

EFFECT OF GnRH AND PGF_{2α} ADMINISTRATION IN EARLY POST PARTUM PERIOD ON FERTILITY IN RETAINED PLACENTA BUFFALOES

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ABSTRACT

The present research experiment was carried out to evaluate the effect of GnRH and PGF_{2α} administration on post partum fertility in retained placenta buffaloes. Total thirty six Murrah buffaloes with retained placenta condition were selected and the placentas were removed manually and intra-uterine boluses were kept (3 boluses per day for 3 consecutive days post-partum) in experimental buffaloes. The buffaloes were divided into three groups comprising twelve buffaloes in each group. Buffaloes from Group-I were treated with injection buserlin acetate (10 µg) i/m while from Group-II with injection tiaprost-trometamol 0.750 mg i/m on day 14 post calving while buffaloes from Group-III were kept as control. The average days required for involution of uterus were 29.16±0.78, 27.41±0.58 and 31.5±1.05 while average days required for exhibition of first post-partum oestrus were 49.33±5.86, 47.66±4.18 and 67.08±4.42 in Group-I, II and III, respectively. The first service conception rate was highest (33.33%) in Group-II while 25 and 16% in Group-I and III, respectively.

Keywords: GnRH, PGF_{2α}, uterine involution, fertility

INTRODUCTION

Retention of fetal membranes (RFM) is one of the common maladies during puerperium in buffaloes (Sane *et al.*, 1982). The consequences of RFM are an increase in calving to service interval, increase in number of services per conception and consequently longer calving interval (Halpren *et al.*, 1985). The major significance of RFM is in the mediation of more severe conditions. Thus cows that suffered RFM has significantly at higher risk for developing metritis (Bartlett *et al.*, 1986) and even subsequent abortion in the following pregnancy (Grohn *et al.*, 1990).

It is estimated that milk production decreases by 8.8% during the first 5 days of lactation due to RFM (Deluyker *et al.*, 1991), thereby causing considerable economic loss at the herd level (Laven and Peters, 1986). The impact of RFM on bovine fertility has been examined by several researchers (Martin *et al.*, 1986). Magnitude of effect varies widely from study to study. Borsberry and Dobson (1989) had found that uncomplicated RFM cases can lead to an increase in calving interval. However, other studies have shown no direct effect of the RFM condition on fertility (Nakao *et al.*, 1992). The deleterious effect on fertility usually associated with RFM is in the pathogenesis of metritis (Mellado and Reyes, 1994), which may be up to 19 times more likely

than after a normal calving (Curtis *et al.*, 1985). The infection of uterus invariably causes damage to endometrial epithelium, thus uterus becomes unable to secrete luteolytic pattern of $\text{PGF}_{2\alpha}$, hence corpus luteum is retained and self perpetuating infection results (Parkinson, 2001).

Retention of fetal membranes has adverse effect on reproduction (i.e. metritis, slower uterine involution and reduced conception rates) in cattle (Pelissier, 1972). GnRH injection in early post-partum period (on day 14) in retained fetal membranes cows contributed to early involution, stimulates ovarian activity and increased conception rates (Mori *et al.*, 1988). So GnRH administered on day 14 post-partum stimulates the reproductive physiology and assists in cleansing the uterus, bringing faster uterine involution and terminal maturation and ovulation of dominant follicle thereby improving conception rate and fertility (Takkar *et al.*, 1999). Prostaglandin plays major role in the regulation of reproductive cyclicity (Singh and Madan, 1985). The reproductive cyclicity and its rhythm in terms of its reawakening during early post-partum period has been linked to temporal changes of hormone mainly prostaglandin (Perera *et al.*, 1981). Lindell *et al.* (1980) reported that PG metabolites increased at the time of parturition and remained high for 8 to 16 days post-partum. So delay in involution of uterus was due to short period of high prostaglandin F2 alpha metabolite release. Whereas, long duration of $\text{PGF}_{2\alpha}$ release resulted in short period for completion of uterine involution (Lindell, 1981). It has also positive effect on the uterine musculature tone (Lindell and Kindahl, 1983). So $\text{PGF}_{2\alpha}$ injection in early post-partum period (day 14) enhances the uterine involution and reproductive efficiency in normal calved buffaloes (Nazir *et al.*, 1994) and also in retained placenta cows (Mcclary *et al.*, 1989). Considering

these facts present research experiment was carried out to evaluate the effect of GnRH and $\text{PGF}_{2\alpha}$ administration on day 14 post calving on uterine involution and post partum fertility in retained placenta buffaloes.

MATERIALS AND METHODS

Housing and feeding

The buffaloes were housed in a loose housing barn with four groups of twenty-four buffaloes. The buffaloes were kept indoors and there was no open paddock in the barn. Each lot had twenty-six resting places (1.2X2 m) on one side and a manure alley with Delta Master™ manure scraper (Delaval AB, Sweden) on the other hand side positioned towards the feed rack. Each lot had one automatic concentrate feeding station (AFS) and nine valve-controlled automatic water bowls. The ordinary routine in the barn was *adlib* feeding of roughages three times a day. The roughages fed during the experiment consisted of fresh, cut and chopped sugarcane, alfalfa, napier grass, green maize and jowar straw which were chopped and transported to the barn in tractor trolley and dispensed manually into the feed troughs. A pre-calculated quantity of concentrate mixture was fed to each buffalo based on milk yield, body weight and pregnancy status. Concentrate was fed through the automatic concentrate feeding station (AFS) in the barn. If the pre calculated amount was not consumed, the residual was transferred to the next feeding. Residual amounts at the end of a 24 h period were transferred to the next 24 h period. During milking, an in-parlor feeding (IPF) system supplied a fixed amount of concentrates. The buffaloes were provided mineral mixture according to milk production and body weight of

the buffaloes.

Health care of buffaloes

All the buffaloes were appropriately vaccinated against Foot and Mouth Disease and Haemorrhagic Septicemia. They were also tested annually to detect possibilities of Brucellosis, Johne's disease and Tuberculosis and the positive reactors were suitably disposed off. The fecal samples and blood smears were also screened periodically for detection of parasitic infestations and protozoan parasites, respectively. As a routine, all buffaloes were dewormed biannually.

Selection of buffaloes

Total thirty six Murrah buffaloes with second to seventh lactation suffered from retention of placenta condition were selected. The placentas were removed manually and intra-uterine boluses (Furea) were kept (3 boluses per day for 3 consecutive day's post-partum) in experimental buffaloes. These buffaloes were divided into three groups and buffaloes from Group-I were treated with Inj. Buserelin acetate (10 µg) (Receptal) while from Group-II with Inj. Tiaprost trometamol 0.750 mg (Illerin) on day 14 post calving intramuscularly while buffaloes from Group-III were kept as control. The uterine involutions were monitored at weekly intervals from day 14 to 28 post-partum. The finger width of left palm was pre measured with help of measuring tape and the same was used as a scale for measuring internal biometry as well as by ultrasonographically by measuring reduction in size i.e. diameters of uterine horns. The data pertaining to uterine involution, post-partum exhibition of oestrus, first service conception rate were suitably tabulated and analyzed following statistical methods described by Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

The average days required for involution of uterus in retained placenta buffaloes were 29.16 ± 0.78 , 27.41 ± 0.58 and 31.5 ± 1.05 days in Group-I, Group-II and Group-III, respectively. The results are statistically significant at $P < 0.05$ and $P < 0.01$ levels (Table 1).

In Group-II (PGF_{2α} treatment) required least time (27.41 ± 0.58 days) whereas Group-III (Control group) required more time (31.5 ± 1.05) for involution of uterus. Retention of placenta may be due to deficiency of PGF_{2α} or lack of conversion of PGE to PGF_{2α} (Leindell, 1980; Gross *et al.*, 1985) that is secreted by fetal membranes. According to Gross *et al.* (1987) cows with retained placenta have E series PGs production than F series PGs. Cows and buffaloes have similar types of placenta (cotyledonary). The same is correlated with present study that PGF_{2α} treated buffaloes showed faster uterine involution. So exogenous PGF_{2α} administration for longer periods (three to six days post-partum period) may be more beneficial effect on uterine involution. Animals with retained placenta have an increased risk of developing uterine infections and consequently, have impaired reproductive performance. The duration of uterine involution may be prolonged, the resumption of ovarian activity may be delayed and calving interval may be increased (Kudlac, 1991). However, PGF_{2α} was successfully used for treatment of post-partum uterine infections by Coulson, 1978 and Ott and Gustafsson, 1981. The beneficial effect of PGF_{2α} may be due to induction of luteolysis if functional CL is present, direct uterotonic effect, stimulation of phagocytosis by uterine leucocytes (Razin *et al.*, 1978) and stimulation of uterine defense mechanism consequent to a fall in circulating progesterone and rise in circulating estrogen (Paisely *et al.*, 1986). All

these events lead to hastening of uterine involution.

Days required for exhibition of first post-partum oestrus

The average days required for first post-partum exhibition of estrus were 49.33±5.86 days in Group-I, 47.66±4.18 days in Group-II and 67.08±4.42 days in Group-III, respectively. The results are significant at P<0.05 (Table. 2).

The average days required for first post-partum exhibition of estrus were 49.33±5.86, 47.66±4.18, and 67.08±4.42 days in Group-I, II and III, respectively. This indicates that GnRH and PGF_{2α} treatment were effective for causing early

post-partum estrus exhibition in retained placenta buffaloes. On scanning available literature the references regarding effect of GnRH and PGF_{2α} treatment on day 14 on exhibition of first post-partum estrus in retained placenta buffaloes are not available hence could not be compared.

First service conception rate

During the present study the first service conception rate for different groups was observed and is presented in Tables 3.

The table shows that in Group-V (PGF_{2α}) the first service conception rate was highest (33.33%) which is indicative of the fact that PGF_{2α} treatment

Table 1. Average days required for involution of uterus in retained placenta buffaloes.

Sr. No.	Groups	Mean
1	Group-I	29.16±0.78 ^a
2	Group-II	27.41±0.58 ^b
3	Group-III	31.5±1.05 ^c

Column wise superscript (a, b and c) denoted the significant difference at P<0.05 and P<0.01 levels.

Table 2. Days required for exhibiting first PPE in retained placenta buffaloes.

Sr. No.	Groups	Mean
1	Group-I	49.33±5.86 ^a
2	Group-II	47.66±4.18 ^b
3	Group-III	67.08±4.42 ^c

Column wise superscript (a, b and c) denoted the significant difference at P<0.05

Table 3. First service conception rate in retained placenta buffaloes.

Criteria	Group-I	Group-II	Group-III
No. of cows served	12	12	12
No. of cows conceived	3	4	2
First service CR (%)	25	33.33	16.16

was most beneficial. The first service conception rate (25%) in Group-IV (GnRH) buffaloes indicates that GnRH treatment also yielded good results. Group-VI yielded lowest results of first service conception rate (16.16%). On scanning available literature the references regarding effect of GnRH and PGF_{2α} treatment on first service conception rate in retained placenta buffaloes are not available hence could not be compared.

CONCLUSION

The treatment of PGF_{2α} showed least time i.e. 22.75±0.91 days were required for uterine involution while 26.91±1.36 days for exhibition of first post partum oestrous. The first service conception rate was highest 41.66% in Group-II which is indicative of the fact that PGF_{2α} treatment was most beneficial for improving post partum fertility in buffalo.

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