

Original Research Article

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Effect of Different Doses of PMSG for Synchronisation of Estrus in Progesterone Primed Goats

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ABSTRACT

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The present study was aimed to evaluate the efficacy of estrus response in synchronized does using intravaginal sponges containing 350 mg progesterone (AVIKESIL-S) *in situ* for 11 days, 125 µg Cloprostenol, on day 10 and PMSG at two doses of 200 IU (Group I) or 400 IU (Group II) on day 11 at the time of sponge removal, in non-descript does under field conditions. The percentage of estrous response and duration of estrus were observed to be 70, 100 and 100; 40.93 ± 1.49 , 42.20 ± 1.32 and 49.50 ± 0.94 in control, Group I and Group II respectively. Pregnancy verification was done 40 to 45 days post mating by ultrasound examination and the conception rate in control, Group I and Group II was 52.40, 63.33 and 66.67 respectively. Follicular study, pre and post treatment of PMSG in the treatment groups indicated an increase in daily growth rate of follicles from 0.05 to 0.09 mm with the increase in dose of PMSG from 100 IU to 400 IU.

Introduction

Reproductive performance is one of the important economic traits in goats.

Higher pregnancy rates, birth weight and rapid recovery of doe's weight after parturition are important reproductive characteristics deciding the benefits of goat rearing (Gangyi *et al.*, 1992).

Estrus synchronization enables large number of females to be presented for breeding within a short chosen period of time so as to assure kidding during optimum time of the year with

minimum husbandry management and expenses.

Estrus is normally induced by progesterone or progestagens, combined with gonadotropins and prostaglandins. Progestagens are administered by vaginal devices for short or long duration, with better fertility (Gordon, 1997).

The present work was conducted to evaluate the dose of PMSG used in combination with progesterone and prostaglandin for control of reproductive cycles in non-descript does under field conditions.

Materials and Methods

Location of study

The present study was carried out at farmers' flocks in Kanchipuram district of the Tamil Nadu State of India. These villages are located in the semi-arid region of the country situated at 12° 50' North Latitude and 79° – 42' east longitude with an average elevation of 275' (83-82m) M.S.L. The temperature throughout the year is high; reaching a maximum average of 37.50°C in the month of April to July and recording of minimum average of 20.50°C temperatures during the months of December to February. Average annual rainfall of the Local Planning Area is 40" or 1125 m.m.

Selection of animals

Non-descript does were screened for reproductive tract abnormalities and pregnancy by using Ultrasound (Sonoscape S2 V) with 7.5 MHz transrectal probe and ninety does in their first to fourth parity were selected for this study. The selected does were dewormed with fenbendazole at the dose rate of 10 mg/kg body weight and supplemented with mineral mixture 10 g/day/animal. The selected does were assigned to control and treatment group irrespective of the stage of the cycle.

Experimental design

Thirty selected does kept as control, were observed for the onset of natural estrus signs. In group I, the selected does (n=30) were treated with progesterone impregnated synthetic vaginal sponges (AVIKESIL-S), placed in the vagina for 11 days with an intramuscular injection of Cloprostenol sodium (Inj. Pragma, Intas pharmaceuticals) at 125 µg/doe on day 10 and 100 I.U. of PMSG (Inj.Folligon, Intervet) intramuscularly on day 11, at the time of sponge removal. In group II,

the does (n=30) were treated with progesterone sponges for 11 days with an intramuscular injection of Cloprostenol sodium at 125 µg/doe on day 10 and 400 I.U. of PMSG intramuscularly on day 11, at the time of sponge removal.

All the treated does were observed for the onset of estrus signs. All the treated does were examined for ovarian status using B-mode ultrasound equipment using a 7.5MHz linear probe (Sonoscape S2 V) transrectally and follicular diameters were measured from day 10 to day 13.

Statistical analysis

All the collected data were analyzed statistically by the method described by Snedecor and Cochran (1989). Data pertaining to estrus response was calculated by using one-way analysis of variance and conception rate was evaluated by Chi-square test.

Results and Discussion

Estrus responses obtained after different treatments are given in Table 1. Estrus response was observed in 60% in the control group whereas 100% response was obtained in group II and group III. The estrus response was significantly ($P<0.01$) higher in groups treated with PMSG (groups I and II) when compared to control.

The mean (\pm SE) follicular diameter on day 10 was found to be $0.28^{ab} \pm 0.06$ and $0.22^a \pm 0.07$ mm in group I and II respectively and the corresponding values on day 13 was $0.41^{bc} \pm 0.03$ and $0.50^c \pm 0.03$ mm. The growth rate of follicle per day was 0.50 mm in group I and 0.90 mm in group II (Table 2).

Duration of estrus was significantly ($P<0.01$) higher in group I and group when compared to control group (Table 1). However there was

no significant difference between control and does in group I. Conception rate in control, group I and group II was 52.40, 63.33 and 66.67 per cent respectively.

Estrus response was observed to be 100 per cent in group II and group III. This finding is in line with the reports of Das *et al.*, (1997), Shawki *et al.*, (2000), Hashemi *et al.*, (2006), Luther *et al.*, (2007) and Ustuner *et al.*, (2007) who also reported estrus response of 100 per cent, using progesterone intravaginal sponges and PMSG treatment. Thus the addition of PMSG induced estrum in all the does in group II and group III, irrespective of the dose levels used. However it was higher than 96.7% (400 IU PMSG) and 76.7% (200 IU PMSG) obtained by Dias *et al.*, (2001) and 88.9% obtained by Dogan and Nur (2006).

In all the treated does, the interval from withdrawal of vaginal sponges to onset of estrus was recorded in the range of 36 to 42 hours. No variation in onset of estrum was

observed between group I and group II in the present study. The results concurred with the findings of Selvaraju (1994) and Senthilkumar *et al.*, (2016) using progesterone and PMSG combination however longer estrus onset (65.4 ± 24.0 h) was observed by Kausar *et al.*, (2009) using MAP sponges alone for a period of 17 days.

The diameter of the ovulatory follicle at the time of device withdrawal was similar among groups (≥ 3 mm), but its development was influenced by the administration of PMSG in comparison with the control goats. More number of follicles of diameter >4 mm were recruited (Figure 1 and 2) with the high dose of PMSG (Figure 3) and the average growth rate of follicles were found to be increased from 0.5 to 0.9 mm per day (Table 2) when the dose of PMSG was increased from 100 IU to 400 IU. This could be due to the long biological half-life of PMSG leads to a continuous recruitment and development of follicles (Armstrong *et al.*, 1983).

Table.1 Estrus responses in the treated and control groups

Parameters	Treatment Groups		
	Control	Group I (P4+ PG + 100 IU PMSG)	Group II (P4+ PG + 400 IU PMSG)
No. of does treated	30	30	30
Estrus response (%)	70.0 ^a (21)	100 ^b (30)	100 ^b (30)
Mean \pm SE duration of estrus (h)	40.93 ^a \pm 1.49	42.20 ^a \pm 1.32	49.50 ^b \pm 0.94
Conception rate (%)	52.40 (11)	63.33 (19)	66.67 (20)

Figures in parenthesis indicate number of animals
Means with different superscripts are significantly ($P < 0.01$) different from each other within row

Table.2 Assessment of follicular population in the treatment groups

	Group I	Group II
Mean(\pm SE) follicular diameter on Day 10 (mm)	0.28 ^{ab} \pm 0.06	0.22 ^a \pm 0.07
Mean(\pm SE) follicular diameter on Day 13 (mm)	0.41 ^{bc} \pm 0.03	0.50 ^c \pm 0.03
Growth rate of follicle per day (mm)	0.50	0.90



Fig.1 Ultrasound image of ovary (day13) in Group I



Fig.2 Ultrasound image of ovary (day 13) in Group II



Fig.3 Measurement of follicular diameter

In the present study the duration of estrus was significantly ($P < 0.05$) higher in the does treated with 400 IU (group II). The addition of PMSG of either dose levels prolonged the estrus duration in group I and group II when compared to control does (Table 1). The duration of estrus was also prolonged with the increased dosage of PMSG (400 IU) in the progesterone primed does. The mean estrus duration of treated does in the present study

are higher the range of 6 to 42 hours reported by Das *et al.*, (2000), in Bharat Merino ewes synchronized with intravaginal (350 mg) progesterone sponges; 52 ± 7.8 h in Nubian goats reported by Ahmed *et al.*, (1998) in does synchronised with intravaginal sponges impregnated with progesterone (40 mg) inserted for a 16-day period plus an intramuscular injection of 300 IU PMSG two days before sponge removal. The longer

duration of estrus observed in group II compared to Group I and control are attributed due the higher dose of PMSG treatment which results in maximal circulating oestradiol values (Rensis and López-Gatius, 2014).

Among the does bred 11(52.40%), 19 (63.33%) and 20 (66.67%) does conceived in control, group I and group II respectively. Though there was an increase in the conception rate in the treatment groups compared to the control, it was not statistically significant. The percentage conception rate was similar to that of Vinales *et al.*, (2001) who recorded 67.0%, in ewes synchronized with MAP intravaginal sponge *in situ* for 12 days followed by eCG injection and also similar to the 60.0% conception rate reported by Martemucci and Alessandro (2010) in ewes synchronized with 40 mg of FGA intravaginal sponges *in situ* for 14 days followed by 400 IU of eCG at the time of sponge withdrawal. However Dogan *et al.*, (2018) reported a lower conception rate (27.8%) using norgestomet ear implants plus an intramuscular injection of 500 IU of equine chorionic gonadotropin (eCG) and 125 µg cloprostenol (PGF_{2α}), 48 h prior to progestagen removal.

The increased estrus response and improved conception rate was found to higher in does treated with 400 IU PMSG. PMSG has both FSH and LH – like activity, thereby improves the development and the ovulation rate of the dominant pre-ovulatory follicle. Thus the quality of the ensuing CL is improved leading to increased progesterone secretion with a positive effect on embryo development and survival (Rensis and López-Gatius, 2014).

In conclusion, the results of the present study suggest that progesterone treatment in combination with PMSG improves the estrus response and conception rate when compared

to untreated control does. This indicates the administration of 400 I.U. of PMSG augments the effect of natural progesterone for synchronization of estrus in non-descript local does.

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