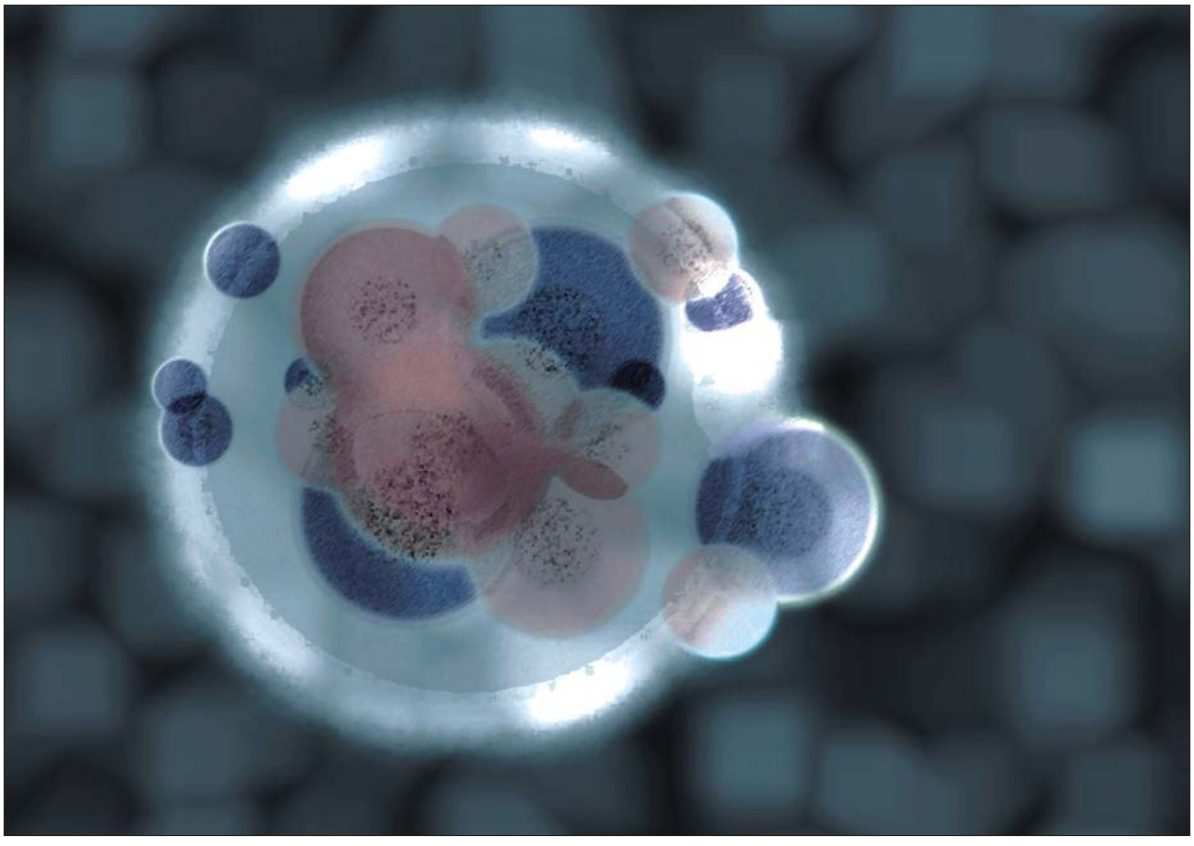

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Reproductive and Productive Performance of Black Bengal Goat under Semi-intensive Management

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Abstract: The study was conducted to investigate the reproductive and productive performance of Black Bengal goat in different parity reared in semi-intensive system. Twenty-five pre-puberal (6-7 months) female Black Bengal goats were selected on the basis of their phenotypic characteristics and their ancestral history from goat Development farm, Savar, Dhaka. The animals were vaccinated against peste Des petits Ruminants dewormed and deeped in 0.5% malathion solution. They are allowed to graze once concentrate supplement was fed at the rate of 300, 200 and 100 g/d to does buck and kid, respectively. Different reproductive and productive characteristics of the Black Bengal goat were recorded during 2 years. Young female attained puberty at an average age and weight of 209±32.25 days and 8.08±1.28 kg, respectively. Mean age and weight at 1st kidding were 401.5±32.08 days and 15.41±1.35 kg, respectively. Growth rate at 1st gestation period was 49.56±9.15 g/d. Sex ratio of male: female kids born was found to be 56:44, 48:52 and 51:49 in the 1st, 2nd and 3rd parity, respectively. It required 1.2-1.4 services per conception with average gestation length of 148 days. Average litter size in the 1st, 2nd and 3rd parity was 1.08, 1.76 and 1.96, respectively. Post partum heat period was 48, 43 and 38 days for 1st, 2nd and 3rd parity, respectively. Kidding interval also reduced significantly ($p<0.05$) from 199 days in 2nd parity to 187 in 3rd parity. Average birth weight of male was higher (1.14 kg) then female (1.06 kg). Total litter size production in the 1st, 2nd and 3rd parity was 1.22, 1.79 and 2.03, respectively. Live weight at kidding in 1st, 2nd and 3rd parity was 15.41, 18.43 and 19.99 kg, respectively. Kid mortality was reduced from 22.2 to 8.16% with the parity. Reproductive and productive performances of Black Bengal goat were better in 3rd parity than that of the 1st and 2nd parity.

Key words: Black Bengal goat, production, reproduction

INTRODUCTION

Black Bengal goats in Bangladesh are famous for its high prolificacy, superior chevon, best quality skin and very good adaptability. Although they are reported to be slower in growth, low milk production and higher kid mortality[1,2], goat meat has a high market share but its milk has only a very small market share and has been consumed more as a medicine than as food[3]. In many situations, milk-producing ability of Black Bengal goat is very poor, which is some times not even sufficient to meet the minimum requirement of suckling kids[4]. The higher demand of meat in the local as well as foreign markets have been focused but the goat enterprise extremely prominent to the vulnerable group to people in the existing socioeconomic condition of the country[4]. Black Bengal goat has an importance in Bangladesh as high quality meat producing animal chevon is acceptable to the people of all community irrespective of caste, creed and religions taboo. Moreover, skin is a valuable asset using as an industrial raw material in home and earning a good amount of foreign currency from abroad. Goat has been recently recognized as a tool of poverty alleviation. Goats are regarded as an intimate and integral part of rural farming systems in Bangladesh. Many of the rural landless and marginal farmer's own 1-5 goats/ family. These goat farmers are distributed throughout the country and are economically viable households in mixed farming systems. In some areas goats contribute up to 41% of the total in come of the farm[4]. The goal of a livestock system including goats is to produce a quantity of quality products with maximum efficiency. A component in achieving this goal is the genetic improvement of goats in the areas of quantity, quality and efficiency. In developing countries, it has been suggested that breed selection are screening producer may be used for genetic improvement of local breed[5]. Reproductive efficiency is always considered to be the most vital factor

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ensuring to increase of productivity to a certain environmental condition. Therefore, the present study was undertaken to evaluate the parity effect on reproductive and productive performance of Black Bengal goat under semi-intensive management.

MATERIALS AND METHODS

Location and agro-climate: The study was conducted at Goat Development Farm, Savar, Dhaka under the Directorate of Livestock Service, Savar, Dhaka. The station is located at 23°53/N, 90°17/E at an altitude of one meter above the sea level and agro-ecologically belongs to the Madhupur Tract (Agro Ecological Zone 28) of Bangladesh with Red-Brown Terrace strong acidic (pH 4.5-5-5) soil having very little (<1.5%) organic matter[6]. Mean annual temperature is 25.3°C with a variation of be <15°C for 50-70 days from December to February from <20°C for 80-90 days from 24th November to 18th February and >40°C for 0-0.5 day during July. Average annual rainfall is 200 mm.

The experimental animal: The study was conducted for 24 months started from January, 2001 to December, 2002. A total of 25 elite pre-puberal Black Bengal does and 4 bucks were selected from own stock of the Goat Development Farm, Savar, Dhaka. Initial age of female was 8.44±1.04 months and weight was 10.0±1.31 kg. Selection was mostly based on the basis of body structure, type of conformation and their ancestral history on milk production and reproductive performance. All the goats were individually ear tagged before starting the work. Productive and reproductive performances of 25 selected Black Bengal does were recorded until 3rd parity. The goats were managed under semi-intensive husbandry system.

Management of the research activities housing: All does were kept on the wooden platform of concrete house. Kids were kept in a specially designed wooden brooding pen with adequate bedding materials, feeding and watering provision and facilities for temperature control. Kids were housed along with their mother in the wooden metabolic stall up to one month of age. Bucks are always kept separately from the does to avoid random mating. Floor space provided for does, buck and kid was 1.86, 2.3 and 2.32 sq m, respectively.

Feeds and feeding: Goats were allowed to graze in the farm from 8 A.M to 5 P.M with 1 hour rest (1-2 PM). A concentrate mixture having 17% CP; 13.4 MJ ME/kg DM was fed twice daily at 8.00 A.M and at 5.00 P.M at the rate of 300, 200 and 100 g/d for does, buck and kid, respectively. *Adllibitum* green grasses were supplied to buck daily. Kids were kept with their mother for the whole day (7.30 A.M. to 5.00 P.M) up to dry period. Fresh drinking water was made available throughout the study period.

Health: Animals were dewormed three times a year. They were vaccinated against pest des petits ruminants. All animals were deeped in 0.5% malathion solution fortnightly.

Mating: Four Black Bengal buck were selected for mating of does during the experimental period. The average age and weight of bucks were 18±1.25 months and 20±2.5 kg, respectively. All the does were naturally mated at 24 h after onset of estrus and at the mating does were found to be pregnant.

Reproductive characteristics: Reproductive characteristics e.g. age at puberty, number of services per conception, gestation length, litter, age at first kidding, post-partum heat period, kidding interval, weighing of kids and does and kid mortality were recorded.

Statistical analysis: Data were analyzed by using univariate General Linear Model procedure of SPSS 9.0 for windows[7]. The following statistical model was used to measure to the effect of parity on different productive and reproductive parameters.

$$Yij = \mu + \alpha i + eij$$

Here:
μ = General mean
αi= Effect of parity (I=1,2 and 3)
eij = Random error

Linear, logarithmic or exponential models were used for expressing the relationship of two variables where appropriate. Besides, mortality rate was analyzed by using Chi-square test.

RESULTS AND DISCUSSION

Reproductive characteristics: The reproductive performances of Black Bengal does are shown in Table 1. Age at first heat varied considerably between goats with a mean of 209 days slightly lower than that of 216 days observed in Black Bengal goat at the similar system

Table 1: Reproductive traits of female Black Bengal goats under semi-intensive management

Traits	No. of animal	Range	Mean±SD
Age at first heat (days)	25	150-270	209.00±32.25
Body weight at puberty (kg)	25	7-11	8.08±1.28
Age at first kidding (days)	25	352-471	401.50±32.08

Table 2: Effect of parity on gestation period, litter size and prolificacy rate of Black Bengal goat

Parity	Gestation period (days)	SE	Litter size (no.)	SE	Prolificacy rate (%)	SE
1st	148	0.91	1.08[a]	0.11	108[a]	11
2nd	147	0.91	1.76[b]	0.12	176[b]	12
3rd	148	0.91	1.96[b]	0.12	196[b]	12
Overall	148	0.53	1.60	0.06	160	6

Means with different superscripts in the same column differed significantly ($p<0.05$)

Table 3: Effect of parity on reproductive performances of Black Bengal goats

	Parity							
Parameters	1st	SE	2nd	SE	3rd	SE	Overall	F-value and level of significance
Post partum heat period (d)	48.32[c]	1.60	43.00[b]	1.60	37.88[a]	1.60	43.07	10.71**
Service per conception (no.)	1.40	0.09	1.20	0.09	1.20	0.09	1.27	1.71 NS
Kidding interval (d)	-	-	199.36[b]	3.86	186.84[a]	3.86	193.10	5.26*
Birth weight of male kid (kg)	1.05[a]	0.04	1.22[b]	0.03	1.15[b]	0.03	1.14	7.02**
Birth weight of female kid (kg)	1.02	0.04	1.05	0.03	1.11	0.03	1.06	1.92 NS
Total litter production at birth (kg)	1.22[a]	0.13	1.79[b]	0.13	2.03[b]	0.13	1.68	9.79**
Kid (0-3 months) mortality (%)	22.2	-	15.9	-	8.16	-	-	NS

Means with different superscripts in the same row differed significantly, NS = Non-significant, *=P<0.05, **=P<0.01

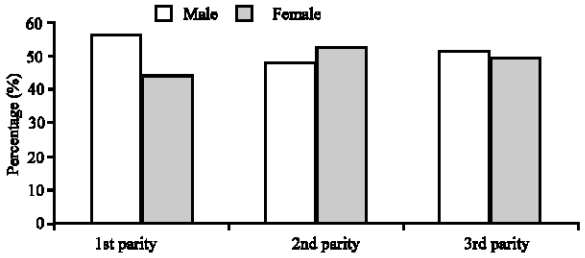

Fig. 1: Percentage of male and female at 1st, 2nd and 3rd parity

observed by Chowdhury *et al.*[8] On the other hand, Amin *et al.*[9] reported the age at first heat was 250 days in Black Bengal goat reared under farmer's condition. Chowdhury *et al.*[8] observed that season and feeding level were affected on age at first heat but rearing system did not affect. Live weight at puberty was found 8.08 (7-11 kg) which is almost similar to 8.89 kg reared with same system reported by Chowdhury *et al.*[8]. Average age at first kidding of does is 401.5 days. Ali *et al.*[9] also reported that average age at 1st kidding for Black Bengal goats 420 days which is almost similar to our observation. Average age of first kidding under intensive and semi-intensive system was 285 and 405 days, respectively observed by Chowdhury *et al.*[8].

Sex ratios of kid: The number of male kid in 1st and 3rd parity was found higher with an exception of 2nd parity (Fig. 1). The sex ratio of male and female kid reported so far was 57:43 in Black Bengal goat[11]. These are similar with the results of 2nd parity and 3rd parity in the present findings, respectively. Therefore, from the above results it may suggest that the variation of sex ratio was not due to breed of goat.

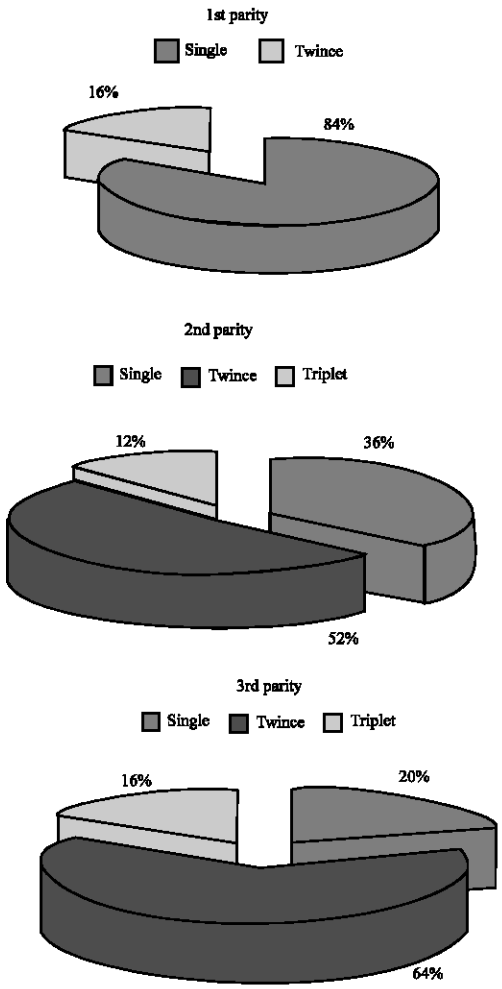

Fig. 2: Effect of parity on birth type of Black Bengal goat

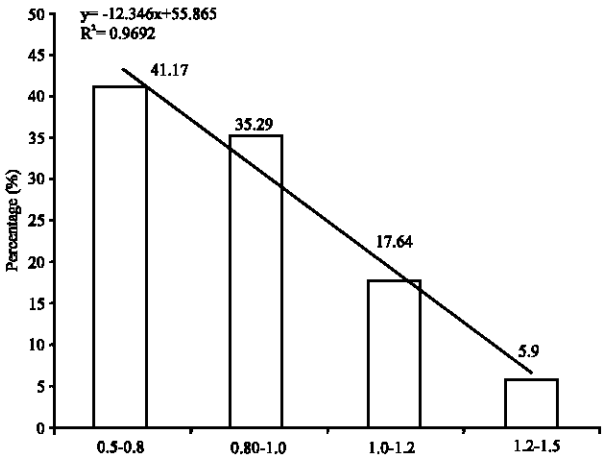

Fig. 3: Effect of birth weight on kid mortality of Bengal goats

Gestation length: Gestation length of Black Bengal goat was 148, 147 and 149 days at 1st, 2nd and 3rd parity, respectively (Table 2). Gestation period of goat reported to be fairly constant at around 146 days[1] yet it may be affected by factors like season, year, sire, litter size, kidding age of dam, parity, kid birth weight, weight of dam at mating, generation and kidding intervals reported by Chowdhury *et al.*[8]. On the other hand, the gestation length was affected by litter size and sex of kid observed by Amoah and Bryant[12]. These factors did not affect in length of gestation in BB goat as evident in this study.

Litter size and prolificacy rate: The average number of kid born per kidding increased significantly ($P<0.05$) from 1st parity up to 3rd parity (Table 2). Composition of birth type in each is shown in Fig. 2. In the 1st parity, single kid comprised 84% of the total kid born and in the 2nd and 3rd parity twin and triplet type birth were 52, 12, 64 and 16%, respectively. This result was almost similar to Chowdhury *et al.*[8]. From 2nd parity onward multiple birth consists of 64 and 80%, respectively. This agrees with the observation of high multiple birth of Black Bengal goat of 80-87%[8].Up to 3rd parity, number of kids born increased linearly ($r^2=0.91$, $p<0.01$) from 1.08 to 1.96 kids (Table 2). Average litter size for Black Bengal goat reported to be of 1.4[1] and 2.15[9], which confirm the reputation of Black Bengal goats for high fecundity.

Post partum heat (PHP) period: Post partum heat period was significantly ($p<0.01$) higher in the 1st parity than 2nd and 3rd parity (Table 3). This result was supported the observation of Chowdhury *et al.*[8] with an exception of 2nd parity. The PHP of Black Bengal goat reared under rural scavenging system reported to be 125 days for the first generation and 70 days for the 2nd generation[9]. Higher post partum heat period in Black Bengal goat of 60 days has also reported by Devendra and Burns[1]. Relatively shorter PHP observed in the semi- intensive and intensive system[8] which was, supported the present observation. Apparently, generation, parity, better management and nutrition were the most important contributing factor responsible for lowering the post partum heat period.

Service per conception (SPC): Difference of service required per conception was not significantly different in the 1st, 2nd and 3rd parities (Table 3). The over all mean of SPC was lower in this trial than that of 1.45 observed in Black Bengal goat under same management system[8]. Service per conception was not affected by the feeding level and parity suggested by Chowdhury *et al.*[8] and Amin *et al.*[9]. Probably, Black Bengal goats produce viable ova and sperm in this management and conception.

Kidding interval: The kidding interval at 3rd parity was found to be lower ($p<0.05$) than that of 2nd parity (Table 3). Results suggested that kidding interval might be reduced with age of Black Bengal goat in the present experiment, which is similar to finding of Chowdhury *et al.*[8]. This is probably due to proper physiological function of organ and glands involved in hormonal surge for onset of oestrus and ovulation with advancement of age. Moreover, kidding interval observed in this trial was the much shortest than any other reports. In this regards, the kidding interval of Black Bengal goat ranged form 255-300 days reared under village conditions reported by Husian[13]. Amin *et al.*[9] also observed 211 days kidding interval of the same breed in same rearing condition. Kidding interval was reduced from 192 days at low feeding level to 177 days at high feeding level also observed by Chowdhury *et al.*[8].

Birth weight of kid: Birth weight of male and female kid is shown in Table 3. Birth weight of male and female kid gradually increased at 2nd and 3rd parity, although higher male kid birth weight at 2nd parity in the experiment. Total litter production increased with subsequently the parity (Table 3). Relatively higher birth weight of male kid was observed[4,9,13]. Birth weight is positively correlated with growth rate, adult size and kid viability[1]. Chowdhury *et al.*[8] reported that birth weight was higher (1.49 kg) in intensive management than that of semi intensive management system (1.28 kg). They also observed that heavier birth weight is an indication of better nutrition and health for higher of kids weaned

reduction of kid mortality and increase of growth rate the kid growth rate.

Kid mortality: Kid mortality up to 3 months is showed that there was no difference in mortality rate of kids within the parity (Table 3). Birth weight of kids was categorized according to their weight in four groups as 0.5-0.8, 0.8-1.00, 1.00-1.20 and 1.2-1.5 kg. Kid body weight less than 0.8 kg were subjected to 41% mortality rate, which decreased (r^2 =0.97; $p<0.01$) linearly up to 6% with the increase of weight (Fig. 3). Similarly, kid mortality decreased from 22 to 8% with the increase in parity number (Table 3). These results were partially supported by Chowdhury *et al.*[8]. The average kid mortality in this study was 15.42%, higher than that of 5-12% observed in Black Bengal kid maintain under farmer's condition[13] and less than the figure of 29.9% reported by Bangladesh Livestock Research Institute. Kid mortality is responsible for many interacting factors, such as effect of dam weight at kidding, effect of birth weight of kid, effect of dam's milk yield, season, effect of birth, effect of litter size, effect of parity, effect of dam's nutrition and diseases were[8].

It may be concluded that reproductive performance of Black Bengal goat was better in 3rd parity. There is a tendency for an increase of reproductive performances of Black Bengal goat. Further continuation of research in these areas is needed to investigate optimum or maximum these performances for determination of potential productivity and their reproductive life.

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