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# Effect of anti-PMSG on the ovulatorv response and serum hormone levels in surti goats superovulated with PMSG

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## ABSTRACT

The morphological changes in ovaries and hormonal changes after superovulation by PMSG (1000 I.U.) and its neutralization with Anti-PMSG administered 8-10 hours after the onset of estrus were studied in Surti goats. Anti-PMSG decreased the number of unovulated follicles from 6.5 in control to 3.83 in treated animals and increased the ovulations from 2.17 in control to 3.83 in treated animals. The estradiol levels decreased after onset of estrus and increased level of progesterone were observed in the treated animals. However, the differences were statistically non-significant.

**Key Words**: PMSG, anti-PMSG, superovulation, ovarian steroids

Successful Superovulation in cattle, goat and sheep is a critical factor in embryo transfer technology. Several preparations of PMSG ( Bindon and Piper,1977), purified FSH ( CordovaSantamaria *et al.*,1993) and hMG (Stefani *et al.*, 1991) have been used in the past for superovulation. The use of PMSG has the advantage that it needs to be administered only as a single dose and hence it is a labour saving, cheap and less stressful to the animal. However, its long biological half-life in cattle and sheep (Dielman and Bevers,1987; Jabbour and Evans.1991) adversely affects fertility and embryo recovery. Administration of Anti-PMSG to PMSG treated buffaloes, cows and sheep at estrus, has been reported as a method to shorten the duration of estrus, increase ovulation and fertilization rates and decrease the number of unovulatory follicles (Palta *et al*.1997; Wang *et al*. 1988, Moyaert et al.1985, Bindon and Piper, 1977 and Martimucei *et al*.1995)

The present study was conducted to determine if the treatment of PMSG superovulated goats with Anti-PMSG can over come the problem associated with superovulatory response.

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## MATERIALS AND METHODS

Twelve cyclic Surti goats received 1000 I.U. PMSG ( Folligon, Intervet) on day 14th of estrous cycle, followed by 7.5 mg. PGf2μ 54 hours later ( Prosolvin, Upjhone). These goats were then divided into 2 groups of six animals each.

Group- A (Control) received no further treatment. Group- B(Expt.) received Anti-PMSG, 2.5 ml i.v. ( Neutra-PMSG, Intervet), 8-10 hours after the onset of estrus. All the animals were subjected to laparotomy, 72 hrs. after the onset estrus for the observation of unovulated follicles and corpora lutea. The blood samples were collected throughout the experiment. Serum was harvested and preserved at -200 C till assayed for estradiol and progesterone. The progesterone was measured by solid phase coat-a -count method and estradiol by double anti-body technique using DPC (Diagnostic Product Corporation, USA) RIA kits.

## RESULTS AND DISCUSSION

The number of Anovulatory Follicles ( AOFs) , Corpora lutea (CL), and serum estradiol and progesterone levels are presented in Table 1 and 2, respectively.

All the goats exhibited estrus between 84-96 hours of PMSG treatment. Anti-PMSG treatment increased

**Table 1. Ovarian response to Anti-PMSG treatment in Surti goats**

| Sr. No. | CONTROL GROUP (ONLY PMSG) Animal No. | Estrus exihibition Hrs. | Ovarian response AOF | CL | Sr. No. | EXPT. GROUP (PMSG + Anti PMSG) Animal No. | Estrus exihibition Hrs. | Ovarian response AOF | CL |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 94-04 | 84 | 6 | 0 | 1 | 95-14 | 84 | 6 | 2 |
| 2 | 95-01 | 96 | 4 | 2 | 2 | 95-05 | 96 | 4 | 1 |
| 3 | 97-02 | 144 | 5 | 5 | 3 | 93-06 | 96 | 1 | 1 |
| 4 | 97-11 | 96 | 10 | 1 | 4 | 93-26 | 96 | 0 | 10 |
| 5 | 93-26 | 96 | 3 | 2 | 5 | 94-18 | 84 | 1 | 4 |
| 6 | 95-02 | 96 | 11 | 3 | 6 | 96-08 | 84 | 11 | 5 |
| Mean ±SE | | 102.00 ± 8.62 | 6.50 ± 1.34 | 2.17 ±0.70 | Mean ±SE | | 90.00 ± 2.68 | 3.83 ±1.70 | 3.83 ± 0.40 |

**Table 2. Blood serum Progesterone (ng/ml) and Estradiol-17β (pg/ml) in Surti goats treated with Neutra-PMSG**

| Character studies | Categoy Group | Stage of blood collections: Before PMSG treatment | 24 hr. after PMSG | 48hr. after PMSG | 72 hr. after PMSG | At onset | 12 hr. after estrus onset | 24 hr. after estrus onset | 48 hr. after estrus onset | 72 hr. after estrus onset |
|---|---|---|---|---|---|---|---|---|---|---|
| Progester one (P4) | Control | 6.16 ±1.11 | 9.83 ±1.24 | 6.27 ±1.11 | 1.95 ±0.34 | 0.61 ±0.09 | 0.61 ±0.11 | 1.03 ±0.39 | 1.86 ±0.59 | 3.37 ±0.89 |
| | Expt. | 7.73 ±0.59 | 10.63 ±1.27 | 9.05 ±0.57 | 1.79 ±0.39 | 0.55 ±0.09 | 0.80 ±0.12 | 1.50 ±0.28 | 2.59 ±0.44 | 4.72 ±0.63 |
| Estradiol-17β (E2) | Control | 18.33 ±2.78 | 31.20 ±4.62 | 66.33 ±16.94 | 97.13 ±32.40 | 207.53 ±71.80 | 184.50 ±70.81 | 131.00 ±53.20 | 94.67 ±39.76 | 78.13 ±33.09 |
| | Expt. | 13.25 ±1.67 | 66.26 ±27.81 | 97.66 ±53.93 | 100.73 ±60.06 | 121.97 ±54.84 | 82.80 ±21.34 | 54.27 ±19.54 | 56.40 ±11.01 | 54.33 ±18.33 |

the average number of CL from 2.17±0.70 in control to 3.83±1.40 in treated animals, where as, the anovulatory follicles (AOFs) in treated animals were reduced ( 3.83 ±1.70) as compared to control (6.50±1.34).

The reduction in the number of unovulated large follicles in Anti-PMSG treated animals could be because of the neutralization of PMSG, that remain in the circulation after the complete maturation of follicles, so that the excess of PMSG does not interfere with the process of ovulation and thus, the number of ovulations increase. These results are in agreement with those of Boryczko *et al.*(1992) in cattle and Vivanco *et.al.*(1992) in sheep.

However, in the present study, the differences in treated and control animals in terms of AOF and CL were not statistically significant. Sarvaiya *et al.* (1995) and Cordovasanta- Maria *et al.* (1993) reported similar finding in buffaloes and goats, respectively.

Significant difference in estradiol -17β levels was observed between control and animals treated with neutra-PMSG. However, the pattern of hormone profiles remained similar in both the groups. The estradiol levels

remained similar in both the groups. The estradiol levels remained high on the day of superovulated estrus in both the groups. but continued to be higher for a longer period in control as compared to treatment group of animals.

In the present study neutral-PMSG treatment significantly ($P < 0.01$), suppressed estradiol levels during 72 hrs post- estrus than in untreated goats, reflacting controlled secondary follicular growth. It is known that unovulated follicles secrete Estradiol -17β that far exceeds preovulatory concentrations ( Schallenberger *et al.*,1990) resulting in abnormal preovulatory hormone balance, improper follicular and oocyte maturation and abnormal progesterone : estradiol (E:P) ratio in the follicular fluid (Callesen *et al.*,1986 and Fortune and Mandel ,1985). Also, the growth of secondary follicular population continues in PMSG treated animals, which secrets estradiol. thus altering the E:P ratio during the post-breeding period and may affect the gametes and /or embryo transport ( Dieleman *et al.*, 1993).

The pretreatment progesterone concentration did not show any significant variation between treated and control groups (7.73±0.59 Vs. 6.16±1.11 ng/ml respectively-Table 2). but it slightly increased following PMSG treatment and reduced to a basal level (< 0.1 ng/ml) after $PGf_2\alpha$ treatment on the day of superovulatory estrus. Seventy two hrs. after onset of estrus, progesterone levels were found to be significantly higher in treated group of goats ( 4.72±0.63 ng/ml Vs 3.73±0.89 ng/ml), reflecting better ovulation rate.

Wang *et al.* (1988) reported that the anti-PMSG through its immunoneutralization, shortens the estrus period. reduces the incidence of cystic ovary and improves the endocrine function of ovaries, exerting an advantageous effect on PMSG induce twinning in beef cows. The present study indicates beneficial effect of Anti-PMSG treatment in goats.

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