



# PATTERN OF INDUCED OESTRUS AND FERTILITY RATE FOLLOWING hCG INJECTION AT EARLY LUTEAL PHASE IN PGF<sub>2α</sub> TREATED REPEAT BREEDER COWS\*

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## Abstract

A total of 48 repeat breeder cows were divided into three groups viz., group I, II and III. Cows in group I and II were treated with 0.98mg of Tiaprost (PGF<sub>2α</sub>) on day 10 following natural oestrus (day 0). Group III cows, served as control without any treatment. AI was done at 72 and 96 h following PGF<sub>2α</sub> therapy in group I and II. Group III cows were artificially inseminated twice at 24 h interval during natural oestrus. Group II cows were injected with 1500 IU hCG on day four following first AI. There was cent per cent oestrus response in PGF<sub>2α</sub> treated cows. The mean onset of oestrus was 59.38±0.81 and 59.63±0.74 h and the mean duration of induced oestrus was 28.50±0.56 and 27.50±0.70 h in group I and II, respectively. In control, the mean duration of oestrus was 29.38±0.77 h. The occurrences of very good and good oestrus intensities were 12.50 and 87.50 (group I) and 25.00 and 75.00 (group II and III) per cent. The first service conception rate obtained was 43.75, 37.50 and 18.75 per cent, in group I, II and III, respectively. It is concluded that administration of PGF<sub>2α</sub> on day 10 following natural oestrus may improve the conception rate in repeat breeder cows and that injection of hCG on day four after fixed time AI is unnecessary.

**Key words:** Induced oestrus and fertility rate, hCG injection, early luteal phase, repeat breeder cows.

Control of oestrus using prostaglandin preparations (PGF<sub>2α</sub>) has been found to be effective in achieving good fertility in cycling cows (Xu *et al.*, 1997). Odde (1990) stated that PGF<sub>2α</sub> treatment has been highly effective in regulating oestrous cycle by inducing complete luteolysis in dairy cows. However, such studies in repeat breeding crossbred cows are lacking. Further lowered conception rate with PGF<sub>2α</sub> in some studies were related to reduced CL weight and subsequent lower serum progesterone content (Rentfrow *et al.*, 1987). Time of administration of hCG (human chorionic gonadotropin) in relation to the occurrence of oestrus influenced the conception rate in cyclical cows (Hixon *et al.*, 1981). Hence, the present investigation was undertaken to study the fertility rate following administration of hCG at early luteal phase in PGF<sub>2α</sub> treated repeat breeder cows.

## Materials and Methods

A total of 48 healthy, parous crossbred cows which failed to conceive after three or more AIs were selected for this study. They were having regular oestrous cycle length of 18 to 24 days with clear genital mucous

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discharge during every previous oestrus. They were free from gross palpable abnormalities and obvious infections of the genital tract. Out of 48 selected animals, 32 cows were treated with 0.98 mg of Tiaprost intramuscularly on day 10 following natural oestrus and were equally divided into two treatment groups *viz.*, group I and group II. AI was done at 72 and 96 h after PGF<sub>2α</sub> injection in these cows. Cows in group II were administered with 1500 IU hCG on day 4 following first AI. Sixteen repeat breeder cows without any treatment served as control (Group III) and were artificially inseminated twice at 24 h interval during natural oestrus. Oestrus response was calculated in percentage (number cows exhibited oestrus out of number of cows treated in group I and II). Onset of oestrus was recorded from the time of PGF<sub>2α</sub> injection to the expression of oestrus signs. Duration of oestrus was estimated in hours in the experimental and control groups from the time of first appearance of oestrus sign to the detection of last oestrus sign. Intensity of natural and induced oestrus in control and treatment group was scored according to the method described by Rao and Rao (1981) with slight modifications. Based on the score card the intensity of oestrus was classified as very good (> 15 points), good (11 to 15 points), fair (6 to 10 points) and poor (< 5 points). Rectal examination was carried out in all the treated and control cows at 60 days after the AI to confirm pregnancy. First service conception rate was calculated in treatment groups (number of animals conceived at induced oestrus divided by number animals treated in each group) and was expressed in percentage. Similarly, in control group first service conception rate was calculated following AI at natural oestrus.

## Results and Discussion

In the present study, injection of PGF<sub>2α</sub> on day 10 after natural oestrus resulted in cent per cent oestrus response in both the treatment groups. This was in agreement with the findings of Zaayer and Van der Horst (1986) and Goley and Kadu (1995) in repeat breeder cows. Lower oestrus responses of 80 to 92 per cent to PGF<sub>2α</sub> treatment in cows were reported in Rentfrow *et al.* (1987). However, Hixon *et al.* (1981) reported only 54 to 57 per cent oestrus response in cows treated with PGF<sub>2α</sub>. The cent per cent efficacy of PGF<sub>2α</sub> treatment in inducing oestrus in repeat breeder crossbred cows in this study might be due to the day of

the cycle in which the drug was administered (Odde, 1990), higher sensitivity of the corpus luteum on day 10 of the cycle to PGF<sub>2α</sub> treatment (Berardinelli and Adair, 1989) and good nutritional status of the cows selected.

In this experiment, in group I and II the mean onset of oestrus was 59.38±0.81 and 59.63±0.74 h respectively. No significant difference was observed between two groups. Goley and Kadu (1995) recorded the mean onset of oestrus in repeat breeder cows treated with PGF<sub>2α</sub> plus GnRH and PGF<sub>2α</sub> plus hCG and the values were 63.71± 6.76 and 67.59±5.00 h, respectively. The mean onset of oestrus in repeat breeder cows found in this study was in concurrence with the observations of Jain and Dave (1992) and Cavalieri *et al.* (1997). Similar interval to onset of oestrus with double injection schedule of PGF<sub>2α</sub> in cows was reported in a study by Jimenez *et al.* 1988. Longer interval (3.66 days) and shorter interval (32 h) between PGF<sub>2α</sub> injection and onset of oestrus were recorded in cows by Jochle *et al.* (1982).

The mean duration of induced oestrus (28.50±0.56 and 27.50±0.70 h in group I and II, respectively) recorded in this study was in accordance with the findings of Selvaraju (1997) in anoestrus cows treated with norgestomet ear implants and in crossbred cows treated with PGF<sub>2α</sub> (Jochle *et al.*, 1982). However, Goley and Kadu (1995) recorded an oestrus duration of 35.57±1.02 h in repeat breeder cows treated with PGF<sub>2α</sub> which was higher than the duration obtained in this study. In control, the mean duration of oestrus was 29.38±0.77 h. More or less similar duration of oestrus in repeat breeder cow was reported by Gustafsson *et al.* (1986) and Goley and Kadu. (1995). It was concluded that oestrus induction with PGF<sub>2α</sub> did not influence the duration of oestrus in repeat breeder crossbred cows.

In this study, the occurrences of very good and good oestrus intensities were 12.50 and 87.50 (group I) and 25.00 and 75.00 (group II and III) per cent respectively. None of the treated and control cows showed fair or poor oestrus intensity. Duchens *et al.* (1995) observed 40 each and 20 per cent of intense, intermediate and weak oestrus following PGF<sub>2α</sub> injection in cows, respectively. However, Peters (1996) found 94.74 per cent good and 4.26 per cent poor intensity in crossbred cows treated with PGF<sub>2α</sub>. In repeat breeder cows, the

percentage of intense, medium and weak oestrus intensity recorded earlier was 64.28, 28.58 and 7.14 in PGF<sub>2α</sub> induced oestrus (Goley and Kadu, 1995). Therefore, it was inferred that oestrus induction programmes may alleviate the problems of oestrus detection in repeat breeder crossbred cows as recommended by Goley and Kadu, (1995) and provide good opportunity for fixed time insemination.

In PGF<sub>2α</sub> alone treated cows (Group I), the first service conception rate obtained was 43.75 per cent in this study. Almost similar conception rate was reported in repeat breeder cows by Stevenson *et al.* (1988). However, higher conception rates of 76.92 (Zaayer and Van der Horst, 1986) and 80.00 (Kumar *et al.*, 2000) per cent were reported in repeat breeder cows. On comparison between control and group I cows, the conception rate obtained was higher in group I (43.75 per cent) than in control (18.75 per cent) in this study. Goley and Kadu (1995) reported that the prostaglandins corrected the uterine milieu and increased the conception rate by preventing early embryonic mortality. Further, they stated that it checked mild endometritis by increasing the phagocytic activity by uterine leukocytes and stimulatory actions on smooth muscles of uterus. Moreover, double inseminations at induced oestrus with good quality semen improved the pregnancy rates in many studies (Kumar *et al.*, 2000). These factors might have contributed to achieve a higher conception rate in group I cows than the control cows.

In the present investigation, injection of hCG at 4 days after AI resulted in 37.50 per cent conception in group II animals. Almost similar percentage of conception was noticed in other studies in oestrus synchronised cows treated with 1000 IU of hCG on day 4 of the oestrous cycle (Holness *et al.*, 1982) and repeat breeder cows treated on day 5 of the cycle (Kumar *et al.*, 2000). However, very high conception rate of 92 per cent was reported in heifers treated with hCG on day 4 of the post breeding oestrous cycles (Peters, 1989). In this study, the conception rate (37.50 per cent) in post breeding hCG groups was marginally lower than the conception rate (47.75 per cent) obtained in group I without hCG supplementation. Day of administration of hCG at post breeding was critical and variations in follicular wave pattern between cows (Peters, 1989) might be the reason for marginal

reduction in conception rate in early luteal hCG group.

It is concluded that the induction of oestrus with PGF<sub>2α</sub> alone and breeding at fixed time might have helped in eliminating errors in oestrus detection and possibly in bringing more favourable hormonal and uterine milieu and might have resulted in increased conception rate in group I than in group II and control. From this study, it is clear that hCG administration on day 4 following AI after PGF<sub>2α</sub> treatment is not necessary and hence it is concluded that PGF<sub>2α</sub> treatment on day 10 following natural oestrus and fixed time double AI at induced oestrus may be followed to augment fertility in repeat breeder cows under field conditions.

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