SERUM PROGESTERONE AND OESTRADIOL PROFILE IN PSEUDOPREGNANT AND PREGNANT GOATS BELOW 3 MONTHS POST-SERVICE

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Abstract

The study was conducted with an objective to compare the serum progesterone and oestradiol levels of early pseudopregnant (Group I) goats before and after treatment (with double regime of PGF2α) with cycling animals (Group II) at similar reproductive stages. No significant difference in serum progesterone levels was observed between group I and II under study, whereas progesterone levels of non-pregnant does were significantly lower than pregnant does on day 21 post-service. There existed a highly significant difference in oestradiol concentrations between the groups. It can be concluded from the present study that, oestradiol can be considered as a tool to differentiate pseudopregnancy from pregnancy.

Key words*: Goat, Hydrometra, pseudopregnancy, cloud burst, persistent corpus luteum, serum progesterone, 17-β oestradiol*.

The mechanism of establishment of caprine pseudopregnancy could be spontaneous persistence of CL either after ovulation without fertilization or following fertilization, foetal death and resorption (Hesselink and Taverne, 1994) and associated with elevated plasma progesterone levels and fluid accumulation in the uterus (Kornalijnslijper *et al.,* 1997). The life span of CL is determined by the luteotrophic and luteolytic mechanisms and the prolonged life of CL in pseudopregnant goats reflects the absence of acute luteolytic signal of uterine origin (Moraes *et al.,* 2007) and the treatment is induction of luteolysis of the persistent CL using luteolytic agents.

The progesterone and oestradiol levels of pregnant animals were found to be increased on advancement of gestation due to progressive production by corpus luteum and placenta respectively (Wittek *et al*., 1988 and Bhattacharya *et al.*, 1993). Despite the

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persistent CL, the plasma concentration of oestradiol-17 β was relatively high during pseudopregnancy and found to be more than that during diestrus in goats (Wittek *et al*., 1998). Real-time ultrasonography is a rapid, efficient and reliable method to differentiate pseudopregnancy from pregnancy (Moraes *et al.,* 2007).

Materials and methods

The present investigation was carried out with the objective to compare serum progesterone and oestradiol concentration in pseudopregnant and pregnant goats below three months post- service at Teaching Veterinary Clinical Complex (TVCC), University Veterinary Hospitals (UVH), Mannuthy and Kokkalai and Goat and Sheep Farm, Mannuthy during May 2017 to April 2018. By ultrasonographical screening, pseudopregnant does (anaechoic to hypoechoic uterine compartments separated by trabeculae) below three months post-

Fig 1: *Early pseudopregnant uterus showing anaechoic uterine compartments separated by hyperechoic trabeculae.*

service irrespective of breed, age, parity and body conditions were selected for the study and were categorised as group I, which consisted of seven animals belonging to Malabari, Jamunapari, Beetal and its crosses with parity ranging from 1 to 5. On the day of diagnosis of pseudopregnancy (day 0), the group I animals were treated with first dose of cloprostenol sodium, 125µg, intramuscularly and 12 days after the initial treatment, a second dose of cloprostenol (125 µg, IM) was administered. All the treated animals were subjected to natural service on two consecutive days of induced

Fig 2: *Involuted uterus with mild intraluminal fluid accumulation and thickened endometrium (induced oestrus).*

oestrus associated with second cloprostenol treatment.

Ten normal cycling does (Attapady black, Malabari and its crossbreeds) were selected as group II and the age and parity of these animals were in the range of group I. Does of group II were not subjected to any treatment but were bred by natural service on two consecutive days of the first observed oestrus.

All the animals were subjected to ultrasonographic examination by day 62 to 90 days post-service.

Blood samples from all the animals under study were collected from the external jugular vein using sterile serum vacutainers with clot activator (NIMS Biomed India). Blood was collected from group I, on day 0, day of induced cloud burst, day 12, day of induced oestrus and on day 21 and 45 post- service and from group □ animals, on day of first observed oestrus after selection, day 12, day 21 and 45 post-service for estimating serum progesterone levels using Enzyme Linked Immuno Sorbent Assay (ELISA).

Blood sample collected from group I animals, on day 0 and group □, at the same stage of pregnancy were utilised for serum oestradiol estimation using Enzyme Linked Fluorescent Assay (ELFA) (Smith *et al*, 1981).

The blood samples were centrifuged

at 1500 rpm for 20 minutes for the separation of serum. The serum samples were stored in eppendorff tubes at -20 °C in a deep freezer until analysis.

The data obtained during the study were subjected to statistical analysis (independent t- test) by using SPSS 24.0 version.

Results and discussion

In the present study, in group I, the mean± SE serum progesterone levels on day 0 was 6.98±0.56 ng/mL, while that of group II at the same stage of gestation (79 days post-service) was 8.04±0.56 ng/mL. A non- significant difference (P >0.05) in P_4 level between pseudopregnant and pregnant animals (6.98±0.56 Vs 8.04±0.56 ng/mL) was observed in the study (Fig. 3).

In group I, on the day of induced cloud burst, the mean± SE serum progesterone level was reduced to 0.88±0.10 ng/mL. The findings were in harmony with Wittek *et al.* (1998), who reported that the progesterone concentrations were found to be less than 1 ng/mL after the cloud burst due to the regression of CL ng/mL on the day of observed oestrus and when the does reached the mid luteal phase, In group I, 12 days after initial treatment, progesterone levels were elevated to 5.34±0.58 ng/mL, as the does entered mid luteal stage and then reduced to basal levels of 0.49±0.06 ng/mL on day of induced oestrus after final treatment with $PGF_2\alpha$ analogue on day 12.In group II, serum progesterone levels were on basal levels of 0.51 ±0.04 the progesterone levels were increased to 4.45±0.41 ng/mL The findings were in agreement with the reports of Rahman, (2006), who obtained low levels of progesterone (< 1ng/mL) on the day of oestrus, which rapidly increased to maximum concentration on day 7 and remained so until day 12-15 post-natural oestrus.

There was no significant difference in serum progesterone concentrations of group I and II on day of induced and observed oestrus and day 12 post-oestrus (P >0.05) The mean± SE progesterone levels of pregnant animals in group I and II on day 21 post-service were 4.34±0.39 and 5.53±0.40 ng/mL respectively, but they varied non-significantly(P >0.05). The progesterone levels of non-pregnant animals on day 21 post-service were significantly lower than the normal pregnant animals. The findings were similar to the reports of Boscos *et al.* (2003), who reported that the accuracy of diagnosing non-pregnancy was l00 per cent on day 21 or 22 post-service.

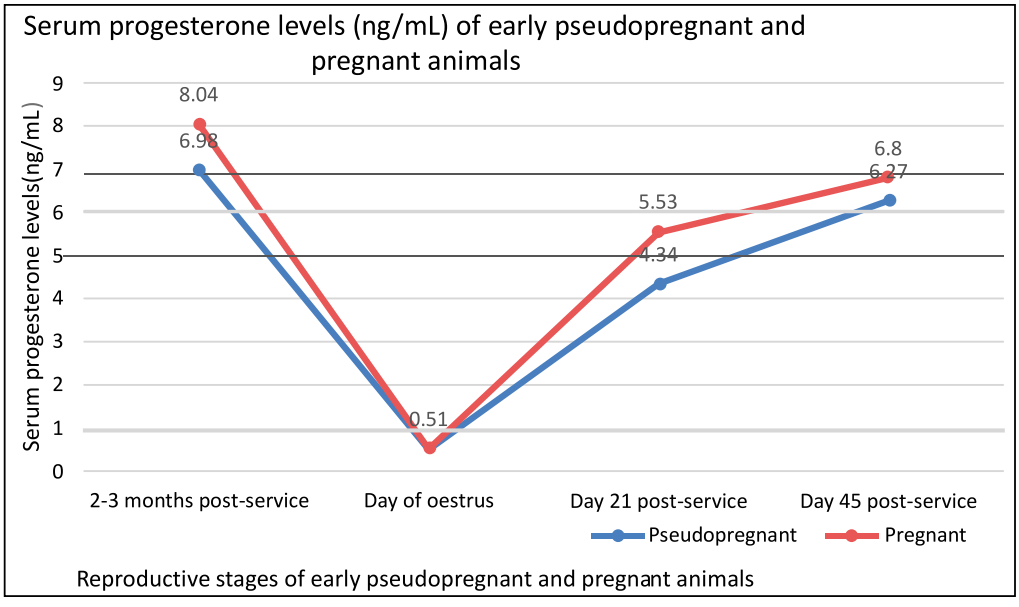

Fig 3:-*Line diagram plotting serum progesterone levels of pseudopregnant and pregnant goats before and after treatment*

Table 1:- *Serum progesterone and oestradiol values of pseudopregnant goats at various reproductive stages of before and after treatment*

Reproductive stages of pseudopregnant animals before and after treatment	Serum progesterone values (ng/mL)	Serum oestradiol values (pg/mL)
Day of diagnosis of pseudopregnancy (2-3 month post-service)	6.98±0.56	9.49±1.71
Day of induced cloud burst	0.88±0.10	4.22±1.15
Day of induced oestrus	0.49±0.06	6.97±0.97
Day 45 post-service	6.27±0.45	13.92±1.42

The mean± SE progesterone levels of pregnant animals in group I and II on day 45 post-service were 6.27±0.45 and 6.8±0.43 ng/mL respectively and differed non- significantly (P >0.05). The findings were similar to the observations of Thorburn and Schnider (1972), who reported that the plasma progesterone concentrations during early pregnancy were in the range of 2.5- 3.5 ng/ml and were found to be similar to the luteal phase values and remained in a steady manner from day 8 to 60 and there could see a secondary increment between day 60-70 (4.5 - 5.5 ng/mL).

Serum oestradiol concentrations of group I animals on day 0 and group II animals at the same stage of pregnancy were found to be 9.49±1.71 pg/mL and 29.92±1.42 pg/mL respectively. Although the serum oestradiol concentrations of pseudopregnant animals were found to be significantly (P <0.01) lower than that of pregnant animals, the concentrations were found to be in elevated levels than basal levels (ranged from 3.28 to 11.25 pg/mL). The findings were in agreement with Wittek *et al.* (1998), who reported that the plasma concentration of Oestradiol-17 β was relatively high (15.06 ± 0.46 pg/mL) during pseudopregnancy. It was supported by Nascimento and Santos (2003) by citing that hyperestrogenism could be responsible for the development of the condition. It could be seen that the mean Oestradiol value of pseudopregnant animals were dropped to levels higher than basal value on day of induced cloud burst (4.22±1.15 pg/ml) after initial treatment with prostaglandin and but were higher than that of the same on induced oestrus (6.97±0.97pg/ml).. Further increase could be seen 45 days after natural service (13.92±1.42 pg/ml).

Bhattacharya *et al.* (1993) reported that the concentration of oestradiol in pregnant Black Bengal goats estimated by RIA technique was 11.72±2.73, pg/mL at 56 days post-service was in agreement with the present findings.

The present investigation revealed that the serum progesterone level cannot be used to differentiate pseudopregnant and pregnant animals (However it can be used to differentiate non- pregnant from pregnant animals after 21 day post-service). Serum oestradiol can be used to differentiate pseudopregnancy from pregnancy after 50 days of post-service.

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