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Augmentation of Reproductive Performance through Controlled Breeding in Goats

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ABSTRACT

The present experiment was conducted in goats to determine the efficiency of three different estrous synchronization protocols viz double $PGF_{2\alpha,}$ CIDR protocol and natural methods i.e. exposing sexually active adult buck to the female goats. A total of 30 healthy nonpregnant Osmanabadi goats were identified using trans-rectal ultrasonography and divided equally into ~~the~~ three groups. The goats of Group-I (n=10) were synchronized by using double prostaglandin protocol (D-Cloprostenol 75µg) administered by intramuscular route 10 days apart, whereas, goats of Group-II (n=10) were synchronized by adopting a short progestogen treatment (0.3g progesterone) with the intravaginal insertion of CIDR kept in-situ for a duration of 9 days. Group-III experimental goats (n=10) were exposed with sexually active adult buck and observed for natural estrus. The estrous synchronization response in Group I, II and III was observed as 80 %, 70 % & 100 %, respectively with non-significant ($p>0.05$) difference in the mean estrus onset interval and mean duration of estrus between all the groups. Exposing matured buck to the female goats was effective to induce estrus in a synchronized manner. Conception rates of goats belonging to Group I, Group II and Group III were found to be 87.5 %, 57.14% and 70 %,

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INTRODUCTION

Goats, often referred to as the "poor man's cow," are the most prolific domesticated ruminants in tropical and subtropical regions, capable of breeding year-round. In tropical regions like India, goats experience estrus continuously throughout the year (Mazumdar and Mazumdar, 1983). Profitability of goat rearing depends on maximizing fer-

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tility potential through assisted reproductive technology. Estrous synchronization is a key element of all the assisted reproductive technologies (ARTs) protocols in livestock animals and has a major influence to increase the overall efficiency of reproduction. In goats hormonal estrus synchronization is achieved either by reducing the length of the luteal phase of the estrous cycle with prostaglandin $F_{2\alpha}$ or by extending the cycle artificially with exogenous progesterone or more potent progestogens (Abecia *et al.,* 2012). Administration of hormones, such as progesterone or its analogues (progestogens) and prostaglandins, will modify the luteal phase of the cycle (Abecia *et al.,* 2012). Sexually active bucks are also able to stimulate the sexual activity of anestrous female goats when kept in contact in a flock. A simple, practical, and reliable method of estrous synchronization, using optimal doses and agents to achieve favorable synchrony and fertility, is essential for farmers. In view of aforementioned need, a current study was carried out to compare the efficacy of hormonal methods and natural methods for inducing synchronized estrus in goats and to assess conception rate with the aid of ultrasonography.

MATERIALS AND METHODS

The experiment was conducted at Punyashlok Ahilyadevi Sheep and Goat Development Corporation, Dahiwadi Farm Dist Satara, Maharashtra. The apparently healthy, non-pregnant Osmanabadi does that had kidded at least once, ranging in age from 3 to 5 years and body weight between 30 and 40 kg were screened by ultrasonography for the non-pregnant status and included in this study. A total of 30 goats were randomly allotted to three groups. The goats in group I (n=10) were synchronized with two intramuscular injections of 1.0 ml Aldstenol (each containing 75 µg d-cloprostenol) administered 10 days apart. Group II (n=10) goats were synchronized using an intra-vaginal CIDR device inserted on Day 0 and removed on Day 9. Group III (n=10) goats were kept with sexually active adult intact male to observe natural estrus.

All the goats were monitored twice/day for behavioral estrus signs (onset of estrus) starting from the day of treatment. The goats were considered and recorded as being in estrus only if they stood still while being mounted by the bucks along with other behavioral estrus symptoms such as keeping alliance with males, wagging of tail, restlessness, estrus discharge and frequent urination. Overall estrus response, time of the onset of estrus and duration of estrus were recorded for all the goats for the treatment groups. The goats exhibiting estrus were mated at least twice with the buck.

All the experimental goats were scanned for pregnancy using real-time B-mode ultrasound scanner with multi-frequency trans-rectal linear array transducer. During this examination, a hypoechogenic embryo inside a non-echogenic area of the uterus was recorded as positive for pregnancy. Conception rate was calculated as the percentage of the number of pregnant goats divided by the number of mated goats in each group. The responses of treatment and conception rates were assessed based on pregnancy diagnosis results in goats of all the groups. The statistical methods used for obtaining results were ANOVA and Student T test to estimate significance levels of the data.

RESULTS AND DISCUSSION

In the present study notable symptoms of displaying estrus in goats under natural and synchronized estrus were the tendency to group around the buck, attracted towards male and keeping alliance with males, wagging of tail, restlessness, estrus discharge and frequent urination. However, intermittent bleating was observed in a few goats during estrus. The intensity of swelling of vulva in goats was found to be less prominent. The bucks when confronted with synchronized goats, presented sexual arousal, exhibited Flehmen reaction and then erection of the penis and goats during estrus were receptive to mounting, and stood still to be mounted. The higher percentage of estrous synchronization response was observed in goats of Group III exposed to buck followed by goats of Group I receiving double $PGF_{2\alpha}$ treatment and Group II goats exposed to short progestogen treatment with CIDR. Present findings regarding the estrous synchronization response of group I were similar with the study of Gidena (2017) when goats were synchronized by adopting double $PGF_{2\alpha}$ regimen, whereas several reports concerned with group II recorded lower percentage of estrus response than the observations reported by Oliveira et al (2001), Motlomelo et al (2002) in goats synchronized with intravaginal CIDR. All the goats of Group III exhibited estrus symptoms on account of buck exposure. Lower estrus response in presence of buck than the observations in the present study were reported by Gonzalez- Bulnes et al (2006) and Singh et al (2018) in goats. Variation in the estrus responses in goats reported in the present study and those reported by different authors may be due to seasonality, breed, location, climate, and managemental differences.

Mean time of estrus onset was shorter in goats of group II receiving progestogen treatment with intravaginal insertion of CIDR in situ for a duration of 9 days as compared to group I synchronized by adopting double $PGF_{2\alpha}$ regimen

Table 1: Effect of different treatment on estrous synchronization and conception rates in does (Mean ± SEM)

Group	Estrus response (%)	Onset of Estrus (h)	Duration of Estrus (h)	Conception rate (%)
Group I (n=10)	8 (80 %)	63.63±9.93	39.56 ±2.40	87.5 % (7/8)
Group II (n=10)	7 (70 %)	45.86±1.64	45.14±3.27	57.14 % (4/7)
Group III (n=10)	10 (100 %)	0.00±0.00	37.50±1.77	70 % (7/10)
		't' value: 1.642^{NS}	'F' value:2.579^{NS}	

Values with p>0.05- Non Significant

and results showed non-significant difference among the groups of does. Similar observations regarding mean time estrus onset has been reported by Amarantidis et al (2004) and Whitley and Jackson (2011) in goats. Lower Mean time estrus onset than in goats of group I of the present study were expressed by Patil et al (2004) and Bitaraf et al (2008). The mean interval of duration of estrus were longer in group II goats synchronized using intravaginal CIDR than other two groups with non-significant difference (p>0.05) among these three groups of goats expressing estrus.

The conception rate in group I goats adopting estrous synchronization protocol of double $PGF_{2\alpha}$ regimen was found to be 87.5 %. The current findings on the conception rate closely align with those of Bonato et al (2019), who reported a conception rate of 88.9 % in goats treated with double $PGF_{2\alpha}$ administration. Conception rate was observed 57.14 % percent in group II goats synchronized using Intravaginal CIDR device which was lower than Muayad et al (2019) and Amiirah et al (2020) who reported as 70-100 percent conception rate with similar synchronization protocol in goats. The conception rate in group III goats exposed with buck was lower than the conception rate reported by Sharma et al (2022) and Choudhary et al (2018).

In comparison with the present study, differences in observations of various research workers might be attributed to different drugs; dose and regimen apart from different breeds of goats, parity, seasons of the year, local feeding and managemental practices and location of study.

CONCLUSIONS

The goats subjected to the double injection regimen of $PGF_{2\alpha}$ for estrous synchronization showed higher percentage of estrus response and conception rate as compared to goat synchronized using intravaginal progesterone (CIDR) insert and naturally induced estrus using buck.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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