  
Khulshi, Chittagong-4225, Bangladesh

## Ashutosh Das

Department of Genetics and Animal Breeding  
Chittagong Veterinary and Animal Sciences University  
Khulshi, Chittagong-4225, Bangladesh

## Tahmina Bilkis

Department of Genetics and Animal Breeding  
Chittagong Veterinary and Animal Sciences University  
Khulshi, Chittagong-4225, Bangladesh

## Md. Moksedul Momin

Department of Genetics and Animal Breeding  
Chittagong Veterinary and Animal Sciences University  
Khulshi, Chittagong-4225, Bangladesh

## Md. Arif Uddin

Veterinary Surgeon, Directorate of Livestock Services  
Bangladesh

## Md. Abdul Alim

Dept. of Pathology and Parasitology  
Chittagong Veterinary and Animal Sciences University  
Khulshi, Chittagong-4225, Bangladesh

## Mohammad Showkat Mahmud

Bangladesh Livestock research Institute  
Savar, Dhaka-1344, Bangladesh

## Omar Faruk Miazi

Department of Genetics and Animal Breeding  
Chittagong Veterinary and Animal Sciences University  
Khulshi, Chittagong-4225, Bangladesh

**Abstract-** The study was conducted to compare the productive and reproductive performances of Black Bengal and Jamnapari goat under semi-intensive system in Bangladesh. Average birth weight of kids of Black Bengal and Jamnapari was  $956.13 \pm 19.72$  and  $1776.56 \pm 75.13$  gms, respectively. In case of single litter the birth weight of Black Bengal and Jamnapari kids was  $962.5 \pm 130.14$  and  $1773.33 \pm 388.62$  gms, whereas in twin it was  $967.17 \pm 139.68$  and  $1816.67 \pm 486.11$  gms and in case of triplet it was  $929.55 \pm 90.7$  and  $1500$  gms, respectively. Birth type showed significant difference ( $P < 0.05$ ) between the breeds. A negative

correlation was found between the litter size and the birth weight of kids. It was observed that in case of does the average body weight was  $14.65 \pm 2.84$  kg and  $30.4 \pm 9.08$  kg in case of Black Bengal and Jamnapari goat respectively. The service per conception was  $1.45 \pm 0.5$  and  $1.34 \pm 0.48$  in Black Bengal and Jamnapari goat, respectively. The average gestation period was  $147.9 \pm 1.6$  and  $150.88 \pm 4.7$  days, post partum heat period was  $36 \pm 7.9$  and  $63.25 \pm 24.32$  days, kidding interval was  $186.15 \pm 7.9$  and  $199.22 \pm 13.61$  days, age at puberty was  $197.35 \pm 13.59$  and  $328.44 \pm 61.65$  days for Black Bengal and Jamnapari goat,

respectively. The results indicated that the productive and reproductive performances were better in Black Bengal goat than the Jamnapari goat under semi-intensive condition.

**Index Terms**— Productive traits, reproductive traits, Black Bengal goat, Jamnapari goat and semi-intensive

## I. INTRODUCTION

Livestock sub-sector plays an important role to GDP which is approximately 5.8 % (DLS, 2007). Goat constitutes an important livestock resource in Bangladesh. Archaeological evidence indicates that the goat was one of the first animals to be domesticated by humans around 10,000 years ago at the dawn of the Neolithic period in the Fertile Crescent (Pringle, 1998; Porter, 1996). Like other domestic goat breeds in South Asia, Bengal goat believed to be derived from wild bezoar of Pasang (*Capra aegagrus*) with infiltrated blood from markhor (*Capra falconeri*) (Rahman *et al.*, 2006). There are about 300 breeds and varieties of goats domesticated in this subcontinent. In Bangladesh, it constitutes about 7% of the total Asiatic goat population which accounted for 20.75 millions heads (DLS, 2007).

Goats are preferred as livestock for rearing especially in small holding farming system due to its unique ability to adapt and maintain them in harsh environment. The goat ranks second position in terms of meat and skin production, representing about 38 and 28 percent, respectively, of the total livestock in Bangladesh (FAO, 2003). Goats gives more production per unit of investment, small sized, have younger slaughter age and well established market (Prasad, 2004).

Bangladesh has only one goat breed known as the Black Bengal goat. Black Bengal goats are dwarf goat and are famous for its adaptability, fertility, prolificacy, delicacy and superior of meat and skin quality (Islam, 2001). It is found almost all parts of the country. Black Bengal goats graze on barren and road-side land with grass and least home made supplies such as rice gruel, various tree leaves such as jackfruit leaves, mango leaves etc. But in case of Jamnapari goat most of farmers fed wheat bran, motor bran, gram chuni, banana residues in addition to the mentioned above.

The Jamnapari is the best dairy goat in India (Rout *et al.*, 1999). They are the tallest breed and commonly known as the Pari (Angel) in its area of origin - Uttar Pradesh - because of its majestic appearance. The number of this breed in Bangladesh is not known, but most are found in Chuadanga, Meherpur, Kushtia, Jhenidah, Pabna, and Jessore districts (Faruque and Khandoker, 2007) and scatteredly found Chittagong and Cox's Bazar. It is one of more renowned dual purpose breeds for its milk as well as meat production. It is also prolific, twin and triplet births being common (Khan *et al.*, 1989). It is well known for superior meat quality in Western Utter Pradesh in India (Mittal and Pandey, 1978). It has proven to be most suitable to tropical climates and has consequently been used widely for upgrading indigenous stock for meat and milk in various countries (Devendra and Burns, 1983). Introduction of breeds having proven ability to thrive in our agro-ecology climate be used to upgrade local breed for increasing overall productivity.

This study was undertaken to investigate the following objectives:

1.To compare the productive and reproductive performance of Black Bengal and Jamnapari goats.

2.To find out the suitability of the breed under semi-intensive farming system.

## II. MATERIALS AND METHOD

### Study area

The study was conducted at the selected areas of Cox's Bazar and Chittagong district of Bangladesh using a questionnaire, developed mainly for collection of informations on productive and reproductive traits, i.e. birth weight, mature weight, type of birth, parity, service per conception, gestation period, post partum heat period, kidding interval, age at puberty etc. The informations related to this study were collected with direct contact of farmers. The data were collected from 40 and 32 smallholder farms of Black Bengal and Jamnapari, respectively of those areas.

### Traits analyzed

The following traits were used to measure the reproductive and reproductive performances of Black Bengal and Jamnapari goats.

**Birth weight of kids:** Kids were weighed within 1-24 hours of birth by weighing balance.

**Mature weight of does:** It was measured by weighing balance.

**Type of birth / Litter size:** It was calculated as the number of kids born per parturition per doe.

**Parity:** It was calculated as how many times a doe gives kid.

**Number of services per conception:** It was calculated by the number of times mating was required for successful conception of does.

**Gestation period:** It was measured as the time in days required from last mating (conception) with buck till parturition.

**Post-partum heat period:** It was estimated as the number of days from kidding to the first subsequent service (mating) of a doe.

**Kidding interval:** The date of one kidding to the date of next kidding constitutes the kidding interval.

**Age at puberty:** It was estimated as the age in days when does exhibited the sign of first heat. By observing wagging tail, swelling and watery discharge from the vulva, jumping tendency to other and bleating.

### Statistical Analysis

Raw data were tabulated in Microsoft Excel and analyzed by One-Way ANOVA of compare means procedure of SPSS 16. Least Significant Difference (LSD) test was performed to know the significance difference. To make the graph Microsoft Excel was used.

## III. RESULTS AND DISCUSSION

The productive and reproductive traits such as birth weight of kids, mature body weight of does, type of birth, parity, service per conception, gestation period, post partum heat period, kidding interval, age at puberty etc were analyzed that are presented in Table 1.

**Table 1: Difference among various reproductive traits between Black Bengal and Jamnapari goat**

Parameters	Black Bengal goat(Mean±SE)	Jamnapari goat(Mean±SE)	F value	Level of significance
Birth weight (gms)	956.13±19.726	1776.56±75.134	134.95	NS
Mature weight (kg)	14.65±.4505	30.4063±1.60635	107.41	NS
Type of birth	2.13±0.102	1.59±0.109	12.50	P<0.05
Service per conception	1.45±0.080	1.34±0.085	0.82	P<0.05
Gestation period (days)	147.90±0.255	150.88±0.846	13.58	NS
Post partum heat period (days)	36.0±1.254	63.25±4.3	44.43	NS
Kidding interval (days)	186.15±1.258	199.22±2.407	25.87	NS
Age at puberty (days)	197.35±2.15	328.44±10.898	171.03	NS

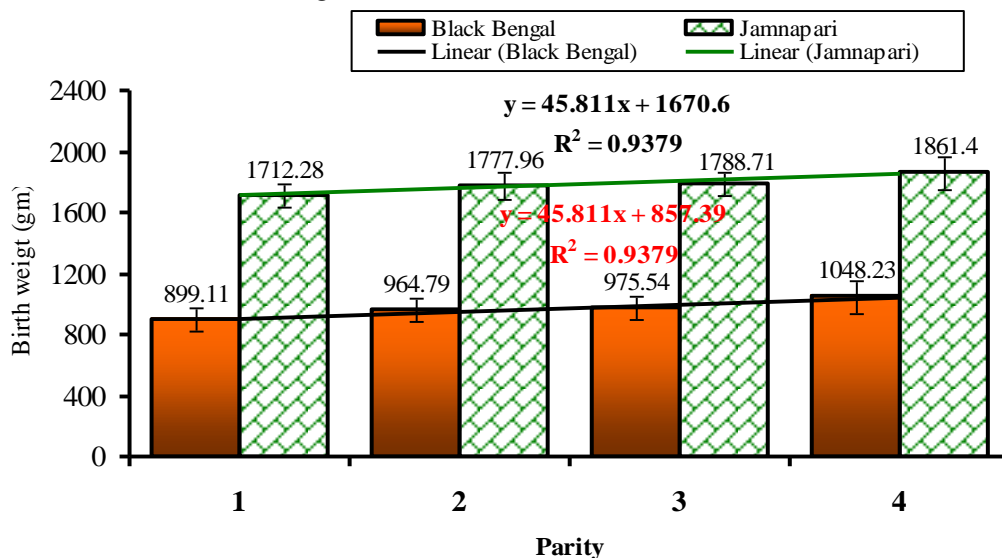
**Productive characteristics**

**Birth weight**

At present study the average birth weight was 956.13±19.72 and 1776.56±75.13 gms respectively in case of Black Bengal and Jamnapari goat (Table 1). Parity affects the birth weight of kids which has been shown in Figure 1. From this study it was also observed that the birth weight in case of single and twins was more than triplet (Figure 2). In the present

study it was observed that birth weight increases in later parity than the first parity. Hassan et al. (2007) reported that the average birth weight of Black Bengal goat and Crossbred goat were 1.60±.50 and 1.90±.75 kg, respectively and differences were statistically significant (P<0.05), which is larger than the present study which may be due to management, feeding and nutritional condition of the goats.

Figure 1: Effect of parity on birth weight of Black Bengal and Jamnapari goats under semi-intensive condition



Hassan et al. (2010) found the mean body weight of Jamnapari kid was 1.6 kg at birth which is similar to present study. Singh et al. (1991) mentioned that the single born kid weighed 18.7% more than twins at birth. Rout et al. (1999) reported that female Jamnapari weighed about 3.7 kg at birth.

**Body weight of does**

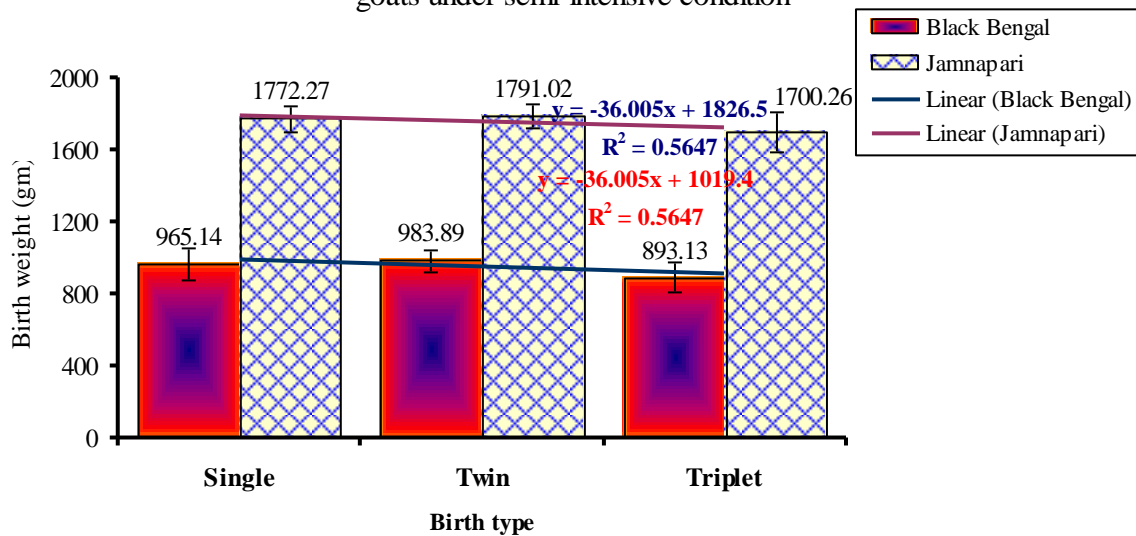
In present study the average mature body weight of Black Bengal and Jamnapari goat was 14.65±.45 and 30.40±1.60 kg, respectively (Table 1). Benerjee, (2004) observed that the

average body weight of adult Black Bengal does was 14 to 20 kg, which was similar to present study.

The average litter size was  $2.13 \pm 0.102$  and  $1.59 \pm 0.109$  in case of Black Bengal and Jamnapari goat, respectively. In the present study kidding produced single, twins and triplets in 46.8, 46.8 and 6.25% of cases, respectively in Jamnapari goat.

**Reproductive traits**  
**Litter size/Birth type**

Figure 2: Effect of birth type on birth weight of Black Bengal and Jamnapari goats under semi-intensive condition



In case of single twin the birth weight was higher than the single and triplet which is shown in figure-2. Under farming conditions, Rout et al. (1999) mentioned that in Jamnapari goats 56.2, 43.1 and 0.7% of litters were single, twin and triplets, respectively. In the present findings, Jamnapari does kid less single, more twins and triplets. The average litter size of Black Bengal goat was 2.13 in both the systems but was higher than that of 1.5 (Chowdhury et al., 2002) and lower than 2.2 (Moulick et al., 1966) in intensive and semi-intensive systems, respectively.

**Age at puberty**

The age at puberty of Black Bengal was  $197.35 \pm 2.15$  days in the present study (Table- 1), where Huq et al. (1988) and Faruque (1999) recorded 269 and 250 days respectively, which was higher than present study. Chowdhury et al. (2002) observed that season and feeding level of were affected of age at first heat. In case of Jamnapari, the age at puberty was  $328.44 \pm 10.89$  days in the present study, where Hassan et al. (2010) found  $354.7 \pm 17.1$  days, which is slightly higher than present study. The variation of results which occur may be due

to genetic cause. Chowdhury et al. (2002) observed that season and feeding level of were affected of age at first heat but rearing system did not affect the age of puberty. Besides genetical influence, feeding and management are important in respect of age of puberty. The management includes feeding, breeding, housing and disease control which affect the age at puberty.

**Gestation period**

The average gestation period of Black Bengal goat was  $147.90 \pm 0.25$  days in present study (Table 1). This result is similar to the observation of Sinha and Sahni (1982) and Faruque (1999) which was 144.9 and 143 days respectively. In present study the gestation periods were different at different parities such as  $146.73 \pm 0.81$ ,  $148.46 \pm 0.79$ ,  $148.29 \pm 0.85$  and  $148.46 \pm 1.21$  days at first, second, third and fourth parity respectively in case of Black Bengal goat (Table 2). Faruque et al. (2010) reported that gestation length was  $143.0 \pm 1.71$  and  $142.8 \pm 1.4$  days in intensive and semi-intensive system respectively for Black Bengal goat, which is slightly lower than present study.

**Table 2: Effect of parity on different reproductive traits in Black Bengal and Jamnapari goats under semi-intensive condition.**

Traits	Parity	Black Bengal	Jamnapari	Level of significance
Gestation period (days)	1	146.73±0.81	149.69±0.87	NS
	2	148.46±0.79	151.42±0.9	
	3	148.29±0.85	151.25±0.81	
	4	148.46±1.21	151.42±1.18	
Post partum heat period (days)	1	41.61 <sup>b</sup> ±4.15	69.17 <sup>b</sup> ±4.44	P<0.05
	2	34.03 <sup>a</sup> ±4.04	61.59 <sup>a</sup> ±4.82	
	3	33.78 <sup>a</sup> ±4.31	61.34 <sup>a</sup> ±4.12	
	4	31.57 <sup>a</sup> ±6.17	59.13 <sup>a</sup> ±6.01	
Kidding interval (days)	1	185.61±2.67	198.52±2.85	NS
	2	185.97±2.60	198.88±3.10	
	3	186.50±2.77	199.41±2.65	
	4	187.49±3.97	200.40±3.87	

Values in the same column indicate the effect of parity on reproductive traits.

For Jamnapari, the average gestation length was 146.24 days in the present study. This results is similar to the observation of Sinha and Sahni (1982), Khan et al. (1989) and Gangwar and Yadav (1987) recorded 149.5, 147.9 and 145.9 days, respectively. In present study the gestation period varied due to parity and which were 149.69±0.87, 151.42±0.9, 151.25±0.81 and 151.42±1.18 days at first, second, third and fourth parity, respectively (Table 2). From the above discussion it is observed that Jamnapari is longer gestation period than Black Bengal, which was supported by Verma et al. (1991).

**Post partum heat period**

The effect of birth type in post partum heat period of Black Bengal and Jamnapari goat was shown in Table 3. In case of Black Bengal, the average post partum heat period found to be 36.0±1.254 days in the present study which is significant(P<0.05). Faruque et al. (2010) found 33.1±5.4 days in semi-intensive system which is similar to present study. Islam et al. (2009) found the post partum heat period 77.00±4.04 days in BB in semi-intensive system.

**Table 3: Effect of birth type on different reproductive traits in Black Bengal and Jamnapari goats under semi-intensive condition.**

Traits	Birth type	Black Bengal	Jamnapari	Level of significance
Gestation period (days)	Single	146.84±0.97	150.26±0.78	NS
	Twin	147.93±0.65	151.36±0.76	
	Triplet	148.39±0.95	151.81±1.20	
Post partum heat period (days)	Single	39.13 <sup>a</sup> ±4.95	64.74 <sup>b</sup> ±3.99	P<0.05
	Twin	36.81 <sup>b</sup> ±3.32	62.42 <sup>b</sup> ±3.90	
	Triplet	32.59 <sup>c</sup> ±4.86	58.21 <sup>a</sup> ±6.12	
Kidding interval (days)	Single	182.43±3.09	197.02±2.49	NS
	Twin	186.42±2.07	201.01±2.43	
	Triplet	187.60±3.03	202.19±3.82	

Values in the same column indicate the effect birth type on reproductive traits.

The average post partum heat period for Jamnapari goat was  $63.25 \pm 4.3$  days in the present study where Hassan *et al.* (2010) found  $50.9 \pm 18.3$  days which is about 12 days lower than the present study. From the above discussion it is observed that the post partum heat period of Jamnapari is higher than Black Bengal.

#### **Kidding interval**

For Black Bengal goat, the kidding interval was  $186.15 \pm 1.25$  days in the present study where Faruque *et al.* (2010)  $181.23 \pm 4.55$  days, which are slightly lower than the present study. For Jamnapari, the kidding interval was  $199.22 \pm 2.40$  days shows by the present study where Faruque (1999), and Raja and Mukundan (1975) recorded 243 and 299.3 days respectively. From the above discussion it is observed that the kidding interval of Jamnapari is higher than Black Bengal. It might be due to the improper record keeping by the farmers.

Rout *et al.* (1999) reported kidding interval was  $229.3 \pm 26.7$  days, which is higher to the present findings. The kidding intervals were different at different parities in case of both Black Bengal and Jamnapari which was shown in table-3. Kidding interval increases in case of both type of goat in later parities than the first one. Due to long lactation, the kidding interval ( $210.6 \pm 29.4$  days) was longer than in Black Bengal goats ( $179 \pm 20$  days) as reported by Hassan *et al.* (2007).

#### **Service per conception**

In case of Black Bengal, the service per conception was  $1.45 \pm 0.080$  in the present study. This result is slightly larger to the observation of Faruque (1999) and Korathar *et al.* (1998) who recorded 1.24 and 1.23, respectively. For Jamnapari, the service per conception was  $1.34 \pm 0.085$  at present study. Hassan *et al.* (2007) found the number of service per pregnancy was  $1.3 \pm 0.6$ , which is similar to present study. This result is near about to the observation of Khan *et al.* (1989) who recorded 1.6. Difference of number of services per conception between the groups of does may be due to lack of proper detection of heat and methods of mating or insemination to the does.

### **IV. CONCLUSION**

Most of the productive and reproductive performances of Black Bengal goats ranked higher than Jamnapari goat in semi-intensive system. So it can be concluded that considering the socio-economic and climatic condition of Bangladesh, rearing of Black Bengal goat under semi-intensive system would be more suitable than Jamnapari goat.

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