

Synchronization of oestrus with PGF₂α analogue and ear implant and serum oestradiol–17β and progesterone profile in Asom local cows*

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ABSTRACT

A PGF₂α analogue (5 ml) injection and ear implant (3 mg norgestomet, 5 mg Estradiol valerate) were used to synchronize oestrus in 2 different groups of Asom local cows, 5 in each group. The treated cows evinced oestrus after 99.00 ± 3.00 and 29.80 ± 0.01 h of hormone application in 2 groups, respectively, the respective response to treatment being 100 and 80%. Oestradiol 17–β reached peak level in the 2 treated groups (145.66 ± 7.89 and 99.00 ± 1.99 pg/ml respectively) on the day of oestrus. On the contrary, the peak level of serum progesterone was recorded on day 14 and 16 of oestrous cycle in the 2 treated groups of animals respectively. The lowest serum progesterone level of 0.19 ± 0.02 ng/ml and 0.24 ± 0.13 ng/ml in PGF₂α analogue and ear implant treated cows, respectively, was obtained on the day of induced oestrus. The present study indicated that while response in inducing synchronized oestrus was high, the variation in oestradiol 17–β and progesterone profile in blood of Asom local cows with PGF₂α analogue and ear implant application was similar to that in normal cycling cows.

Key words: Asom local cows, Ear implant, Oestrus, Oestrous cycle, Oestradiol, PGF₂α analogue, Progesterone

A much used PGF₂α analogue and ear implant (combination of norgestomet and oestradiol valerate) proved potential to synchronize oestrus in cattle (Kastelie *et al.* 1999, Singh and Thakur 1999, Reddy *et al.* 2001). Since application of exogenous hormones might exert varying degree of effect on the endogenous secretion of different hormones, the serum levels of progesterone and oestradiol 17–β were monitored along with the oestrus response following treatment of non-descript Asom local cows with PGF₂α analogue and ear implant for synchronization of oestrus.

MATERIALS AND METHODS

Healthy cycling Asom local cows (15) were divided into 3 groups, comprising 5 animals in each group. Group 1 animals were untreated control while the animals of group 2 were administered with a single intramuscular injection of 5 ml PGF₂α analogue on day 11 of the oestrous cycle and the group 3 animals were subjected to ear implant (3 mg Norgestomet) for 9 days during follicular phase followed by 5 mg estradiol valerate injection intramuscularly for

synchronization of oestrus. The occurrence of oestrus was determined on the basis of physical signs of cows and their receptivity to males. About 5 to 8 ml of venous blood was collected from each animal by jugular venipuncture on every alternate day from day 0 of oestrus till the onset of next oestrus in all the groups. Radioimmunoassay (RIA) technique was employed to estimate the serum level of progesterone and oestradiol–17β in the collected samples. The standard RIA methodology (coat-a-count), as per manufacturer of the kit was followed for estimation of hormones. The data obtained were statistically analysed (Snedecor and Cochran 1989).

RESULTS AND DISCUSSION

All the cows of group 2, responded to the treatment of PGF₂α analogue and showed oestrus with mean interval of 99.00 ± 3.00 h following the treatment, the range being 95–108 h. Krishnakumaran and Subramaniam 1999 and Reddy *et al.* 2001 reported similar responses following PGF₂α injection in different breeds of cattle. Four out of 5 of group 3 cows responded to treatment of ear implant and the mean interval between the treatment to the onset of oestrus was 29.80 ± 0.01 h with a range of 24 to 48 h. Tregaskes *et al.* (1994) reported a similar efficacy of ear implant in respect of synchronization of oestrus in heifers while Logue *et al.* (1991) and Kastelie *et al.* (1999) observed much lower rate

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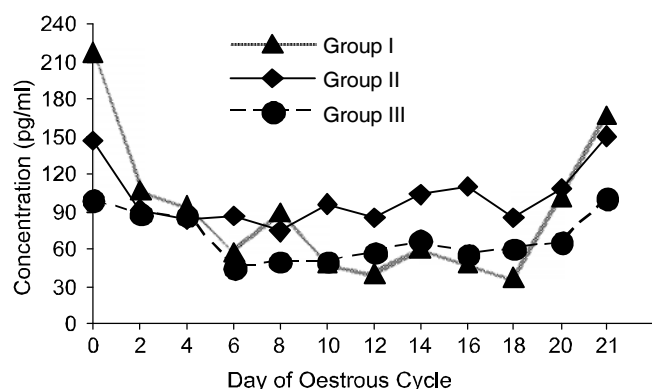


Fig. 1. Serum estradiol 17 β concentration in hormonally treated and control animals

of synchronization response in dairy and beef cattle respectively. In all the groups the serum oestradiol 17- β level decreased from the late oestrus till day 18 post-oestrus and then rose to peak on the day of subsequent oestrus (Fig. 1). Peak oestrogenic phase at induced oestrus (day 0) in the cows of treated groups followed by significant reduction at different days of luteal phase essentially indicated conventional oestrogenic curve as reported earlier in cases of normally cycling cows (Larsen and Kiracofe 1995, Sarvaiya *et al.* 1997, Gupta *et al.* 1998 and Purohit *et al.* 2000). Analysis of variance in serum oestradiol -17 β concentration revealed a significant difference between different groups ($P < 0.05$) at oestrus and between different days of oestrous cycle ($P < 0.01$) in all the groups and the interaction between groups and days was highly significant ($P < 0.01$). The serum oestradiol level was significantly lower in group 2 (145.66 ± 7.89 pg/ml) and group 3 (99.00 ± 1.99 pg/ml) as compared to that of control group (216.20 ± 18.21 pg/ml) on the day of oestrus, but there was no significant difference in its level between group 2 and group 3 animals.

Both the hormonally treated groups (Fig.1) showed similar pattern of oestrogenic curve during the oestrous cycle; however, the PGF $_2\alpha$ analogue-treated cows showed comparatively higher concentration of serum oestradiol-17 β than that of ear implant treated and control cows. It is assumed that luteolytic effect of exogenous PGF $_2\alpha$ was more intense to cause considerable decrease of progesterone secretion and consequently caused higher rate of oestrogen secretion by the ovary (Mc Donald 1980).

Two cows each in group 2 and 3 exhibited short oestrous cycles following synchronized oestrus. Although these animals achieved oestrogenic peak on the day of oestrus, they failed to reach the normal cyclic length. The short oestrous cycle following synchronized oestrus in these animals might be attributed to early maturation of follicles that were recruited in the second follicular waves (Hafez 1987).

In all the groups there was an increasing trend of serum

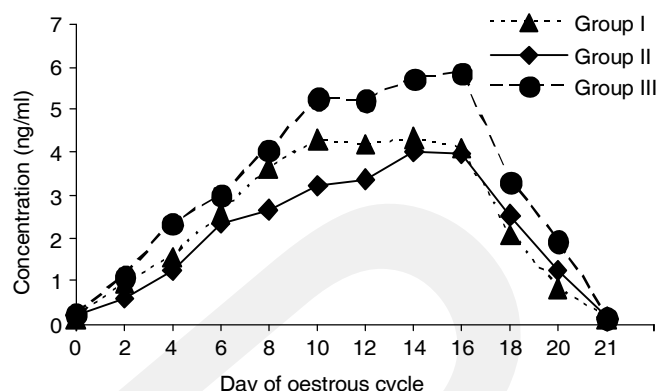


Fig. 2. Serum progesterone concentration in hormonally treated and control animals

progesterone concentration from day 0 of oestrus till day 16 of the oestrous cycle and thereafter progesterone concentration rapidly decreased to the base level towards the onset of next oestrus (Fig. 2). Adeyemo and Health (1980) and Sharma *et al.* (1999) reported similar variation in the serum progesterone concentration during the oestrous cycle in normally cycling cows and buffaloes. Analysis of variance on serum progesterone level indicated significant difference ($P < 0.01$) between different groups at oestrus and between different days of oestrous cycle in all the groups, but interaction between groups and days was not significant. There was no significant difference in the progesterone concentration on day 0 of oestrus among the cows of group 1, 2 and 3 although it was slightly higher at synchronized oestrus in group 2 and 3 animals as compared to that at normal oestrus in group 1 animals (0.12 ± 0.01 ng/ml). The progesterone concentration was found to be lower in PGF $_2\alpha$ analogue-treated animals (0.19 ± 0.02 ng/ml) than in ear-implanted animals (0.24 ± 0.13 ng/ml) on day 0 of the oestrous cycle. This could be attributed to the difference in mode of action of the two exogenous hormones treatments. The highest level of serum progesterone concentration in PGF $_2\alpha$ analogue-treated animals was obtained on day 14 (4.00 ± 0.11 ng/ml) of oestrous cycle, while in ear-implanted animals the peak was reached on day 16 of the oestrous cycle (5.83 ± 0.02 ng/ml). However, a consistent significantly ($P < 0.01$) higher serum progesterone level was observed in ear implanted cows than in PGF $_2\alpha$ analogue-treated cows from day 8 through day 16 of oestrous cycle, which could be attributed to exogenous progesterone content in the ear implant. Booth *et al.* (1975) reported similar findings. The cows of group 2 and group 3 that had short oestrous cycles following synchronization of oestrus were found to have serum progesterone concentration at oestrus corresponding to that in cows with normal cycle length; however, they failed to reach the similar peak of serum progesterone concentration at luteal phase. This might be ascribed to faster luteolysis and lesser formation of luteal tissue in these animals.

It could be concluded that the oestrus response was high, and the pattern of oestradiol-17 β and progesterone profile in blood in Asom local cows following application of PGF₂ α analogue and ear implant for synchronization of oestrus was similar to that in cycling cows with normal manifestation of oestrus.

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