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PATTERN OF OESTRUS AND FERTILITY RATE FOLLOWING SYNCHRONIZATION OF OVULATION IN TELLICHERRY GOATS

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Abstract: The efficacy of intravaginal sponge (group I), Ovsynch (group II)and Ovsynch with sponge(group III) protocols on oestrus response, pattern of oestrus and fertility rate after fixed time breeding (NS/AI) was investigated in Tellicherry goats during winter and summer seasons. A total 120 does after first kidding were utilized. Out of 120 does, 60 does in winter and remaining 60 does in summer season were selected. The onset and duration of observed oestrus following treatment were recorded. All the does in group II and III were bred by natural service or artificial insemination using100 $x10^6$ spermatozoa 16-18 hrs after second GnRH injection. In group I breeding was done 60 hrs after sponge removal. The rates of oestrus exhibited in the does were 95, 100 and 100 per cent in group I, II and III during winter and 90, 95 and 95 percent in summer season and the time from sponge removal to the observation of oestrus during both seasons were 30.79 ± 0.42,34.55 ± 0.45 hrs in group I, 36.55 ± 0.60, 38.42 ± 0.31 hrs in group II and 31.60 ± 0.32 and 35.63 ± 0.26hrs in group III, respectively. The duration of oestrus was higher in group I than other groups (II and III) in both the seasons and in winter the duration of oestrus was longer (33.75± 0.65hrs) than in summer (30.52 ± 0.74 hrs). The intensity of oestrus was high in group I and III and it was higher in winter (51.66 per cent) than summer season (31.66 per cent). The fertility rate was higher in group III (Ovsynch plus sponge) during winter (80 per cent)than summer (70 per cent). It is concluded that the Ovsynch plus sponge protocol found to be the best protocol for synchronization of ovulation in Tellicherry goats.

Keywords: Intravaginal sponge, Ovsynch, Fixed Time Breeding.

Introduction

Synchronization of oestrus and ovulation ina group of females allows one to predict the time of oestrus with reasonable accuracy and minimizes the time and difficulty involved in detecting oestrus [1]. Oestrus synchronization and ovulation requires the manipulation of luteal and follicular phases of the oestrus cycle. Even though, the goats are polyoestrus, they do not express clear-cut signs of oestrus, as seen in cows and are mated arbitrarily. Further, it is not possible to obtain uniform kidding distribution throughout the year using natural oestrus as the oestrus behaviour is not expressed properly during hot summer [2]. Synchronization of ovulation is the process by which the reproductive cycle of an animal manipulated by the use of hormones or their analogues to induce ovulation at a precise point in time. The Ovsynch protocol has also been adopted for use in the goat after the success that

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was reported in sheep [3]. The synchronization of ovulation protocol offers an alternative to the traditional sponge and eCG treatment to synchronize does [3]. Multiplication of indigenous breed like Tellicherry breeds using synchronization of ovulation in conjunction with artificial insemination is necessary for sustainable goat production [4]. Numerous studies in bovines indicated that the pregnancy rates to the Ovsynch program were comparable and in some studies greater than the appropriate control group. But such studies are lacking in goats especially in Tellicherry breed. Hence, with the above points in view, the present research was conducted in Tellicherry goats.

MATERIALS AND METHOD

An experiment was conducted in Tellicherry goats with 120 healthy, parous which had completed 60 days post-partum were subjected to thorough gynaeco-clinical examination and were included in this study. Out of 120 does, 60 were selected during winter season and the remaining does were treated during summer season. The selected does of each season were randomly and equally divided into three experimental groups viz., Groups I (Control group), II and III. In Group I, the selected does were inserted with intravaginal sponges containing 0.35 mg of synthetic progesterone on day 0 and kept *insitu* for 9 days. One day before sponge withdrawal (day 8) 250 µg of $PGF_2\alpha$ and on the day of sponge removal (day 9) 300 IU of equine chorionic gonodotrophin were given intramuscularly. Breeding by NS or AI was done at 60 hours after sponge removal. In group II, an intramuscular injections of 10 µg of GnRH on the day of start of synchronization of ovulation (day 0), 250 µg of $PGF_2\alpha$ seven days later (day 7) at the time of sponge removal and another 10 µg of GnRH (2^{nd} GnRH) at 48 hours after the $PGF_2\alpha$ injection (day 9). Timed breeding by NS or AI was done at 16-18 hours after the second GnRH injection (day10). In group III, along with ovsynch the progesterone intravaginal sponge between day 0 and 7. Timed breeding by NS or AI was done at 16-18 hours after the second GnRH injection (day10). All the collected data were analysed statistically [5].

RESULTS

The oestrus response in the experimental does during winter and summer season are presented in Table 1. In group II and III, during winter season does exhibited 100 per cent oestrus response. This result clearly indicated that the synchronization of ovulation protocol were highly effective to induce 100 per cent oestrus response in does. However, oestrus responses of 95 per cent in group I (winter) and 90 (group I) and 95 per cent (group II and III) in summer were observed.

The mean (±SE) interval for time taken to observation of oestrus in does during winter and summer seasons are presented in Table 1. During winter season, all the vaginal sponge treated groups (groups I and III) on both the season the onset of observed oestrus was shorter and showed significant difference (P≤0.05) from group II (winter). In group II, the time taken for observed oestrus was longer than group I and III during winter and summer seasons. However, these groups (I and III) had no significant difference in mean onset of observed oestrus between them. The mean (±SE) interval to observed oestrus in winter season was significantly different (P≤0.05) from the corresponding groups of summer season. The result indicated that the season had influence on the onset of oestrus following synchronization of ovulation in does.

The mean (±SE) duration of induced oestrus in does during winter and summer is depicted in Table 1. During winter season the mean (±SE) duration of induced oestrus in group I on both seasons had longer duration of oestrus and significantly differed with groups (groups II and III).In group II during winter and summer seasons duration of oestrus was shorter. The overall mean (±SE) duration of oestrus during winter season was significantly differed (P≤0.05) from summer season.

The oestrus behaviour pattern, oestrus intensity was higher in group I and III than group II in both the seasons. During winter season the intense oestrus was (51.66 per cent) was higher in winter season than summer season (31.66 per cent). The overall percentage of intermediate oestrus in does during winter season was higher (36.66) than the summer season (31.66 per cent). The intermediate oestrus was higher in groups II during winter and summer season. The overall percentage of weak oestrus was higher in summer than winter season.

The conception rates obtained following synchronization of ovulation protocols are documented in Table 2. During winter and summer seasons, the percentage of first service conception rates were higher in ovsynch with sponge group than all other treatment groups. Further Natural service (NS) resulted in higher conception than artificial insemination (AI). In this study, the winter season had higher conception rate than summer season

DISCUSSION

The percentage of synchronized oestrus response in both winter and summer seasons (Table 1) in the present study was 90 -100 per cent in does treated with vaginal sponge alone, Ovsynch and Ovsynch with sponge protocols. The result obtained in the present study concured with the observations in goats following Ovsynch treatment, [3,4,6,7,] treated with FGA and MAP sponges with 500 IU of PMSG at sponge removal. However, reduced oestrus

response of 94-97 per cent was recorded during the breeding season[9,10,11] in goats. The 100 per cent oestrus response in groups II and III during winter might be due to all the selected does were in mid luteal phase at the time of selection as evinced by the levels of serum progesterone in this study (2.53 to 3.15 ng/ml). The does treated with exogenous progesterone involves suppression of ovarian follicular development during the artificially extending the luteal phase and removing the hormonal blockade in goats rebound into a compact follicular phase followed by synchronized oestrus [12].

In the present study, 4 out of 120 does did not express oestrus in this study. These goats had less than 1.25 ng/ml of serum progesterone at the time of selection, and hence these goats might had been in anoestrus or in proestrus or early oestrus. If exogenous progesterone or progestagen treatment is applied at the beginning of luteal phase, it did not seem to prevent ovulation and leads to failure of oestrus response [13].

In the present study the overall mean time taken for the observation of oestrus (Table 1) in group I and III was 30.79 ± 0.42 and 31.60 ± 0.32 hours, respectively. This was shorter than group II (36.55± 0.32 hours) in winter season and similar trend was noticed in summer season. The quicker oestrus in group I and III during winter and summer might be due to the action of $PGF_2\alpha$ as a luteolytic agent for the elimination of remnant corpora lutea, since exogenous progesterone does not affect the production of progesterone by the corpora lutea, Further administration of eCG at the time of sponge removal (group I) might have stimulated the growth of ovarian follicle and increase estrogen secretion [13,16] which might be the reason for the early onset of oestrus in group I and III.

In the present study, the mean duration of oestrus was significantly ($p \leq 0.05$) longer in group I during winter and summer seasons. The extended duration of oestrus in the present study might be due to presence of large unruptured follicles which was stimulated by eCG [15]. The mean duration of induced oestrus was shorter in group II and III during winter and summer. It might be due to administration second GnRH injection which would have stimulated LH surge and ovulation lead to shorter duration of oestrus [3].

In the current investigation, the intensity of oestrus was higher in group I and III during winter and summer. It might be due to the inclusion of sponge between GnRH and $PGF_2\alpha$ injection. It might have prevented premature oestrus behaviour, LH surge and a highly synchronous time to oestrus, pronounce estrogen secretion [3,17].In this experiment, the intense and intermediate oestrus were higher during winter than summer. Weak oestrus was higher in summer than winter. It might be due to the stress which would have reduced the

intensity of oestrus. Further, reduced concentration of serum estradiol-17β during summer might be the reason for high rate of weak oestrus in summer [18] in this study.

In the present study, the first service conception rate of 65.00, 75.00 and 80.00 per cent was found in group I, II and III during winter and 60.00, 65.00 and 70.00 per cent in summer, respectively. The pregnancy rates after insemination varied from 33 to 52 per cent after different synchronization programmes [19]. The fertility rate was higher in group II than group I during winter and summer seasons. Our results are in agreement with the findings of [3]. In the present study, group III (Ovsynch with sponge) had higher fertility rate than group I and II in both the seasons. The reason could be due to progesterone supplemented Ovsynch group would have prevented the premature oestrus expression, further administration of second GnRH induced the LH surge and ovulation leads to higher fertility [3]. From this investigation it is concluded that an Ovsynch with sponge treatment may be useful alternative to the traditional vaginal sponge treatment and ovsynch treatment to augment fertility in Tellicherry goats.

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TABLE 1: OESTRUS RESPONSE, OBSERVED OESTRUS, DURATION AND INTENSITY OF OESTRUS FOLLOWING SYNCHRONIZATION OF OVULATION

S. No.	Treatment groups		No of does treated	Oestrus response (per cent)	observed oestrus (Mean ±SE) (hours)	Duration of oestrus (Mean ±SE) (hours)	Intensity of oestrus		
							Intense	Intermediate	Weak
1.	Winter season (October to January)	Group I	20	95	30.79 ± 0.42 [a]	36.63 ± 0.53 [a]	13 (65.00)	6 (30.00)	0.00
2.		Group II	20	100	36.55 ± 0.60 [b]	32.60 ± 0.73 [b]	6 (30.00)	10 (50.00)	4 (20.00)
3.		Group III	20	100	31.60 ± 0.32 [a]	33.89 ± 0.37 [b]	12(60.00)	6 (30.00)	2 (10.00)
		Overall	**60**	**98.33**	**33.83± 0.42[a]**	**33.75± 0.65[b]**	**31 (51.66)**	**22 (36.66)**	**6 (15.00)**
1.	Summer season (April to July)	Group I	20	90	34.55 ± 0.45 [a]	33.15 ± 0.33 [a]	6 (30.00)	7 (35.00)	5 (25.00)
2.		Group II	20	95	38.42 ± 0.31 [b]	29.84 ± 0.27 [b]	5 (25.00)	6 (30.00)	8 (40.00)
3.		Group III	20	95	35.63 ± 0.26 [a]	30.00 ± 0.13[b]	8 (40.00)	6 (30.00)	5 (25.00)
		Overall	**60**	**93.33**	**36.49± 0.32[b]**	**30.52 ± 0.74[a]**	**19 (31.66)**	**19(31.66)**	**18 (30.00)**

TABLE 2: CONCEPTION RATE FOLLOWING SYNCHRONIZATION OF OVULATION IN WINTER AND SUMMER SEASONS

S.No	Treatment groups		No of does treated	First service conception rate		
				NS	AI	Overall
1	Winter season (October -January)	Group-I	20	(8/10) 80.00	(5/10) 50.00	(13/20) 65.00
2		Group-II	20	(8/10)80.00	(7/10) 70.00	(15/20) 75.00
3		Group-III	20	(9/10) 90.00	(7/10) 70.00	(16/20) 80.00
		Over all	**60**	**25/30)83.33**	**19/30)63.33**	**(44/60)73.33**
1	Summer season (April to July)	Group-I	20	(7/10) 70.00	(5/10) 50.00	(12/20) 60.00
2		Group-II	20	(7/10) 70.00	(6/10) 60.00	(13/20) 65.00
3		Group-III	20	(8/10)80.00	(6/10) 60.00	(14/20) 70.00
		Over all	**60**	**22/30)73.33**	**17/30)56.66**	**(39/60) 65.00**

Group I - Vaginal sponge , **Group II** - Ovsynch , **Group III** - Ovsynch + sponge

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