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Research Paper

Reproductive Traits for Identifying Prolific Black Bengal Goat (*Capra hircus bengalensis*)

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ABSTRACT

The present investigation recorded that the average litter size was 2.03 per doe and the prolificacy rate being 202.92%. The result indicates that the litter size proportion for single, twin and triplet were 28.3%, 40.4% and 31.3% respectively. There was a tendency of increasing body weight with higher litter size and such variation was highly significant (P<0.01). The result revealed that the overall mean age of first estrus was 209.08±2.06 days. Maximum age of first conception was 226.18±5.39 days when the animal gave single birth and the minimum AC was 216.65±4.9 days when it produced triplet indicating that failure of conception was more in single bearing does. Service period were recorded to very significantly (P<0.01) among different litter bearing groups, the highest value was observed in triplet producing does (80.88±4.68 days). This is an important finding to understand that, less Age of Puberty (AP), Age at 1st Conception (AC), Days Open (DO) & Kidding Interval (KI) has prominent benefit for multiple foetuses and thus achieving economic benefit.

Keywords: Black Bengal Goat, Prolificacy, Reproductive Parameters, Kidding size, Days Open, Kidding Interval, Age of Puberty, First Conception, Number of Service per Conception, Service Period, Length of Gestation, Age at First Kiddin

Black Bengal is an accredited (INDIA_GOAT_ 2100_ BLACKBENGAL_ 06004) goat breed of eastern region of India, which is mainly reared for meat purpose by the farmers of this region. This breed is distributed throughout West Bengal and adjoining parts of the neighbouring states, like Bihar, Jharkhand, Orissa, Assam, parts of Tripura and Bangladesh. Black Bengal goat is a dwarf breed and famous for high fertility, prolificacy, superior chevon quality, best quality skin, early sexual maturity, resistance against common diseases, low kidding interval and very good adaptability (Husain 1993). Black Bengal goat is a prolific breed, with prolificacy percentage 187.49 and the percentage of multiple ovulations is 72.88 percent (Patra *et al.* 2014). It has high reproductive efficiency, increased litter size, relatively high fertility rate; kids are born twice round the year or more commonly thrice in two years. Meat and skin obtained from the Black Bengal are of excellent quality and contributing in poverty alleviation particularly in subsistence level of farming for many small and landless farmer families at rural level (Amin, 2000). It is obvious that better production efficiency can be obtained from goats when they have a high reproductive efficiency with the potentials for increased litter size and shorter generation interval specifically having higher fertility rate in comparison to other farm animals (Haque *et al.* 2013).

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MATERIALS AND METHODS

Three districts of West Bengal viz. Nadia, Hooghly and Purba-Bardhaman were selected for the present investigation (Fig. 1). Two blocks under each district and two villages under each block were randomly selected. Twenty to twenty-five pregnant Black Bengal goats, preferably at the 1st month of pregnancy but not later than 2nd month, from each village were randomly selected; a total of 240 female pregnant animals of different age groups and parity were included in the present study. A group of animals were offered concentrate supplement while the other group thrived only on grazing. Some general information, qualitative traits and reproductive parameters were collected one time, while different morphometric traits including body weight were recorded at monthly interval during five months of pregnancy period and one set of observation after kidding. A complete time-series data on 240 pregnant goats were analysed using One-Way ANOVA, F-test, T-test, Chi-square test, DMRT & stepwise discriminant function analysis using SPSS.

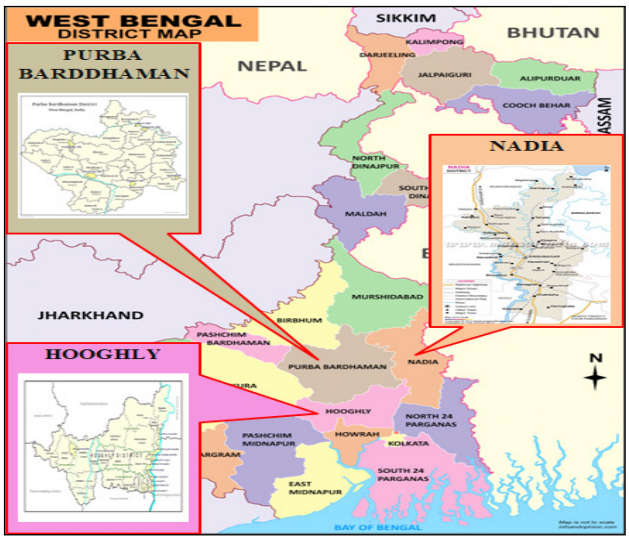

Fig. 1: Map of West Bengal showing the district wise experimental area

RESULTS AND DISCUSSION

Age of Puberty (AP): The result revealed that the overall mean age of first estrus was 209.08±2.06 days (Table 1). Significance difference (P<0.01) of AP was noted among different litter size groups, the highest value was recorded (218.62±4.45 days) for single birth. On the other hand the value was least for triplet birth (Table 1). By comparing the result with Chowdhury *et al.* (2002) who reported that the age at first heat varied considerably between goats with a mean of 216±9.52 days and the range was 131-338 days for Black Bengal goat. Hassan *et al.* (2015) revealed that the age at puberty was found to be 197.82±12.58 days under semi-intensive condition and 208.82±12.60 days under extensive condition. The values are in clear proximity to the present finding. This is an important finding to understand, that less AP has prominent benefit for multiple fetuses and thus achieving economic benefit.

Age at First Conception (AC): In this experiment, the maximum age of first conception was 226.18±5.39 days when the animal gave single birth and the minimum AC was 216.65±4.9 days when it produced triplet (Table 1). The overall AC was 219.96±2.73 days. Similar result was reported by Bhowmik *et al.* (2014) who found that the age at first conception of Black Bengal goats was 217.94±16.87 days. The result showed that AC was not influence by LZ. It appeared that failure of conception at 1st service was more in single giving does compared to twins and triplets.

Number of Service per Conception (NSC) and Service Period (SP): Service per conception and service period of Black Bengal goat under the present study are presented in Table 1. SP values were recorded to vary significantly (P<0.01) among different litter bearing groups, the highest value was observed in triplet producing does (80.88±4.68 days) NSC values, on the other hand, were not influenced (P>0.05) by litter size. Prolific does took longer service period which might be due to their reproductive preparation after gestation. Samanta *et al*. (2009) reviewed that the number of service per conception and service period were 1.15±0.03 and 62.84±1.24 days respectively and Jalil *et al.* (2016) also reported that the number of service per conception was 1.37±0.03 which corroborated the present findings.

Length of Gestation (GL): The average Gestation Length of Black Bengal goat in this experiment was 146.4±1.15 days, the result showed non-significant variation with LZ (Table 1). The result tallied well with previous studies wherein Chowdhury *et al.* (2002) observed that the average gestation length of Black Bengal goat was 146, 147, 142 and 146 days respectively at 1st, 2nd, 3rd and 4th parity. Haque *et al*

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Table 1: Mean and Correlation between LZ & different Reproductive Traits

Mean (Days)	Litter Size							F-Value	Sig. (S_e)	Test of Sig.
	Single	SEM ±	Twin	SEM ±	Triplet	SEM ±	Total±SEM			
AP	218.62[b]	4.45	212.55[b]	3.38	195.97[a]	2.14	209.08±2.06	10.79	0.000	*
AC	226.18	5.39	218.15	4.11	216.65	4.9	219.96±2.73	1.06	0.35	NS
NSC	1.25	0.05	1.31	0.05	1.28	0.06	1.28±0.03	0.30	0.744	NS
SP	33.81[a]	6.11	76.92[b]	5.21	80.88[b]	4.68	65.94±3.35	21.48	0.000	*
GL	145.82	2.31	146.91	1.7	146.25	2.11	146.4±1.15	0.077	0.926	NS
AK	379.18	5.4	371.16	4.11	369.65	4.9	372.96±2.73	1.055	0.3497	NS
DO	69.06	7.1	73.19	5.5	75.85	6.6	73.53±3.72	0.190	0.827	NS
KI	211.06	13.75	215.94	6.64	227.13	4.02	225.97±6.03	62.97	0.000	**

*Where, * denotes that significance at P<0.01 level, ** denotes that significance at P<0.05 level, NS denotes Non-Significant & [abc] Means for different groups with different superscript letters within a row differ (P<0.01)*

(2013) also reported that the overall gestation length of Black Bengal goat was 145.34±0.32 days. The data regarding GL and LZ showed that the highest GL is 146.91±1.7 days followed by 146.25±2.11 days when the animals gave twins and triplet birth respectively. But lowest GL (145.82±2.31 days) was observed when the animals gave single birth. From the short review above, key findings hypothesize that the highest GL rife an impact in prolificacy.

Age at First Kidding (AK): The age of 1st kidding of Black Bengal goat under the present investigation belonging to single, twins, triplet and overall were recorded to be 379.18±5.4, 371.16±4.11, 369.65±4.9 and 372.96±2.73 days respectively (Table 1), litter size did not have any appreciable impact on age of 1st kidding. These findings were comparable with Samanta *et al*. (2009) and Faruque *et al.* (2010) who reported that age at first kidding for BBG was 380.46±0.695 days and 370.26±25.48 days respectively. Minimal AK means high production of animal in total life span and thus achieving more economic benefits.

Days Open (DO): In the present study days open of Black Bengal goat corresponding to single, twins, triplet and overall are 69.06±7.1, 73.19±5.5, 75.85±6.6 and 73.53±3.72 days respectively (Table 1). In line with previous studies, Husain (1993) reported that the post-partum heat period of BBG ranged from 68 to 85 days. Our result is lower than Halder *et al.* (2014 a) who reported that the Days Open of Black Bengal goat was 104.11±41.54 days. Pan *et al.* (2015) who found that the DO of Black Bengal goat belonging to single, twins, triplet and quadruplets were 94.44±2.93, 103.95±.29, 97.89±5.22 and 79.71±13.56 days respectively. Although, DO have non-significant impression with LZ, even so, the least DO point prominent benefit with accelerated kidding for achieving economic benefit.

Kidding Interval (KI): The results of present study revealed that the maximum KI was observed when animal delivered twins (215.94±6.64 days) or triplet (227.13±4.02 days) as compared to animals giving single birth through such variation was noted to be significant (P<0.05).The present experiment showed that the overall KI was 225.97±6.03 days (Table 1). Hussain (1999) observed the kidding interval of Black Bengal goat ranged from 255–300 days reared under village conditions. Choudhury *et al.* (2012) also reported that the range of kidding interval of BBG was 150-365 days. Consequently, the lower KI have non-significant effect for multiple fetuses but it agreed with accelerated kidding for achieving economic benefit.

CONCLUSION

The result revealed that the overall mean age of first estrus was 209.08±2.06 days. Does with single birth were recorded highest value (218.62±4.45 days) compared to others. The overall age of first conception was 219.96±2.73 days. Maximum age of first conception was 226.18±5.39 days when the animal gave single birth and the minimum age of 1st conception (AC) was 216.65±4.9 days when it produced triplet indicating that failure of conception was more in single bearing does. Service period were recorded to vary significantly (P<0.01) among different litter bearing groups, the highest value

was observed in triplet producing does (80.88±4.68 days). Number of service per conception, on the other hand, were not influenced (P>0.05) by litterer size. Maximum, number of service per conception (NSC) value (1.31) was noted in does giving twin birth. Prolific does took longer service period which might be due to their reproductive preparation after gestation.

The average Gestation Length of Black Bengal goat in this experiment was 146.4±1.15 days, the result showed non-significant (P>0.05) variation with litter size (LZ) indicating that gestation period of goat is fairly constant. The age of 1st kidding of goats belonging to single, twins, triplet and overall were recorded to be 379.18±5.4, 371.16±4.11, 369.65±4.9 and 372.96±2.73 days respectively, litter size (LZ) did not have any appreciable impact on age of 1st kidding.

Thus it could be concluded that the selection of suitable does for higher Kidding Size may be done based on their various reproduction parameters like early age of puberty, shorter service period, and higher previous kidding size may be considered as good quality for identification of prolific goats.

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