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Research article

Effects of high energy feeding on estrus synchronization and conception rate of Black Bengal goats under semi-intensive system

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ABSTRACT

The research was conducted to study the estrus synchronization and artificial insemination in Black Bengal goats under two feeding regimes in semi-intensive system. For estrus synchronization, the palpation of udder of does and the buck effect were studied. It was observed that the palpation method showed higher estrus rate than the buck effect. Goats were artificially inseminated by using vaginal speculum and locally developed inseminating device and it was found that about 50% goats conceived. The conception rate of artificial insemination was lower than the natural mating for both groups. It was observed that both, palpation and buck effect methods were lower than the hormonal method for estrus behaviour. However, palpation and buck effect methods are mainly managemental and are less costly than the hormonal method.

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1. INTRODUCTION

Black Bengal goat is a potential goat breed of Bangladesh and due to unsystematic use of buck, disease outbreaks and improper management its population and productivity is decreasing. To increase the number and productivity of goats it is essential to use the modern techniques for reproductive manipulation (Vivanco 1988), and set up a structured genetic improvement programme. The estrus synchronization and artificial insemination is very important to manipulate the female reproduction and enhance the genetic gains of traits. Estrus synchronization and artificial insemination has been accomplished by using several methods with varying degrees of success (Faruk et al. 2004). However, so far these techniques have not been well adapted for Black Bengal goat. Therefore, the study was undertaken with the objectives (i) to study the effect of feeding on the estrus synchronization in Black Bengal goat; and (ii) to practice artificial insemination and detection of pregnancy rate under two feeding regime.

2. MATERIALS AND METHODS

The study was conducted at the research farm of Chittagong Veterinary and Animal Sciences University from July 2010 to June 2011. The methodology is described under the following sub-heading.

2.1. Study of estrus synchronization

Goats were reared under semi-intensive conditions. They were divided into two groups (group A and B), each group having 12 goats of first parity and their age between 1 to 1.5 years. All the goats were allowed free grazing for 5 to 6 hours and they were fed with neem tree (Azadirachta indica) leaves, jack fruit tree (Artocarpus heterophyllus) leaves and common concentrate mix (wheat bran, maize crush, mustard oil cake and vitamin mineral premix). The goats of group-A; were fed with high energy feed, i.e. 10.5 Mega Joule (MJ) metabolisable energy (ME) per kg dry matter (DM) and Group-B (Non treated group) were fed a normal feeding regime (Table 1). The detailed feeding and management procedure was followed as Khan and Khatun (2013).

Table 1. Composition and calculated nutrient content of ration of goats

Feed ingredients	Nutrient composition (%) for Group A	Nutrient composition (%) for Group B
Broken corn	56.00	50.00
White bran	26.50	32.00
Til oil cake	16.00	16.50
Vitamin/Mineral mix	1.00	1.00
Salt	0.50	0.50
Total	100.00	100.00
Chemical Composition for ration		
ME (MJ)	10.50	10.00
CP (%)	15.00	15.00

From September 2010 to December 2010, the goats of two groups (A and B) were palpated every alternative day and the palpitation was given gently on their udder and observed regularly. When the goats showed heat then it was examined by looking the behavior of goat that is the goat become restless, bowls frequently, and excrete frequent urination etc. and recorded and after 24 to 36 hour onset of estrus the goats were artificially inseminated or allowed for natural service. After 3 months of this trail with the remaining goats the buck effects were studied.

For buck effect, the bucks were kept separately from the goats firstly for 14 days and then 2 bucks were mixed with the goats for each group (group A and B) for 2-3 hours on 15th day. However they were restricted from mating by tightening a cloth surrounding belly and prepuce though buck cannot penetrate the penis in to vagina of goat just allowed for teasing only. Then the goats were observed closely for their sign and symptoms of estrus. If the goats showed estrus, then they were allowed for natural mating. After 3 trails, the buck separation time was increased for 21 days from 14 days and similar procedure was followed. These two trails (palpation and buck effect) required about 9 months.

2.2. Study the conception rate/pregnancy rate

The goats were bred artificially irrespective of above mentioned estrus synchronization method due to small population size, only the feeding regime group A and B was considered. Artificial insemination was done by using a locally made device (the catheter was made by syringe with a tube) for depositing the semen into the female reproductive tract. When the goats showed heat then they were inseminated with the fresh semen and recorded for detection of pregnancy and the conception rate was estimated. Pregnancy was diagnosed by observing the goats regularly and from the non-return rate. Furthermore, ultrasonography (SSD 500 with 3.5 MHz probe, Aloka, Japan) was done after 45 days of insemination. For comparing the result of artificial insemination the natural mating was also practiced in both group (A and B).

2.3. Statistical Analysis

The collected data was edited and the percentages were calculated by using Microsoft EXCEL. Data was analyzed by using the statistical analytical software (SAS 2000). The following statistical model was used to estimate the mean with standard error of all the parameters. The model is given as:

$$Y_{ij} = \mu + F_i + e_{ij}$$

Where, Y_{ij} is the parameters value, F_i is the effect of feeding regimes and e_{ij} is the random error distributed as $N(0, \sigma^2)$.

The mean differences were compared using least significant difference (LSD) (Steel et al. 1997) at 5% level of significance.

3. RESULTS AND DISCUSSION

3.1. Estrus synchronization of Black Bengal goats under semi-intensive system

Out of 12 does per group, eight (66.67%) from the group A and five (41.67%) from group B exhibited heat after 30 days of regular palpation. The buck effects showed 50% does from both groups come in heat using 14 days and 21 days, buck separation interval from the goats. The differences of estrus between group A and B of palpation methods might be attributed due to the effects of nutrition. A similar result was obtained by Zarazaga et al. (2005) on Spanish Payoya goats for nutritional study. On the other hand, the lower percentage of estrus of buck effects was obtained for the effects of completeness of isolation and nutrition. The buck stimulation can be varied by factors breed, season of the year, completeness of prior isolation, nutrition and stage of postpartum (Islam et al. 2012).

Khandokar et al. (2009) reported that out of 20 Bangladeshi does, 19 does (95%) have shown behavioral

signs of heat and expressed estrus behavior after synchronizing with synthetic $PGF_{2\alpha}$ as dinoprost® injection. Ishwar and Pandey (1990) reported that 90% goats showed heat after progesterone administration.

In comparison of current study with hormonal study, it can be seen that both the palpation and buck effect showed lower estrus were than the hormonal method for estrus behaviour. However, both the palpation and buck effect methods are managemental and less costly than the hormonal method.

3.1. Conception rate/pregnancy rate of Black Bengal goats under semi-intensive system

The conception rate/pregnancy rate for artificial insemination and natural mating are shown in Table 2. Table 2, shows the conception rate/pregnancy rate of artificial insemination was lower (45-50%) than the natural mating (60-70%). The conception rate / pregnancy rate of goats in group A was higher in artificial insemination than group B, but reverse results was obtained for natural service (Table 2). This might be due to the fact of semen deposition in inappropriate place (vagina) and also the time of insemination at the end of estrus that is after 24 to 36 hour onset of estrus. Hasan et al. (2010) reported that pregnancy rate for Black Bengal goats were 52.4% after artificial insemination, which was slightly higher than in the current study.

Table 2. Conception/Pregnancy rate of Black Bengal goats under natural and artificial insemination

Parameters	Group A (High energy feeding group)		Group B (Normal feeding group)	
	Natural service (NS)	Artificial insemination (AI)	Natural service (NS)	Artificial insemination (AI)
Conception rate / Pregnancy rate	0.60^{a}± 0.06	0.50±0.03	0.75^{b} ±0.04	0.45±0.04

Superscript a and b differs significantly at 5% level of significance.

4. CONCLUSION

The study was conducted to know the estrus synchronization and artificial insemination of the black Bengal goat under two feeding regime in semi-intensive system to manipulate the reproductive cycle and increase productivity. It was observed that the palpation method showed higher estrus than the buck effect. But both, palpation and buck effect methods estrus percent were lowered than the hormonal method. These methods are managemental and less costly than the hormonal method and it will be easy for the farmers to use in their goat flock. Goats were artificially inseminated by locally developed inseminating device and it was found that about 50% goats conceived and the rate was lowered than the natural mating. There were some limitations in the study, such as the small population size and PPR disease infestation in the base population. Therefore, for making confirmation of results further study with more goats are recommended.

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