

EFFECT OF PGF₂α AND UTROVET ON UTERINE INVOLUTION AND POSTPARTUM PERIOD IN HF CROSSBRED COWS

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An experiment was designed to evaluate the effect of prostaglandin (PGF₂α) administration and Utrovet after calving on postpartum reproductive performance in HF crossbred cows. Total 18 HF crossbred cows from potential farm of Shri Surat Panjarapole, Bhestan, Surat were selected. Group-I cows were treated with inj. Dinoprost tromethamine immediately after parturition, Group-II cows were given Tablet Utrovet (PO) on the day after parturition till 10 days, Group-III cows were treated as control. Expulsion time of placenta (hrs) was to be found significantly earlier in Group-I (2.94±0.30) as compared to Group-II (3.95±0.36) and Group-III (5.36±0.19) cows. Time taken for completion of uterine involution (days) were significantly shorter in Group-I (28.17 ±0.95) than Group-II (32.83 ± 1.28) and Group-III (37.67 ±1.30) cows. First postpartum estrus (days) was found significantly shorter in Group-I (26.50 ± 0.87) as compared to Group-II (39.00±2.84) and Group-III (48.00±2.39) cows, Service period (days) was found shorter in Group-I (60.00±4.81) as compared to Group-II (78.25±7.47) and Group-III (100.33±6.64) cows. However, number of services per conception was found non-significantly lower in Group-I (1.6±0.25) as compared to Group-II (2.0±0.41) and Group-III (2.67±0.33) and conception rate was found higher in Group-I (83.33 %) as compared to Group-II (66.67 %) and Group-III (50.00 %). It was concluded that injection of PGF₂α immediately after parturition induce early expulsion of fetal membranes, accelerated the process of uterine involution and reduce the time period of first postpartum estrus in HF crossbred cows.

Key Words: PGF₂α, Utrovet, Expulsion of Placenta, Uterine Involution, Service Period

The uterine involution and resumption of cyclic ovarian activity are key factors of future fertility, the hastening of uterine involution and/or earlier initiations of postpartum cyclicity improve the reproductive performance in postpartum cows. Puerperal uterine soundness is essential for the early establishment of postpartum estrus cyclicity (Tiwari *et al.*, 2004). Uterine Prostaglandin F₂α (PGF₂α) is responsible for the cyclical regression of corpus luteum, initiation of parturition and resumption of ovarian activity in farm animals (McCracken *et al.*, 1999). The prostaglandin and its synthetic analogue are considered as drug of choice in reproductive management of cattle. It is widely used to manipulate estrus cycle for early breeding of postpartum buffaloes and pubertal heifers (Shyam, 2011). Use of PGF₂α is common during the early postpartum period to improve uterine involution and fertility in dairy cattle (Nakao *et al.*, 1997). PGF₂α and its agonists may be used in the treatment and prevention of placental retention and such treatment may help to decrease the incidence of delayed uterine involution.

The oral administration of herbal preparation with proven ecbolic and restorative actions therefore, appears to be a safe and effective option both therapeutically and prophylactically. Earlier, Scientists had reported the uses of herbal preparations were found effective uterine cleanser and restorative, which benefits the postparturient health and productivity of the animals when either used therapeutically or prophylactically (Ravi and Bhagwat, 2007).

However, studies of drug like hormones and herbal preparation to enhance the period of postpartum estrus, timely/early expulsion of fetal membranes and restoration of uterus in HF crossbred cow are lacking and therefore this study is designed to investigate the effect of PGF₂α hormone and Utrovet on puerperal events.

MATERIALS AND METHODS

Experimental animals: The study was conducted on 18 recently calved HF crossbred cows from one week before their expected parturition to puerperal period and thereafter up to 120 days post partum without any reproductive problems in their last calving reared at the potential cows, farm of Shri Surat Panjarapole, Bhestan, Surat, Gujarat. The cows in T1 group (n=6) were treated with 5 ml Inj. Dinoprost tromethamine (Inj. Lutalyse, 25mg, Natural PGF₂α, i/m route) immediately after parturition; the cows in T2 group (n=6) treated with Tab. Utrovet (10 tablets twice a day) on the day after parturition till 10 days and the cows in T3 group (n=6) were treated 5 ml of Inj. Normal Saline (placebo).

Management of animals: All the animals were fed green fodder, hay, compounded concentration and mineral mixture as per the standard feeding schedule on the farm. The animals were palpated at 72 hours intervals

up to 45 days and uterine as well as ovarian changes were noted. The time required for expulsion of placenta, uterine involution, and first and fertile estrus postpartum were recorded. Estrus occurrence was detected daily with the help of teaser bull parading in morning and evening hours and females were naturally served with known fertile bull or bred with good quality frozen semen through artificial insemination. They were palpated per-rectum for confirmation of pregnancy at 60 to 90 days post-breeding.

Statistical analysis: The data were analyzed statistically using one way analysis of variance technique (Steel and Torrie, 1980). Significant means were compared by Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

Expulsion time of fetal membrane:

The time required for expulsion of placenta in hours was found significantly lower in PGF₂α treated (T1) group as compared to T2 and T3 group. Moreover, PGF₂α involved in the placental expulsion mechanism and had been proposed that failure of the process that leads to separation of the cotyledons from the caruncles was associated with an alteration in the prostaglandin metabolism that caused PGF₂α decrease and PGE₂ increase (Kankofer *et al.*, 2002). These observations coincided with the results of

1. Effect of different treatments on Reproductive Performance of the treated and control groups of HF crossbred cows (Mean ± SEM)

Parameters	Group-I (T1)	Group-II (T2)	Group-III (T3)	Overall	P value
Expulsion time of fetal membrane(hours)	2.94 ± 0.30 ^a	3.95 ± 0.36 ^b	5.36 ± 0.19 ^c	4.08 ± 0.28	0.00
Involution of uterus (days)	28.17 ± 0.95 ^a	32.83 ± 1.28 ^b	37.67 ± 1.30 ^c	32.89 ± 1.14	0.00
First postpartum estrus (days)	26.50 ± 0.87 ^a	39.00 ± 2.84 ^b	48.00 ± 2.39 ^c	37.83 ± 2.45	0.00
Service Period (days)	60.00 ± 4.81 ^a	78.25 ± 7.47 ^a	100.33 ± 6.64 ^b	76.17 ± 5.82	0.01
Number of Services per Conception	1.60 ± 0.25 ^a	2.00 ± 0.41 ^a	2.67 ± 0.33 ^a	2.00 ± 0.21	0.14
Conception Rate (%)	83.33	66.67	50.00	66.67	--

Group-I = PGF₂α, Group-II = Utrovet, Group-III = Control

Means bearing different superscripts within a row (between the groups) differ significantly (p < 0.05).

the study, in which the expected increase of serum PGF₂α concentrations within the first 12 hrs postpartum facilitated the expulsion of the placenta and might had been due to prolonged uterine contraction induced by PGF₂α (Edquist *et al.*, 1978). The findings were in agreement with Majeed *et al.* (2009) and Niar *et al.* (2006) in cows, they observed a significantly shorter time between calving to expulsion of the placenta after PGF₂α treatment as compared to control group. Khatri *et al.* (2013) also observed early expulsion of placenta in PGF₂α given group (3.1 ± 0.3 hrs) as compared to oxytocin (4.45 ± 0.5 hrs) and control group immediately after starting of labor pains.

Moreover, in Group-II time required for expulsion of placenta (3.95 ± 0.36 hrs) was found earlier as compared with control (5.36 ± 0.19 hrs) group. Similarly, time required for expulsion of placenta was 4.00 ± 0.21 hrs in EXAPAR-N treated and control (9.00 ± 0.25 hrs) group reported by Thakur *et al.* (2013) in retained placenta cases group of Deoni cows and Marathwari buffalo breeds. In addition to this, time required for expulsion of placenta was 4.30 ± 0.21 hrs (unknown herbal uterine (AV/UTL/17) cleanser), 4.00 ± 0.21 hrs (Exapar) and 9.00 ± 0.25 hrs (control) in post parturient cows and buffaloes observed by Patil *et al.* (2014). However, in the present study, the time required for expulsion of placenta was found 5.36 ± 0.19 hrs in the control Group-III (T3), which was little bit earlier as compared to 6-12 hrs reported by Hafez *et al.* (2000).

Uterine involution:

The time required for uterine involution was significantly lower in PGF₂α (T1) treated group as compared to Utrovet treated (T2) and control (T3) groups, which clearly indicates that PGF₂α accelerated the uterine involution in postpartum, that was agreement with Patel *et al.* (2013)^a, who used PGF₂α immediately after parturition in HF cows and Khatri *et al.* (2013) in Kundhi buffaloes immediately after starting of labor pains, they all observed significantly shorter time for the uterine involution. In the present study, mechanism by which PGF₂α treatment could favour uterine involution was controversial, because in this study PGF₂α

was administered within the first 24 hrs of postpartum, without the presence of an active (functional) corpus luteum. However, it has been proposed that PGF₂α could favor uterine involution by induction of uterine contractions, increase of uterine phagocytosis and exudates and bacteria elimination through the cervix.

Moreover, oral herbal preparation used worldwide in dairy cattle for the last many years as reported by various workers and reported hasten uterine involution and improve conception rate when used postpartum cow and buffaloes (Thakur *et al.*, 2013; Patil *et al.* 2014), they stated animal treated with herbal preparation of postpartum period that hasten the uterine involution as compared to untreated animals as was found in the present study.

First postpartum estrus, Service period and Conception rate:

In the present findings, first postpartum estrus in PGF₂α treated (T1) group and control (T3) group as 26.50 ± 0.87 days and 48.00 ± 2.39 days were some extent agreement with 28.14 ± 1.68 days and 43.50 ± 1.66 days reported by Patel *et al.* (2013)^a in treated group with 25 mg PGF₂α (i/m) immediately after calving and control group in HF cow, respectively; However, longer first postpartum estrus observed as 80.28 days and 92 ± 12.4 days reported by Sinha *et al.* (2002) in cows treated with 25mg PGF₂α (I/M) within 24 hrs postpartum and Selami *et al.* (2012) in cow treated with PGF₂α within 2 hr & 8hr after calving, respectively.

The service period in days was found non-significantly shorter in PGF₂α treated (T1) group as compared to other treated groups (T2) and significantly with control (T3) group and first post partum estrous was found significantly shorter in PGF₂α (T1) as compared to other treated (T2) groups and control (T3) group under the study, which clearly showed the luteolytic effect of PGF₂α on pregnancy CL of ovary and earlier resumption of ovarian activities as compared to treatment (T2) and control (T3) group that closely in agreement with Madej *et al.*, 1984, they observed PGF₂α (25 to 30 mg) or its analogue induced luteolysis and was found to be useful for the induction of estrus

and ovulation. PGF₂α had found direct effect on bovine ovary, thereby causing resumption of ovarian activity postpartum. Longer periods of high concentrations of PGF₂α metabolites had been associated with a stimulating effect on follicular and luteal components of the ovary postpartum. Prostaglandin F₂α also stimulated the ovarian activity before involution and regression of myometrium and endometrium. Prostaglandin administration at early postpartum period causes a decrease in the service period in cows (Fedosova *et al.*, 1991). Whereas, no significant difference was observed in the calving to conception interval had been shown by Morton *et al.* (1992).

Whereas, in the group (T2) first postpartum estrus and service period were shorter than that of control group which was in agreement with (Thakur *et al.*, 2013; Patel *et al.*, 2013^b and Patil *et al.*, 2014), they all observed first postpartum estrus and service period significantly shorter in treated group with herbal preparation than the untreated control animals. The number of services per conception rate was non-significantly lower in PGF₂α (T1) treated as compared to treatment (T2) and control (T3) group and conception rate was higher in (T1 & T2) group as compared to (T3). These findings were agreed with Randel *et al.*, 1988, they stated the overall conception rate increased with the use of prostaglandin in early postpartum phase. On the contrary, no significant differences in the interval from parturition to first postpartum estrus, service period, conception rate or number of inseminations per conception reported by Saturnino *et al.* (1991) in (¾ Holstein X ¼ zebu) cows treated with 25 mg cloprostenol per day from 1 to 18 days postpartum and Steffan *et al.* (1991) in cows treated with PGF₂α per day from 10 to 16 days after calving between treated and control group. The service period, first postpartum estrus interval, services per conception in control group-III were observed earlier as 177.1 ± 12.5 days, 95.9 ± 8.12 days, 2.2 ± 0.1 reported by Rafique *et al.* (2000) in Holstein X Sahiwal cows; 151.72 ± 6.826 days, 126.23 ± 6.610 days and 1.54 ± 0.090, respectively reported by Habib *et al.* (2010)

in Red Chittagong Cattle. Whereas, the interval from parturition to first estrus 31.00 ± 0.06 days and service period 147.00 ± 13.69 days reported by Hadiya (2006) in triple crossbred (HF X Jersey X Kankrej) cows which were shorter interval from parturition to first estrus as compared to present findings. While, service period was longer 147.00 ± 13.69 days as compared to result of the present study. The overall conception rate was 66.67 per cent and highest in Group-I (83.33 per cent) as compared Group-II (66.67 per cent) and control Group-III (50.00 per cent). Whereas, 79.12 ± 2.82 per cent reported by Habibi *et al.* (2010) in Red Chittagong cattle and 70 per cent reported by Sinha *et al.* (2002) treated with Dinoprost within 6 hrs postpartum in crossbred cows, respectively. It could be concluded that uses of PGF₂α immediately after parturition enhance the process of placental separation, hasten the uterine involution and increased the conception rates and thereby calving interval to the economic milieu as compared to Utrovet treated group and control group. Use of the PGF₂α immediately after parturition in HF crossbred cow showed earlier first postpartum estrus and minimized the service period about 40 days as compared to control group suggested strong luteolytic effect followed by early resumption of ovarian activity. Use of Utrovet tablet had been helped in expulsion of placenta, uterine involution, first postpartum estrus, service period and conception in HF crossbred cow up to some extent.

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