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Studies on growth parameters of black Bengal goats in coastal Sundarban of West Bengal

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Abstract

The present study was carried out at Coastal Saline zone (Gosaba Block), West Bengal for an elaborative study on growth of Black Bengal goats. The average birth weights of Black Bengal goats obtained in different occasion revealed that there was significance difference ($P < 0.05$) in the average birth weight of male and female kids. Seasonal influence had significance effect ($P < 0.05$) on the birth weight of kids in Bengal goats in coastal zone. Effect of type of birth significantly ($P < 0.05$) differ in the average birth weight in all the four types of birth. In the average birth weight of male and female kids it was found that there was significant difference ($P < 0.05$) in the body weight. Body weight in summer month had no significant difference ($P > 0.05$) where as body weight between monsoon and winter months differs significantly ($P < 0.05$). The birth weight in single kidding recorded to be the maximum while kids in quadruplet or multiple births was the lower weight and was found to be significantly different ($P < 0.05$) in all the type of births in B. B. goat in coastal areas on Sundarban. Statistically there is a significance difference ($P < 0.05$) in the birth weight and body weight gain in the later stage of life in the goats born in the multiple type of birth.

Keywords: Black Bengal goats, coastal saline zone, seasonal influence, body weight

1. Introduction

Goats are the earliest ruminant domesticated in prehistoric times to around 9000 to 7000 B.C. In the existing socio-economic situations in India where per capita land holding is merely 0.2 ha, small ruminants like goat rearing stands to be an inseparable unit in mixed farming system in rural India. The estimation recorded that nearly 16% of the production of meat is contributed by goat (Animal Husbandry & Fisheries Statistics, GOI, 2014). The goat has the greatest adaptations ability among all domestic animals and can thrive well on incidental vegetations grown on poor agricultural lands. In Sundarban area, goat is the main source of livelihood to rural farmers' especially small and landless framers. It was found that goat rearing is in practice under conventional management systems where variations in production traits leading to physiological changes do happen. Birth weight, weaning weight and growth rate are economically important traits. These traits are controlled by polygenes and are also affected by feeding practices, climatic factors and management under farm conditions. The breed, size, age, sex, as well as maintenance and feeding conditions are known to have an important impact on the body weight and weaning weight (Akta and Dogan, 2014) [1]. Production traits are affected by various nongenetic factors like sex, season, year (Kumar *et al.*, 2007) [8]. Knowledge of the phenotypic and genetic parameters of growth traits is of utmost importance in goat production. The growth performance of an animal is a function of its genetic merit and the environment. It is therefore a pre-requisite that knowledge of environmental influences and magnitude of their effects should be known in genetic improvement and decision making that can enhance productivity. West Bengal provides the natural habitat of the most popular goat breed known as 'Black Bengal Goats'. Black Bengal goats have achieved the highest acceptability among livestock farmers due to its high prolificacy, highly priced, excellent quality skin & for its best quality tender & tasty meats. Keeping in view the above conditions, the present study has been undertaken to study the factors affecting growth parameters of Black Bengal goats in coastal area of Sundarban of West Bengal.

2. Materials and Methods

The Sundarban region of South 24 Parganas district was selected for the growth parameters. For the study of growth performance of goats, all the relevant data were collected from Rangabelia and Jotirampur villages of South 24 Parganas district under AICRP of WBUAFS (West Bengal University of Animal and Fishery Sciences) for a complete one and half year cycle covering three seasons viz. Summer, Monsoon and Winter. The climate of this district is characterized by an oppressive hot summer; high humidity nearly all the year round and well distributed rainfall during monsoon season.

Goats were selected on the basis of birth weight (according to litter size, sex), weight gain (sex wise) at 3, 6, 9 and 12 months age; type of birth, season of birth, mortality percentage at different age groups was studied from a total number of 508 Black Bengal kids.

Body weight and growth rate data of kids adults were collected from beneficiaries of AICRP field unit, Rangabelia, Sundarban by asking specific questionnaires. Body weights were recorded by using hanging spring balance. Data pertaining to birth weight and body weight at different age groups (at 3, 6, 9 and 12 months) were also collected from the Kid Register maintained by AICRP field unit, Rangabelia, Sundarban. All the data were classified according to sex and different age groups in the study area.

Different types of low cost housing system for goats were observed. Information regarding floor type, floor space, and height of houses, types of shed wall, roofing type, cleanliness and drainage system were obtained by sets of questionnaire to the goat owners as well as by direct observation. Several types of housing system and types were recorded that are mentioned as below.

- i. Kutch house: separate Kutch house for goat.
- ii. Pucca house: separate Pucca house for goat.
- iii. Keeping the goats along with human being as a part of residence.

Feeding practices observed in village level of this sub-region in two ways, viz. 1) Tethering with limited free grazing and 2) Tethering with supplementation of little homemade concentrates. Generally grazing was allowed from 9.00 A.M to 3.00 P.M (6 hours) on continuous basis during winter

season and from 7.00 A.M to 12.00 noon & from 3.00 P.M to 5.00 P.M (7 hours) on intermittent basis during summer. Certain percentages of goat owners allowed both grazing and tethering (tethering in the morning and grazing in the afternoon. Supplementation of concentrates to goats as practiced by farmers is very less. Few number of goat owners could supply balanced concentrate mixture, very less percentage of farmers provided single concentrate (e.g. broken wheat) or combination of two or three (e.g. mixture of broken wheat, rice bran, wheat bran, rice gruel, dal chuni, broken rice & oil cakes). Few farmers used to practice feeding of mineral mixture through rice gruel.

3. Statistical Analysis

All the parameters for each group were compared (Analyze - Compare Means) for the mean value along with standard error (S.E) and the significance (P value) was recorded at 5% level and 1% level. The complete statistical analysis was done with the help of IBM Statistical Package for Social Scientists (SPSS), Software 21.0 version.

4. Results and Discussion

The present study reveals that there was significance difference ($P<0.05$) in the average birth weight of male (1.043 ± 0.026) and female (1.000 ± 0.022) kids (Table no.1). Birth weight of male kids was recorded to be higher than female kids of Black Bengal goats by many workers in the world as well as in India and is in agreement with the findings of Hasan *et al.* (2014)^[12], Khan *et al.* (2013)^[7].

Seasonal influence had significance effect ($P<0.05$) on the birth weight of kids in Bengal goats in coastal zone. The average birth weight of kids recorded was higher in winter season (1.068 ± 0.019) followed by summer (1.034 ± 0.027) and lower in monsoon (0.967 ± 0.037). Effect of type of birth significantly ($P<0.05$) differ in the average birth weight in all the four types of birth and highest body weight was recorded in single birth (1.150 ± 0.026) followed by twin (1.081 ± 0.012), triplet (0.962 ± 0.018) and in case of quadruplet (0.865 ± 0.066). The above interpretations are in compliance with the results of Bushara *et al.*, (2013)^[5], Thiruvankadan *et al.*, (2009)^[14], Mabrouk *et al.*, (2010)^[10], Meza-Herrera *et al.*, (2014)^[11], Bazzi and Ghazaghi (2011)^[4].

Table 1: Birth weight of Black Bengal goat in according to Sex, Season and Type of Birth

According to Sex		According to Season			According to Type of Birth			
Male (283)	Female (225)	Summer (250)	Mon soon (74)	Winter (184)	Single (86)	Twin (311)	Triplet (101)	Quadru plet (10)
$1.043^a\pm 0.026$	$1.000^b\pm 0.022$	$1.034^c\pm 0.027$	$0.967^b\pm 0.037$	$1.068^a\pm 0.019$	$1.150^d\pm 0.026$	$1.081^c\pm 0.012$	$0.962^b\pm 0.018$	$0.865^a\pm 0.066$

*abc Means in the same row with different superscripts are significantly different at ($P<0.05$)

In the present study, the average body weight at birth, 3, 6, 9 and 12 months of age was observed as 1.04 ± 0.03 , 4.79 ± 0.17 , 7.85 ± 0.17 , 10.17 ± 0.19 , 12.78 ± 0.27 in male kids and 1.00 ± 0.02 , 4.85 ± 0.14 , 8.07 ± 0.17 , 10.29 ± 0.22 , 13.11 ± 0.31 in female kids, respectively in the coastal zone (Table no.2). In the average birth weight of male and female kids it was found that there was significant difference ($P<0.05$) in the body weight which is in contrast with the findings of the two workers viz. Das (2014)^[6] and Lal (2014)^[9]. It was also found that weight of female goats increases as the age

advances up to 12 months of age and significantly ($P<0.05$) differ from male and this findings is in agreement with the observation of Das (2014)^[6]. A tendency of increased body weight gain in female in contrast to male goat was noticed in coastal zone which may be a suggestive cause of better care, feeding and management undertaken by the goat owner particularly to that category of goats. Feeding of whole wheat grain and other feed supplements which was observed during study period may be the other cause of better health condition in this area.

Table 2: Body weight of Black Bengal goats according to Sex at different age groups in Coastal Zone of Sundarban.

Sex	At birth	3 months	6 months	9 months	12 months
Male	1.04 ^a ±0.03 (283)	4.79 ^a ±0.17 (250)	7.85 ^a ±0.17 (159)	10.17 ^a ±0.19 (93)	12.78 ^a ±0.27 (48)
Female	1.00 ^b ±0.02 (225)	4.85 ^b ±0.14 (197)	8.07 ^b ±0.17 (123)	10.29 ^b ±0.22 (69)	13.11 ^b ±0.31 (40)

*abc Means in the same row with different superscripts are significantly different at ($P < 0.05$)

The body weight at 3 months age was higher during summer month compared to Monsoon, (Table no.3). At 3months age the mean body weight was found as 4.95 ± 0.17 , 4.77 ± 0.13 , and 4.74 ± 0.24 during summer, monsoon and winter months respectively. Body weight in summer month had no significant difference ($P > 0.05$) where as body weight between monsoon and winter months differs significantly ($P < 0.05$). In the present study, the mean body weight at 6

months age recorded were 7.69 ± 0.15 , 7.91 ± 0.23 and 8.36 ± 0.23 during winter, summer and monsoon respectively indicating significant effect ($P < 0.05$) in the body weight between monsoon and winter seasons. Similarly, at 9 months age significant difference ($P < 0.05$) in body weight was found between monsoon and winter months but statistically non significant ($P > 0.05$) result was found at the body weight in all the seasons at 12months age group in coastal saline areas.

Table 3: Body weight of Black Bengal goats according to Season.

Season	At birth	3 months	6 months	9 months	12 months
Summer	1.03 ± 0.03(250)	4.95 ± 0.17(219)	7.91 ± 0.23(105)	10.22 ± 0.25(88)	13.06 ± 0.27(57)
Monsoon	0.97 ^b ± 0.04(74)	4.74 ^a ± 0.24(56)	8.36 ^a ± 0.23(40)	10.54 ^a ± 0.29(25)	13.49 ± 0.45(10)
Winter	1.07 ^a ± 0.02(184)	4.77 ^b ± 0.13(172)	7.69 ^b ± 0.15(137)	9.95 ^b ± 0.20(49)	12.40 ± 0.35(21)

*abc Means in the same row with different superscripts are significantly different at ($P < 0.05$)

Multiple births are a common phenomenon in Black Bengal goat and their body weight differs as the age advances. The birth weight in single kidding recorded (Table no.4) to be the maximum (1.15 ± 0.05) while kids in quadruplet or multiple births was the lower weight (0.87 ± 0.07) and was found to be significantly different ($P < 0.05$) in all the type of births in Black Bengal goat in coastal areas on Sundarban. Goats of single type of birth showed highest body weight gain viz. 5.34 ± 0.18 , 8.49 ± 0.21 , 10.88 ± 0.24 and 13.11 ± 0.38 at 3, 6, 9 and 12 months of age, respectively which are significantly differ ($P < 0.05$) from the other type of births except at the age of 12 months where no significant difference was observed in the present study.

Twinning is the most common feature of birth in Black Bengal goat as this strongly supports in this study also and the birth weight and body weight in the next categorized time period was also higher than the triplet and multiple type of birth. In case of quadruplet or multiple births, the kids birth weight were found to be the lowest (0.87 ± 0.07) and 4.20 ± 0.42 , 7.31 ± 0.51 and 9.48 ± 0.68 kg at 3, 6 and 9 months of age, respectively which was lower than the other goats born in single, twin and triplet type of kidding. So, statistically there was a significance difference ($P < 0.05$) in the birth weight and body weight gain in the later stage of life in the goats born in the multiple type of birth. Analysis of goat at the age 12 months (quadruplets) could not performed as the animals were marketed in between 10-12 months period.

Table 4: Body weight of Black Bengal goats according to type of birth.

Birth type	At birth	3 months	6 months	9 months	12 months
Single	1.15 ^d ± 0.05(86)	5.34 ^a ± 0.18(77)	8.49 ^a ± 0.21(48)	10.88 ^a ± 0.24(35)	13.11 ± 0.38 (22)
Twin	1.08 ^c ± 0.01(311)	4.88 ^{ab} ± 0.08(275)	7.89 ^{ab} ± 0.11(176)	10.11 ^a ± 0.14(96)	12.92 ± 0.20(58)
Triplet	0.96 ^b ± 0.02(101)	4.77 ^{ab} ± 0.13(85)	7.85 ^{ab} ± 0.22(50)	9.95 ^{ab} ± 0.32(27)	12.81 ± 0.47(8)
Quadruplet	0.87 ^a ± 0.07(10)	4.20 ^b ± 0.42(10)	7.31 ^b ± 0.51(8)	9.48 ^b ± 0.68(4)	-

*abc Means in the same row with different superscripts are significantly different at ($P < 0.05$)

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