

Assessment of Reproductive Performance of Black Bengal goat in Village Condition

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Abstract: This present study was compiled to investigate the reproductive performance of Black Bengal goat at Saver Upazilla under the Dhaka district from July/2017 to June/2018. All goats of this study were rearing under extensive conditions. Least-squares means for body weight at birth of Black Bengal goat for 1st, 2nd and 3rd parity were 0.92±0.01, 0.99±0.01 and 0.97±0.01 kg respectively. The body weight at birth for winter, summer and rainy season were 0.92±0.01, 0.99±0.01 and 0.97±0.01 kg respectively. The body weight of Black Bengal goat at weaning period were 5.12±0.06, 5.03±0.05 and 4.97±0.06 kg respectively at 1st, 2nd and 3rd parity and body weight at weaning were 4.89±0.05, 5.27±0.05 and 4.93±0.09 kg respectively at winter, summer and rainy season. The litter sizes of Black Bengal goat at birth were 1.21±0.06, 2.07±0.08 and 2.43±0.12 respectively at 1st, 2nd and 3rd parity. The litter size of Black Bengal goat at birth was 1.83±0.09, 1.80±0.09 and 1.75±0.14 respectively at winter, summer and rainy season. The litter sizes at weaning of Black Bengal goat were 1.18±0.05, 1.56±0.06 and 1.91±0.12 respectively at 1st, 2nd and 3rd parity. The litter sizes at weaning were 1.60±0.08, 1.40±0.07 and 1.30±0.08 respectively at winter, summer and rainy season. The gestation periods of black Bengal goat at 1st, 2nd and 3rd parity were 144.1±0.43, 143.5±0.40 and 144.1±0.48 days respectively and at winter, summer and rainy season were 143.9±0.37, 143.9±0.41 and 143.6±0.59 days respectively. It can be concluded that third parity and summer season give better performance in village condition.

Keywords: Goat, reproductive traits, body weight, litter size, gestation period.

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I. Introduction

Among domesticated animal goat (*Capra hircus*) is the first ruminant livestock after dog that domesticated around 90000 B.C. (Luikart *et al.*, 2006). Out of world goat population, about 90% goats are found in developing country. Among the Asiatic countries, Bangladesh has fourth highest population of goats (DLS, 2008). In Bangladesh goat population is about 26.1 million (FAO, 2018). Black Bengal goat is the own breed of Bangladesh. The average number of goats per household is about 2.31 in Bangladesh (Faruque, 2010). "The goat is the poor man's cow" old man saying (MacHugh and Bradley, 2001). The goat recognized as a significant food source due to good convertor of feed DM into milk. Goats are economically important & promising animal genetic resources in the developing country. Black Bengal goat is more popular for its high fertility, prolificacy, short generation period, early sexual maturity, delicious meat and superior skin, resistant to disease and found in almost in all villages of Bangladesh (Devendra and Burns, 1983). Superior skin is a valuable assets which used as an industrial raw material and earn foreign currency. There is no prejudice about the consumption of goat meat. Black Bengal goat recognized as a tool of poverty alleviation.

Reproductive traits are important factors which have lifetime influence on the production of an animal (Banergee, 1989). During selection body weight, birth weight, mature weight, litter size, gestation period etc. should be considered to improve animal. There are genetic variations in different reproductive traits between individuals in Black Bengal goat within and between locations (Amin *et al.*, 2000). Reproductive efficiency is the pre-conditions for increasing production potential in any given environment. Reproductive performance depends on genetic potentialities of dam and sire. Expressions of genetic potentialities are affected by different factors such as season, parity of dam, environment, management, health, nutrition, fertility etc. In order to evaluate the productive ability of goats, prolificacy and birth weight are considered the most important and economic criteria. If reproductive performance increases then finally increase production which contribution in poverty alleviation particularly small and landless farmer families at rural level. Systemic information on reproductive performance of Black Bengal goat under extensive rearing system is limited, although a lot of works have been done on productive and reproductive parameters. To take any improvement policy in the rural area, problem and prospects of goats should be identified. So to gather update information this study was designed with the objectives to learn about present status of Black Bengal goat reproductive performance in village condition.

II. Materials And Methods

Data collection & Location

The data of the experiment was collected during July 2017 to June 2018, through door to door visit of farmers' house in village at Savar, Dhaka of Bangladesh. Information on reproductive performances, i.e. body weight at birth, body weight at weaning, gestation period, litter size at birth and weaning was collected from some villages namely Kalma, Uttar Kalma, Adorshagram, Anakali and Dusaed of SavarUpozilla with direct contact of farmers.

Management of experimental animal

Black Bengal goats were selected for data collection which was reared under extensive rearing system. Most of the farmers, goats were reared under extensive condition. They provide small place for stay night or in adverse climate or for rest. All does were naturally mated. During pregnancy period, the owner gives extra concern for kids and proper care for both mother and kids after birth. During rainy season farmers provide green grass or tree leaves by cutting at their stall. Few farmers vaccinated and dewormed their goats. Treatment of their goats when disease was prevailed. The goats were dewormed with broad spectrum anthelmintics twice in a year. Sometimes anti-diaorrheal drug and saline also used for their goats.

Parameter

The following reproductive traits of Black Bengal goats which were considered in this study-

Body weight at birth: The body weight which were recorded within 24 hours of birth. The data was collected by digital weighing balance and recorded only those kids which were alive for analysis.

Body weight at weaning: The weaning period is that period when kids separated from milk of their dam. Weaning period of Black Bengal goat is about 3-4 months. During weaning age, the body weights were recorded to include in datasheet.

Litter size at birth: Litter size means the number of kids which born per birth per doe. It may be occurred in single, twin or triplet or quadrate. During birth count the number of kids of a doe and recorded for analysis.

Litter size at weaning: At the weaning stage of kid, total number of kids alive remains of a doe those are born in at a time of that doe. During weaning period of those kids count total number of kids for analysis.

Gestation period: The period from conception to parturition. Gestation period is the time in which a fetus develops, beginning with fertilization and ending at birth.

In this study the effect of different factors such as parity and season was investigated on reproductive traits of Black Bengal goats in village condition.

Parity: Parity is the number of times that does have kidded. Parity of dam can be grouped into first, second, third and fourth or fifth.

Season: A year is divided into three seasons such as winter (from November to February), summer (from March to June) and rainy (from July to October).

Statistical analysis

For Statistical analyses considering parity of dam and season of birth, simple ANOVA was performed by using Statistical Analysis System (SAS, 1998).

III. Result

Reproductive traits of Black Bengal goat was measured such as body weight at birth, body weight at weaning, litter size at birth and weaning and gestation period which are presented in different Tables. The body weight at birth, body weight at weaning, litter size at birth and weaning and gestation period were affected by season and parity.

Body weight at birth

The body weight at birth of Black Bengal goat at 1st, 2nd and 3rd parity was 0.92±0.01, 0.99±0.01 and 0.97±0.01 kg respectively (Table 1). The body weights at birth of Black Bengal goat were 0.92±0.01, 0.99±0.01 and 0.97±0.01 kg at winter, summer and rainy season respectively (Table 1). The birth weight of Black Bengal goat was significantly ($p < 0.05$) influenced by season. The birth weight higher in summer season than winter and rainy season.

Table 1: Effect of different factors on body weight at birth of Black Bengal goat

Factors	Body weight at birth (kg)	
	No. of observation	LSM±SE
Parity of dam		
First	73	0.92 ^c ±0.01
Second	77	0.99 ^a ±0.01
Third	33	0.97 ^{ab} ±0.01
Level of significance		*
Season of kidding		
Winter	73	0.92 ^c ±0.01
Summer	76	0.99 ^a ±0.01
Rainy	33	0.97 ^{ab} ±0.01
Level of significance		*

Means with different superscripts within each column differ significantly *, (p<0.05), No: number, LSM: Least-squares means, SE: Standard error.

Body weight at weaning

The body weight at weaning of Black Bengal goat were 5.12±0.06 kg, 5.03±0.05 kg and 4.97±0.06 kg at 1st, 2nd and 3rd parity respectively (Table 2). At winter, summer and rainy season the body weight at weaning were 4.89±0.05 kg, 5.27±0.05 kg and 4.93±0.09 kg respectively (Table 2). There was no significant effect of parity on body weight at weaning period. But there was statistically significant (p < 0.05) effect of season on body weight of Black Bengal goat at weaning. In this study showed that the weaning weight was higher in summer season than others. The lower weaning weight found at winter season due to disease, lacking of feed and management systemetc.

Table 2: Effect of different factors on body weight at weaning of Black Bengal goat

Factors	Body weight at weaning (kg)	
	No. of observation	LSM±SE
Parity of dam		
First	66	5.12±0.06
Second	73	5.03±0.05
Third	44	4.97±0.06
Level of significance		NS
Season of kidding		
Winter	73	4.89 ^b ±0.05
Summer	76	5.27 ^a ±0.05
Rainy	33	4.93 ^b ±0.09
Level of significance		*

Means with different superscripts within each column differ significantly *, (p< 0.05), NS: non-significant, No: number, LSM: Least-squares means, SE: Standard error.

Litter size at birth

The average litter size at birth of Black Bengal goat were 1.21±0.06, 2.07±0.08 and 2.43±0.12 at 1st, 2nd and 3rd parity of dam respectively (Table 3). At winter, summer and rainy season the average litter size at birth were 1.83±0.09, 1.80±0.09 and 1.75±0.14 respectively (Table 3). There was no significant effect existed for season of kids even though highest litter size at birth was seen in winter. Parity of dam has highly significant (p< 0.01) effect on litter size at birth of Black Bengal goat.

Table 3: Effect of different factors on litter size at birth of Black Bengal goat

Factors	Litter size at birth (no.)	
	No. of observation	LSM±SE
Parity of dam		
First	66	1.21 ^c ±0.06
Second	73	2.07 ^b ±0.08
Third	44	2.43 ^a ±0.12
Level of significance		**
Season of kidding		
Winter	92	1.83±0.09
Summer	66	1.80±0.09
Rainy	24	1.75±0.14
Level of significance		NS

Means with different superscripts within each column differ significantly **, (p<0.01), NS: non-significant, No: number, LSM: Least-squares means, SE: Standard error.

Litter size at weaning

Average litter size at weaning period of Black Bengal goat at 1st, 2nd and 3rd parity were 1.18±0.05, 1.56±0.06 and 1.91±0.12 respectively (Table 4). There was highly significant (p<0.01) effect of parity in litter size of Black Bengal goat at weaning age. Kid mortality response to reduce the litter size at weaning period. Kid mortality rate increase due to disease breakdown such as PPR (Peste Des Petits Ruminants), diarrhoea, poor management, poor nutrient and environmental distress etc. The mean of litter size at weaning of Black Bengal goat at winter, summer and rainy season were 1.60±0.08, 1.40±0.07 and 1.30±0.08 respectively (Table 4). There was statistically significant (p<0.05) different in litter size at weaning for season of Black Bengal goat.

Table 4: Effect of different factors on litter size at weaning of Black Bengal goat

Factors	Litter size at weaning (no.)	
	No. of observation	LSM±SE
Parity of dam		
First	66	1.18 ^c ±0.05
Second	73	1.56 ^b ±0.06
Third	44	1.91 ^a ±0.12
Level of significance		**
Season of kidding		
Winter	77	1.60 ^a ±0.08
Summer	66	1.40 ^{ab} ±0.07
Rainy	32	1.30 ^{bc} ±0.08
Level of significance		*

Means with different superscripts within each column differ significantly *, (p< 0.05), **, (p<0.01), No: number, LSM: Least-squares means, SE: Standarderror.

Gestation period

The average gestation periods of Black Bengal goat in this study were 144.1±0.43, 143.5±0.40 and 144.1±0.48 days at 1st, 2nd and 3rd parity respectively (Table 5). At winter, summer and rainy season the gestation length of Black Bengal goat were 143.9±0.37, 143.9±0.41 and 143.6±0.59 days respectively (Table 5). There is no effect of season and parity on gestation period of Black Bengal goat.

Table 5: Effect of different factors on gestation period of Black Bengal goat

Factors	Gestation period (days)	
	No. of observation	LSM±SE
Parity of dam		
First	66	144.1±0.43
Second	73	143.5±0.40
Third	44	144.1±0.48
Level of significance		NS
Season of kidding		
Winter	74	143.9±0.37
Summer	76	143.9±0.41
Rainy	33	143.6±0.59
Level of significance		NS

Means with different superscripts within each column differ significantly, NS: non-significant, No: number, LSM: Least-squares means, SE: Standard error.

IV. Discussion

Body weight at birth

The body weight at birth of Black Bengal goat in intensive management (1.49 kg) was higher than semi-intensive management system (1.28kg) showed by Faruque *et al.* (2010) which are higher than the present study. Almost similar result with this study was reported by Faruque *et al.* (2016), Paul *et al.* (2011) and Paul *et al.* (2014). Bhowmik *et al.* (2014), Faruque *et al.* (2010) and Jalil *et al.* (2016) showed lower result than this study. Jahid *et al.* (2015), Islam *et al.* (2016), Mia *et al.* (2013) and Hasan *et al.* (2014) reported higher body weight at birth than the present study. The lower body weight at birth of Black Bengal goat in the present study

due to extensive management system, poor feeding, disease and poor breeding management. Some environmental factors also responsible for poor body weight at birth.

Body weight at weaning

Islam *et al.* (2009) compared the weaning weight of Black Bengal goat under different rearing system and showed that lower weaning weight at scavenging production system. The result of Black Bengal goat under semi-intensive production system (5.43 kg) is almost similar with this study. Under scavenging production system, the body weight at weaning (4.17 kg) which is lower than the findings. The lower body weight at weaning period of Black Bengal goat reported by Rahman *et al.* (2007), Akter *et al.* (2006) and Halim *et al.* (2011) than this study. Chowdhury *et al.* (2002) evaluated the weaning weight at low and high feeding system of Black Bengal goat was 3.76 ± 0.032 kg and 9.50 ± 0.81 kg respectively. The result of low feeding system (3.76 kg) which is lower than the present study (Table 2) and due to high feeding system (9.50 kg) at weaning period which is higher than this study. Differences in body weight within breed are influenced partly by genetic factors but largely variation due to environmental factors. The findings of Paul *et al.* (2011), Jalil *et al.* (2016) and Islam *et al.* (2016) also strongly supports the present study.

Litter size at birth

The average litter size of Black Bengal goat has been reported by Faruque *et al.* (2010) 1.5 and 1.06 respectively for intensive and semi-intensive rearing system. Faruque *et al.* (2010) also reported that at winter (November to February), summer (March to June) and rainy (July to October) litter size of Black Bengal goat were 1.0, 1.37 and 1.0 respectively which is lower than the present study. Hasan *et al.* (2014), Paul *et al.* (2014) and Jahid *et al.* (2015) found lower results than this study. The present result is almost similar with the findings of Jalil *et al.* (2016) and Akter *et al.* (2006). The mean of litter size of Black Bengal goat under semi-intensive and scavenging system were 2.00 ± 0.00 and 2.33 ± 0.33 respectively founded by Islam *et al.* (2009) which is almost similar with the present study.

Litter size at weaning

Mia *et al.* (2013) also showed that the litter size at weaning of Black Bengal goat at winter, summer and rainy season were 1.27 ± 0.19 , 1.04 ± 0.16 and 0.80 ± 0.23 respectively which is slightly lower than this study. He reported that the highest litter size found in winter season and lowest in rainy season which is in agreement with the present study. Hamed *et al.* (2009) showed that the litter size at weaning period of Black Bengal goat at 1st, 2nd and 3rd parity were 1.39 ± 0.03 , 1.64 ± 0.03 and 1.75 ± 0.03 respectively which is slightly higher than the present study. He also showed that the litter size at weaning period of Black Bengal goat at March and October were 1.61 ± 0.02 and 1.67 ± 0.03 respectively which is also slightly higher than the present study.

Gestation period

Faruque *et al.* (2010) and Mia *et al.* (2013) showed similar result with the present findings. The results of this study also slightly higher than those results which were reported by Kabir *et al.* (2013), Bhowmik *et al.* (2014) and Halim *et al.* (2011). Jalil *et al.* (2016) showed that the average gestation length of Black Bengal goat was 142.45 ± 0.31 days which are lower than this study. Devendra and Burns, (1983) reported that although gestation period of goat was fairly constant at about 146 days yet it may be affected by factors such as sire, season, year, kid birth weight and weight of dam at mating. Those of factors did not effect on gestation period of goat in the present study.

V. Conclusion

This study concluded that third parity of dam and summer season give better performance than others. This study revealed that under extensive rearing condition, Black Bengal goat give better reproductive performances though it has low capacity to produce meat and milk. If we want to improve productive performance, we must be improving reproductive performance of Black Bengal goat and it will be possible through proper management. So, it can be concluded that considering the socio-economic and agro-climate condition of Bangladesh, rearing of Black Bengal goat under extensive system in village, would be more profitable than other livestock which may help in alleviating poverty.

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