



RESEARCH ARTICLE

Effect of Different Treatment Protocols on the Incidence of Retained Placenta and Post-partum Reproductive Health of Cross Bred Cows upon Induction of Parturition

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Abstract

Cross-bred cows (n=45) were strategically induced to calve on day 280 of gestation. They received pre and post-partum vitamin mineral mixture & calcium supplement (VMC), intravenous cloprostenol and methyl-ergometrine in Ringer's Lactate (CMR) just after expulsion of fetus, intrauterine infusion of metronidazole and furazolidone bolus with 80 ml 3% hydrogen peroxide after the expulsion of fetus (MF+HP) and oral methyl ergometrine as ecbolic (ME) for 6 days post-partum. They were then divided into three groups viz. Group 1 (n=15), Group 2 (n=15) and Group 3 (n=15) receiving VMC + CMR + (MF+HP) + ME, CMR + (MF+HP) + ME and MF respectively. Group 4 (n=15) constituted cows without retention of placenta (ROP). Induction of parturition resulted in ROP in 80% of cows in group 3. VMC treatment resulted in significant reduction in ROP. CMR + HP + ME significantly reduced ROP in group 2 compared to group 3. Mean days open first service (DOFS) and mean days open pregnancy were smallest while first service conception rate (FSCR) was greatest in group 1. The results indicate that parturition can be induced on day 280 of gestation and infusion of uterus with hydrogen peroxide along with slow i.v. administration of methyl-ergometrine after fetal expulsion greatly reduces ROP.

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Introduction

Retention of fetal membranes (RFM) is a pathological condition caused by expulsion failure during the third stage of parturition. Placenta is said to be retained if not expelled during the first eight hours of parturition (Roberts, 1971). There are numerous factors influencing placental expulsion: hereditary, nutritional, immunological, and pathological. Complete understanding of the process is still unclear. Retained placenta (RP) delays uterine involution and could lead to endometritis and metritis leading to sub-fertility (Maizon *et al.*, 2004). The therapy of RP has been a controversial subject for many years. Manual removal of fetal membranes and an intra-uterine antibiotic treatment are common in veterinary practice. Some studies have shown that manual removal of placenta decrease uterine defence mechanisms and impair subsequent fertility (Peters and Laven, 1996). We have therefore tested the efficacy of different treatment strategies in expulsion of placenta and post partum fertility of cross bred cows.

Materials and Methods

Forty five nine months pregnant cross-bred cows (Holstein Friesen × Non-descript) were selected for the present experiment from progressive farmers belonging to different villages of Gaighata Block, West Bengal. These cows had a record of date of insemination and received balanced ration in the form of straw and concentrate. However these cows were not supplemented with vitamin mineral mixture nor had they been de-wormed within past three months due to general ignorance of these farmers.

All cows were dewormed with fenbendazole (Panacur®, MSD Animal Health, India) before the start of experiments. The cows were divided into three groups viz. Group 1 (n=15), Group 2 (n=15) and Group 3 (n=15) receiving treatments enlisted in Table 1. Group 4 (n=15) constituted cows those had normal birth with no retention of placenta. They were strategically induced to calve on 280 days of gestation (i.e. 5 days short of normal gestation) with the consent of their owners.

Percentage of Retained Placenta (ROP %), Mean Days Open First Service (MDOFS), Mean Days Open Pregnancy (MDOP) and First Service Conception Rate (FSCR %), First Month Lactation Yield (FMLY) and Mean Lactation Yield during DOFS (MLYD) were recorded and data analyzed by Duncan's Multiple Range Test or Chi-Square test using SPSS 8. Software. Pregnancy was diagnosed on day 60 by rectal palpation. MDOP has been counted from day of parturition to the day of insemination that resulted in conception.

Results

Induction of parturition resulted in significantly lower birth weight of calves (28 ± 1.57 kg; n=45) than control (32.5 ± 0.98 kg; n=20). Eighty percent of cows (n=15) with induced calving on day 280 of gestation and without treatment had retained placenta (group 4; Table 2). Vitamin and mineral supplementation two weeks before the induction of parturition resulted in significant ($P < 0.05$) reduction in retention of placenta (group 1 Vs group 2; Table 2). The use of intra-venous methyl-ergometrine and cloprostenol after the expulsion of fetus along with intra-uterine infusion of 3% hydrogen peroxide significantly reduced the incidence of ROP (group 2 Vs group 3; Table 2).

MDOFS and MDOP were smallest in group 1 and greatest in group 3 (Table 2) while FSCR was greatest in group 1 although the difference in FSCR among groups was non-significant. The first month mean lactation yield of group 1 was the greatest among all groups while that of group 2 and 3 did not differ significantly (Figure 1). The results of our study demonstrate that the effect of mean lactation milk yield during DOFS had no significant effect on DOFS in vitamin-mineral treated group unlike other groups (Figure 2).

Table 1. Treatment Protocol for cows induced to parturate.

	Group 1	Group 2	Group 3	Group 4 (control)
N	15	15	15	15
Induction of Parturition	25 mg Dex. + 500 µg Clop. i.m.	25 mg Dex. + 500 µg Clop. i.m.	25 mg Dex. + 500 µg Clop. i.m.	
Vitamin-mineral pre-treatment	100 ml. <i>Ostovet</i> ® + 50 g <i>VM</i> ® powder orally for 2 weeks before parturition and 1 week thereafter.			
Oral ecbolic	150 ml <i>Utrasafe</i> for six days post-partum	150 ml <i>Utrasafe</i> for six days post-partum		
Intra-venous infusion	10 mg methyl-ergm + 500 µg Clop in 200 ml. RL over 2 hrs. period after expulsion of fetus	10 mg methyl-ergm + 500 µg Clop in 200 ml. RL over 2 hrs. period after expulsion of fetus		
intra-uterine infusion	6 <i>Cleanex</i> bolii + 80 ml. 3% HP 1 hour after expulsion of fetus. Thereafter 6 <i>Cleanex</i> bolii every alternate day till day 10 post-partum	6 <i>Cleanex</i> bolii + 80 ml. 3% HP 1 hour after expulsion of fetus. Thereafter 6 <i>Cleanex</i> bolii every alternate day till day 10 post-partum	6 <i>Cleanex</i> bolii + 80 ml. 3% HP 1 hour after expulsion of fetus. Thereafter 6 <i>Cleanex</i> bolii every alternate day till day 10 post-partum	

Dex= Dexamethasone (*Curadex*®, Concept Pharmaceuticals, Mumbai) Clop= Cloprostenol (*Pragma*®, Intas Pharmaceuticals, Ahmedabad), Methyl-ergm= Methyl Ergometrine (*Utrasafe*®, Vet Mankind, New Delhi), *VM*® powder= (multi-mineral, multi-vitamin supplement containing Vit. A, Vit. E, Se, Zn, Cu, Co, etc, Intervet India,

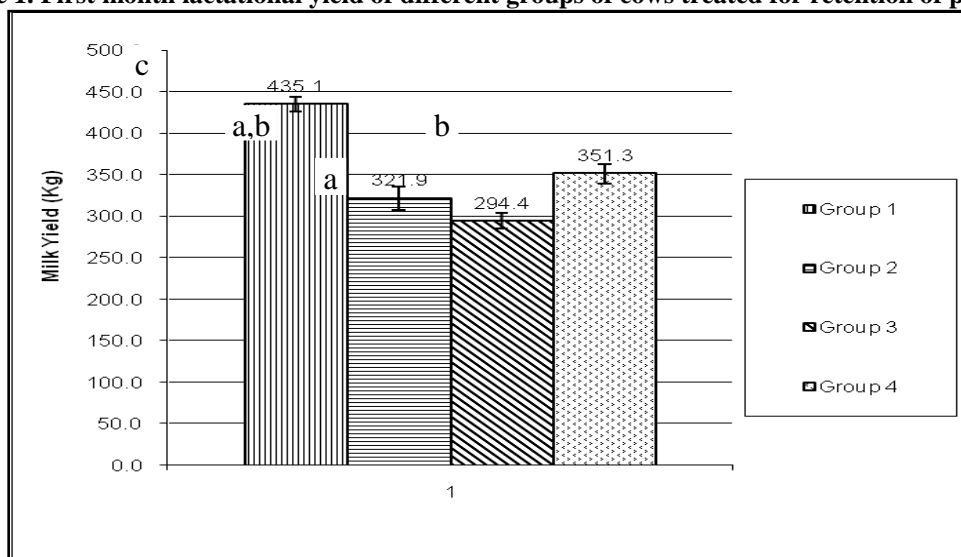
Pune), *Ostovet*®= (supplement of calcium, Vit. D₃, etc., Virbac, India), *Cleanex*® bolus= (Nitrofurazone, Metronidazole, Providone Iodine, Dosch Pharmaceuticals, Mumbai), HP= hydrogen peroxide
 *If cervix was not open enough to permit intra-uterine infusion then the drugs were administered by making a suspension in 20 ml normal saline and administered by a catheter

Table 2. Differences in reproductive performances between group.

	Group 1	Group 2	Group 3	Group 4	Sig.
N	15	15	15	15	
ROP %	33	60	80		P<0.05
MDOFS	65.8 ^a	80.3 ^b	92.6 ^c	78.9 ^b	P<0.05
MDOP	98.7 ^a	115.8 ^b	127.5 ^c	110.8 ^b	P<0.05
FSCR %	66.6	53.3	53.4	60	NS

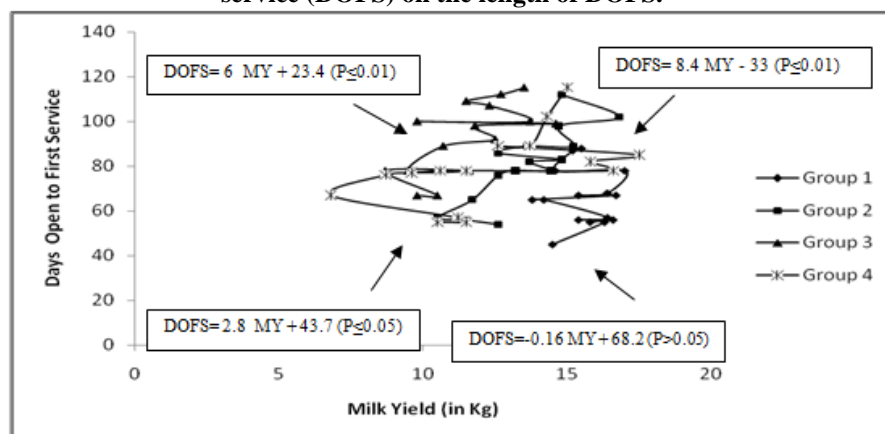
Different superscripts along same row denote significant means. ROP = retained placenta, MDOFS = mean days open first service, MDOP = mean days open first pregnancy, FSCR % = first service conception rate

Figure 1. First month lactational yield of different groups of cows treated for retention of placenta.



a,b,c: similar alphabets denote homogeneous means

Figure 2. Scatter diagram showing the effect of mean lactation yield (in Kg) of cows during days open to first service (DOFS) on the length of DOFS.



Discussion

Induction of parturition resulted in lower birth weight of calves that is consistent with the fact that during the last two weeks of parturition, the growth rate of fetus is approximately 450 grams per day (Villaroel and Lane, 2010). Though it has been reported that premature birth before fifteen days of parturition resulted in weaker calves with greater neonatal mortality rate (Villaroel and Lane, 2010), we did not find problems of calf mortality when induced to calve on day 280 of gestation.

Induction of parturition resulted in retention of placenta in 80% of cows without any treatment before and after parturition (group 4; Table 2). It has been reported that one of the negative effects of induction of parturition is retention of placenta (Yildiz, 2009). Reduction in retention of placenta in vitamin and mineral supplemented group might be due to the fact that vitamin A has epitheliotropic property and vitamin A, E and Se are anti-oxidants that enhance immunity by stimulating neutrophil function during the peri-parturient period (Spears and Weiss, 2008), thus their supplementation resulted in healthy placenta that was removed easily by the stimulated immune system (Beagly *et al.*, 2010) at the time of parturition. It is reported that cows with oxidative stress at parturition with decreased level of blood glutathione peroxidase, superoxide dismutase had greater incidence of retention of placenta (Ahmed *et al.*, 2009). Pre-partum supplementation of calcium might have resulted in increased and effective myometrial contractions aiding in expulsion of placenta. More recently it has been found that increased placental collagenase activity results in detachment of fetal cotyledons from maternal caruncles and calcium is required for this activity (Beagly *et al.*, 2010).

The beneficial effect of slow intra-venous drip of methyl-ergometrine and cloprostenol after expulsion of fetus in reduction of ROP might be due to the fact that cloprostenol, a PGF_{2α} analogue stimulates uterine defence mechanism and methyl-ergometrine increases myometrial contractions (Azawi, 2008). More recently hydrogen peroxide has been found to be effective not only for its bactericidal property against anaerobes (*Fusobacterium necrophorum*, *Arcanobacter pyogenes*, etc.) but also aiding in placental detachment by its effective tissue debridement property (Dolezel *et al.*, 2010).

Since post-partum infection, endometritis or metritis have been implicated for delayed involution of uterus as well as suppressing folliculogenesis (Sheldon *et al.*, 2008), one common sequel to retention of placenta is longer MDOFS and MDOP. The results indicate that post-partum reproductive health of cows those had vitamin mineral supplementation with calcium was better than those without treatment and interestingly even better than those without ROP. Intra-uterine *Cleanex* bolus (metronidazole, nitrofurazone and providone iodine) was effective in controlling post-partum metritis and endometritis. Vitamin A, E, Se and Ca supplementation probably reduced the oxidative damage to the endometrium, hastened involution of uterus and stimulated uterine defence mechanism (Hanafi *et al.*, 2008) during the post-partum period. Significantly better MDOFS and MDOP in group 2 compared to group 3 suggests that oral ecobolics for six days along with intra-uterine antibiotics aid in effective cleansing of uterine lochii and probably quicker involution of uterus.

The first month mean lactation yield of group 1 was the greatest among all groups. Since lactation is also related with nutritional stress (Butler, 2008), pre-partum vitamins, minerals with Ca supplementation is vital for improving milk production apart from improving reproductive health. Lactation has been implicated for longer DOFS by suppressing the release of gonadotrophic hormones from the pituitary gland (Butler, 2008). However, pre and post partum vitamin mineral supplementation was effective in mitigating the effect of lactation stress on resumption of estrous as demonstrated in our study that mean lactation milk yield during DOFS did not affect DOFS in vitamin-mineral treated group (group 1) unlike other groups.

Thus this study reveal that problem of retention of fetal membranes associated with induction of parturition can be reduced considerably by pre and post partum vitamin mineral supplementation. Administration of methyl ergometrine and cloprostenol in Ringer's Lactate as slow intra-venous drip just after expulsion of fetus and infusion of uterus with 3% hydrogen peroxide (80 ml) greatly reduces incidence of retained placenta and can be brought into routine managemental practice. Since manual expulsion of placenta is recently being discouraged, oral ecobolic and intra-uterine antibiotics on alternate days is mandatory for treatment of retained placenta. Moreover, induction of parturition on day 280 of gestation can greatly reduce complications such as dystocia due to lighter weight of calves as well as proper planning of management and labour.

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