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Article

Productive and reproductive performances of Brown Bengal goat (Hilly goat) at research farm level

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Abstract: A nucleus-breeding flock of selected Brown Bengal goat was established in the Bangladesh Livestock Research Institute (BLRI), Regional Station, Naikhongchari, Bandarban, with the objective of characterization, conservation and improvement of the breed. A total of 69 does of different generations (Foundation = 07, Generation one = 32, Generation two = 23 and Generation three = 07.) and 07 bucks (All were first generation) were used to study the genetic parameters of Brown Bengal goat on productive and reproductive traits. The studied Animals were bred naturally. Goats were reared under semi-intensive management system in which goats were browsing in nature and allowed to graze in field as well as mounting in hills. All goats were housed in a plastic made floor house and allowed to graze 6-8 hours in a day and concentrate was offered twice daily during morning and evening at the rate of 1% of their body weight per day. The adult body weight of hilly goat was 20.95 kg. The phenotypic characteristics like the face, horn, ear and udder length were 15.56, 7.18, 12.19 and 12.67 cm respectively. On the other hand the hearth girth, front leg, hind leg and body length were 61.51, 46.8, 49.48 and 55.24 cm respectively. The gestation length, kidding to first heat, kidding to conception and kidding interval were 148.52 ± 1.06, 33.48 ± 2.85, 33.40 ± 1.98 and 176.86 ± 1.98 days, respectively. According to parity the GL, AFH, KC and KI were not followed trends up to 3rd parity but kid birth weight was increasing trends with increasing parity up to fifth. The birth weight of male kid (1.25 ± 0.25 kg) was higher than that of female kid (1.13± 0.27 kg). The highest birth weight (1.24±0.02 kg) was found in single birth. According to litter size the birth weight of single kid (1.24 ± 0.01 kg) stood first followed by twine (1.20 ± 0.01), triplet (1.1±0.03 kg) and quadruplet kids (0.93±0.08 kg). . The productive and reproductive performances of brown Bengal goat were not affected by parity. Birth weights of kids were significantly varied with birth type.

Keywords: productive; reproductive; performance; Brown Bengal goat; farm level

1. Introduction

The hilly goats are available at hilly districts of Bangladesh. There are reputed to be very hardy and capable of thriving in any adverse environmental condition. There are browsing animal and allowed to grassing field. The hilly goats are a small size goats and known to be famous for its high adptability, fertility, prolificacy (Talukder *et al.*, 2009). Systematic information on genetic and phenotypic parameters at hilly goats is very limited. As hilly goats are being reared primarily for meat production, body weight and growth rate to be considered as the most important factors. Detailed knowledge of genetic variation within and among different breeds in very important for understanding and developing endogenous economic genetic traits of breed (Yeo *et al.*, 2000). Therefore, the main aim of this study is to characterize hilly goats by qualitative and quantitative measurement in ultimate production profile. So, it seems essential to identify and quantify the parameters by which hilly goats can be described distinctively from others. The majorities of the tribal people live in the hilly forests with

primitive ways of life and practice traditional agriculture which predominantly integrated farming system including crop production under shifting cultivation together with homestead garden, livestock, horticulture and forest trees (Alam *et al.*, 1993). Introduction of livestock especially goat may play a vital role in the integrated Agro forestry system especially in the hilly districts. The hilly goats no doubt a promising treasure of Bangladesh but is going to be extinct. The government of Bangladesh is realizing importance of its conservation and development. With the view of above circumstances, Bangladesh Livestock Research Institute has undertaken a "Community based hilly goat development program at hilly regions at Nikhongchari". The objective of the research work was to determine the productive and reproductive performances of hilly goats at farm level hilly area at Nikhongchari.

2. Materials and Methods

2.1. Animal used

The data used in the experiment were from "Community based hilly goat development program at hilly regions at Naikhongchari" project conducted at Bangladesh Livestock Research Institute, Regional Station, Naikhongchari, Bandarban. The study was conducted in the year from 2010 to 2012. In the study period, a total of 69 does of different generations ((Foundation = 07, Generation one = 32, Generation two = 23 and Generation three = 07.) and 07 bucks (All were first generation) were reared to study the productive and reproductive performances of Brown Bengal goats. These goats were collected from different parts of Bangladesh. Selection was mostly based on phenotypic characteristics viz. body size, conformation, weight for age, their ancestral history on production and reproduction and also on dam performance. Twinning and triplets kidding of dam was also considered for female selection

2.2. Management procedure

2.2.1. Housing

Initially goats were kept in the wooden floor and tin shed houses with the wooden wall. Then in second year of the project, goats were housed in permanent house with slated platform of 1m above from the ground. All goats were kept separately according to sex and age groups to avoid random mating and collect data easily.

2.2.2. Breeding

The breeding program was conducted initially through Open Nucleus Breeding System (ONBS) at hilly areas at Naikhonchari and was designed in such a way, which resists inbreeding. Then a selective breeding program was performed to improve the economically important traits. The physical sign of heat (barking, swelling and mucus discharge of vulva, jumping on other animal, off-feed) was observed with a buck in the morning. Female in estrous were mated with the buck naturally according to mating chart that has been planned previous.

2.2.3. Feeding and rearing system

Goats were allowed to graze for 6 hours (from 10 AM to 4 PM) with 1-hour rest (1:00 PM to 2:00 PM). Animals were given a concentrate mixture containing 17% CP, 11 MJ ME/kg DM provided twice daily in the morning and evening at the rate of 1% of their body weight for different categories as pregnant and milking does, dry goats, growers, kids and bucks respectively.

2.2.4. Health care and diseases

In cold and dry season kids were kept in a specially designed brooding pen with facilities for temperature control, feeding and watering provision and with adequate bedding materials. Animals were vaccinated against PPR (Peste Des Petits Ruminants) for two times in a year. De-worming program was applied every three month in a year and animals were dipped in 0.5% melatheon solution for each month. Necessary treatments were provided against specific diseases according to the suggestion of Veterinarian.

2.2.5. Phenotypic characteristics

In the experiment, the phenotypic traits that were analyses are adult body weight, the face, horn, ear and udder length. The hearth girths, front leg, hind leg, body length of hilly goat were also recorded.

2.2.6. Reproductive characteristics

Reproductive parameters studied were litter size (LS), gestation length (GL), kidding to first heat (KFH), kidding to conception (KC) and kidding interval (KI).

2.2.7. Productive data
Productive characteristics of goats like birth weight of male kids and birth weight of female kids were recorded.

2.2.8. Record keeping
All the experimental animals were ear-tagged individually. Flock book, shed book, milking book, kid book, mating book, health book, feed book were used for record keeping. All the information about production and reproduction were recorded in an individual data sheet for each of the animal. Then all data were stored in computer for analyses. The statistical analysis of the data was performed using compare mean with one way ANOVA and univariate analysis of variance procedure of SPSS package. The difference between treatments means were examined by using Duncan Multiple Range Test.

3. Results and Discussion
3.1. Phenotypic parameters
The phenotypic parameters are shown in Table 1. The adult body weight of hilly goat was 20.95 kg. The face, horn, ear and udder length were 15.56, 7.18, 12.19 and 12.67 cm respectively. The hearth girth, front leg, hind leg and body length were 61.51, 46.8, 49.48 and 55.24 cm respectively.

Table 1. Phenotypic parameters of adult hilly goat.

Parameters	Body wt. (kg)	Face (cm)	Horn (cm)	Ear (cm)	HG (cm)	FL (cm)	HL (cm)	BL (cm)	Ud (cm)
Mean	20.95	15.56	7.18	12.19	61.51	46.8	49.48	55.24	12.67

HG=Hearth girth, FL=Front leg, HL=Hind leg, BL=Body length, Ud=Udder length

3.2. Reproductive traits
The results of reproductive traits are shown on Table 2 and 3. The reproduction traits were non-significantly (P<.05) affected on gestation length, kidding to first heat, kidding to conception and kidding interval.

3.3. Gestation length
The result of the gestation length (GL) is shown in Table 2. The results of GL was non significant and the GL was 148.52 ± 1.06 days. Talukder *et al.* (2010) studied that the gestation length of Brown Bengal goat was 149.24 ± 2.37 days. Talukder *et al.* (2008) found that the gestation length of Black Bengal goat was 143.22 ± 0.64 days. Jalil *et al.* (2003) found that the GL of Black Bengal goat was 142.45 ± 0.95 days. Similar type results (144 ± 1.75 days) of GL of Black Bengal goat was also described by Chowdhury and Faruque (2001). Although, GL was non signicnat (P<0.05) of hilly goat but ranges was higher than that of Black Bengal goats. There were no specific trends of GL was observed according up to 3rd parity and similar results was also found Talukder *et al*. (2010).

Table 2. Reproductive traits of hilly goat.

Parameters (days)	No.	Mean ± err.	Sig.
Gestation length (GL)	30	148.52 ± 1.06	NS
Kidding to first heat (KFH)	46	33.48 ± 2.85	NS
Kidding to conception (KC)	43	33.40 ± 1.98	NS
Kidding interval (KI)	36	176.86 ± 7.98	NS

NS= Not Significant

3.4. Kidding to first heat (KFH)
Kidding to first heat was non-significant. The average KFH was 33.48±2.85 days. KFH significantly (P<0.01) affected according to generation was found by Talukder *et al.* (2008). KFH was higher at present studies than mentioned by Hussain (1993).

Ali *et al.* (1973) was described that the Black Bengal goat at farm condition KFH was 61.0 days. KFH was significantly (P<0.65) affected with generation was found Jalil *et al.* (2003). They found that the average KFH was 27.72 ± 2.29 days. A trial was conducted by Chowdhury and Faruque (2001) described that the KFH was 37.43 ±2.61 days. According to parity the KFH was no constant trends up to 3rd parity (Table 3) but Jalil *et al.*

(2003) found that KFH in Black Bengal goat at farm condition was decreasing trends up to 6th parity. The sample size and management practice was might be affected the results.

Table 3. Reproductive traits of hilly goat according to parity.

Parameters (days)	Parity-1	Parity-2	Parity-3	Sig.
GL	151.0±0	143.57 ± 3.25	156 ± 0.0	NS
KFH	37.76±17.98	24.71 ± 6.42	42.10 ± 26.90	NS
KC	28.93±9.54	38.28 ± 15.25	34.83 ± 12.99	NS
KI	174.88±12.53	182.50 ± 12.9	172.00 ± 31.0	NS

NS= Not Significant

3.5. Kidding to Conception (KC)

There was no significant (P<0.05) difference on KC of hilly goat. The average KC was 33.40 ± 1.98 days (Table 2). Talukder *et al.* (2008) studied that in Black Bengal goat KC was non-significantly (P<0.05) affected with generation. The average KC was 40.67 ± 5.67 days. Jalil *et al.* (2003) described that the KC in Black Bengal goat was 42-52 days. The effect of parity were non-significantly (P<0.05) affected on the KC (Table 3). The reproductive traits of KC were showed no particular constant trends up to 3rd parity. Talukder *et al.* (2008) also found that there was no significant (P<0.05) differences of KC according to parity in Black Bengal goat and it was increasing trends up to 3rd parity then decreasing.

3.6. Kidding Interval (KI)

The reproductive traits of KI in hilly goat are shown in Table 2. The KI was not significantly (P<0.05) different. The hilly goats' means KI was 176.86±1.98 days. Talukder *et al.* (2008) found that the Black Bengal goat generation was significantly (P<0.05) affected with KI and the average KI was 193.36 ± 2.49 days. Jalil *et al.* (2003) studied that KI was significantly affected with generation and the average KI was 188.01± 5.24 days. Chowdhury and Faruque (2001) found that low feeding diet KI was 192 ± 3.85 days. The results reproductive traits according to parity are shown in Table 2. The effect of parity were non significantly (P<.05) affected on the KI. The reproductive traits of KI were showed no particular constant trends up to 3rd parity. According to parity KI was increasing trends up to 3rd parity and then decreasing was also studied by Talukder *et al.* (2008) in Black Bengal goat. Although Jalil *et al.* (2003) found that the KI was not consistent increasing/or decreasing trends according to parity (Table 3).

3.7. Productive traits

3.7.1. Kid birth weight

The kid birth weights are shown in Table 4. The overall mean of kid birth weight was 1.20 ± 0.27 kg. Male kids were more birth weight than that of female kid (Table 4). The birth weight of male kid (1.27 kg) was higher than female kid (1.16 kg) but the effect was non-significant (P<.05). This may also be due to anabolic effect of the male sex hormone. Talukder *et al.* (2008) found that higher birth weight of male kid (1.39 kg) than female kid (1.32 kg) in Black Bengal goat. Similar result was also studied Jalil *et al.* (2003) in Black Bengal goat. They showed that male and female kid birth weight 1.33± 0.02 kg and 1.20 ± 0.01 kg respectively. Chowdhury and Faruque (2001) described that the male and female kid birth weight were 1.46 ± 0.05 and 1.27 ± 0.25 kg respectively in high feeding diets.

Table 4. Kids birth weight according to sex.

Parameters	Mean
Male Kid (kg)	1.25 ±0.25 (170)
Female Kid (kg)	1.13 ±0.27 (140)
Average mean (kg)	1.20 0.27 (319)

3.7.2. Birth weight of kid according to parity

The kid birth weights according to parity are shown in Figure 1. The effects of parity were non-significant (P>0.05) on kid birth weight. Birth weight of kid according to parity was increasing trends with increasing parity up to fifth. The effects of parity were non-significantly (P>0.05) affected on kid birth weight was also

studied by Talukder *et al*. (2010) in Brown Bengal goat. Chowdhury and Faruque (2001) revealed that birth weight of male kid was significant (P<.05) but female kid was non-significantly (P>0.43) affected on parity. They showed that birth weight not follow any specific trends according to parity in Black Bengal goat. Talukder *et al.* (2008) found that female kid (P<.05) birth weight was significantly affected according to parity but male kid was non-significantly (P>0.05) affected with BW. Jalil *et al.* (2003) studied that BW of kids were no consistent trends according to parity in Black Bengal goat.

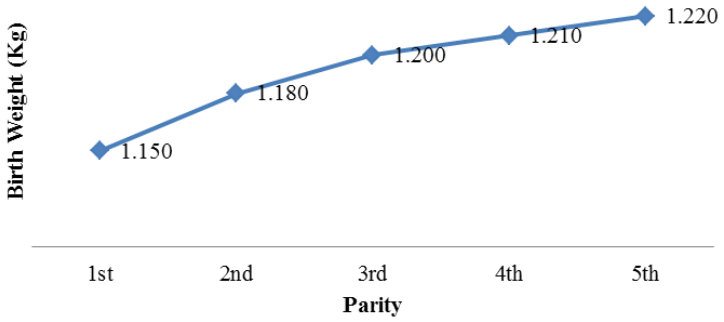

Figure 1. Birth weight of kid according to parity.

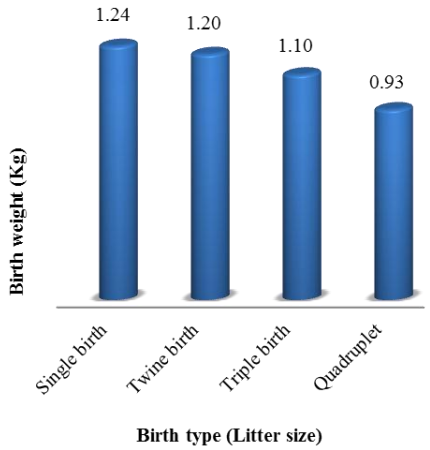

Figure 2. Birth weight of kid according to litter size.

3.7.3. Birth weight according to litter sizes

The kid birth weights according to litter size are shown in Figure 2. The kid birth weights was significantly (P>01) affected with litter size. The highest birth weight (1.24±0.02 kg) was found in single birth. According to litter size the birth weight of single kid (1.24 ± 0.01 kg) stood first followed by twine (1.20 ± 0.01), triplet (1.1±0.03 kg) and quadruplet kids (0.93±0.08 kg). Talukder *et al.* (2008) revealed that male kid birth weight was significantly (P<0.01) highest for single birth (1.42 ± 0.03 kg) and the values was significantly (P<0.01) higher than double (1.3 ± 0.02 kg) and triplet birth (1.33 ± 0.03 kg). Chowdhury and Faruque (2001) studied that litter size non-significantly (P>0.05) affected with BW. The birth weights of single, double and triple kid were 1.38 kg. 1.29 kg and 1.15 kg respectively in Black Bengal goat at semi-intensive management system.

4. Conclusions

From the above findings the reproductive traits were non-significantly (P<.05) affected on gestation length, kidding to first heat, kidding to conception and kidding interval. According to parity the reproductive traits of GL, KFH, KC and KI were no constant trends up to 3rd parity but kid birth weight was increasing trends with increasing parity up to fifth. The birth weight of male kid was higher than that of female kid. Birth weight of single kid stood first followed by twine, triplet and quadruplet kids.

Conflict of interest
None to declare.

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