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Induction of Parturition in Cows with Misoprostol

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Abstract: The purpose of this study, was to determine the efficacy of intravaginal misoprostol for induction of parturition in cows. Twenty-seven multiparous Holstein cows with singleton pregnancies were used in this experiment. As randomly, cows were assigned to 1 of 2 treatment groups (n = 9) and a control group (n = 9). On day 270 of gestation cows in the treatment groups were received 200 μg or 400 μg of misoprostol (cytotec®) intravaginally. Intravaginal misoprostol was given every 6 h until the onset of labour. A maximum of 6 doses was administered. The average gestation length in control cows was 281 days. All induced cows (except for one cow administered 400 μg misoprostol) calved between 24 and 72 h after administered misoprostol. The 400 μg dosage of misoprostol resulted in induction failures of 11.1%. The rate of placental retention, birth weights, calving difficulty and calf viability did not differ among groups. Vaginal administration of misoprostol is an effective method of inducing parturition in the cow. Misoprostol could be used to produce a predictable calving time.

Key words: Misoprostol, induction of parturition, cow, intravaginal, labour

INTRODUCTION

The induction of parturition in cattle presents great economic incentives and significant economic benefits and advantages as a management tool animal husbandry (Mansell *et al*., 2006). Induction of parturition may be indicated to terminate pregnancy if desired, to advance the calving date in late conceiving cows, to synchronize the beginning of lactation, to terminate gestations, which have run too far over their time, to control fetal development where gross fetal oversize could be excepted to cause dystocia at full term parturition, to treat of uterine hydrops, chronic traumatic reticulitis, kidney diseases, circulatory incompetence with bronchial pneumonia, cardiac failure, fractures, or other health-related matters, in which salvage of the fetus or the life of the cow are being considered (Barth, 2006; Bazer and First, 1983; Holmes and Garcia, 1999; Shukla *et al*., 2008). Surgical techniques and pharmacological methods are available for this purpose. Various types and combinations of hormone treatments to induce parturition in cattle have been found applicable to synchronize calving for better and convenient calving management (Barth, 2006). Cortisol and prostaglandins analogues have been used for the on-farm induction of parturition in ruminants (Taverne, 1998). Misoprostol is a synthetic 15 deoxy-16 hydroxy 16-methyl analogue of the naturally occurring prostaglandin E_1. Several studies have found misoprostol effective as an agent for cervical ripening and induction of labour (Aronsson *et al*., 2007; El-Sherbiny *et al*., 2001; Collins, 1990; Zeiman *et al*., 1997). Misoprostol has a number of advantages for clinical use. It is inexpensive, easy to store and stable at room temperature (Collins, 1990; El-Sherbiny *et al*., 2001; Goldberg *et al*., 2001; Sanchez-Ramos *et al*., 1993). Attempts to the induction of parturition with Misoprostol have been made only in women (El-Sherbiny *et al*., 2001), goats (Alan and Tasal, 2002) and ewes (Tasal *et al*., 2001). Similar to those studies, a study in cows had been not defined the beginning of parturition.

This study was undertaken to compare the efficiency and safety of 2 doses of intravaginal misoprostol in achieving induction of parturition.

MATERIALS AND METHODS

Twenty-seven multiparous Holstein cows with singleton pregnancies were used in this experiment. As randomly, cows were assigned to 1 of 2 treatment groups (n = 9) and a control group (n = 9). Cows in control group received no treatment; On day 270 of gestation, cows in the treatment groups were received 200 μg (Group 1) or 400 μg (Group 2) of misoprostol (cytotec®) intravaginally. Intravaginal misoprostol was given every 6 h until the onset of labour. A maximum of 6 doses was administered. The tablets were dampened by 3 drops of water immediately prior to insertion in the treatment groups with water. Induction is considered to have failed if cows have

not calved by 72 h after treatment. The number of cows responding, the interval from misoprostol administration to parturition, calving difficulties, calf birth weight, calf vigor, sex ratio of calves born and the incidence of retained placentas were observed and recorded. Calving difficulties were classified as unassisted, manual traction, manual repositioning and traction or caesarean section. A calf was considered of normal vigor if it was able to stand and nurse within 2 h of birth; it was classified as weak if it required any assistance for its survival (Barth *et al*., 1978). Placentas were considered retained if they were not released by 24 h after calving.

Data are recorded as percentages, means and standard deviation. The time intervals from misoprostol administration to calving and birth weights were compared by analysis of variance. Differences in the number of induction failures, calving ease, rate of placental retention and pregnancy rate were analyzed by chi square (χ^2).

RESULTS AND DISCUSSION

The observations in relation to induction of parturition in cows (mean+SE) are shown in the Table 1.

Table 1: Observations in relation to induction of parturition in cows

Groups	I (200 mcg)	II (400 mcg)	III (Control)
No. of animals in group	9	9	9
Gestation period up to the first treatment (days)	270	270	270
Interval between treatment and calving (h) (time+std. error mean)	38.44±2.78	36.22±3.07	-
Induction failure rate (%)	0	11.11	100
Gestation period up to birth (days)	272	272	281
Retained fetal membranes (%)	33.33	22.22	22.22
Mode of delivery			
Spantaneous vaginal delivery (%)	44.44	55.55	44.44
Manual traction (%)	33.33	22.22	44.44
Positioning and traction (%)	22.22	11.11	11.11
Caesarian (%)	0	11.11	0
State of calf			
Very good (%)	22.22	33.33	33.33
Good (%)	66.66	44.44	55.55
Weak (%)	22.22	11.11	11.11
Mortality (%)	0	0	0
Mean birth weight (kg)	39.5	39.3	41.0
Calf's sex			
Female	5	3	4
Male	4	6	5

The normal gestation period of dairy cattle ranges between 278 and 290 days (Adams, 1969). The average gestation length in control cows was 281 days. In both treated groups the mean length of gestation was significantly less ($p<0.01$) than in the untreated group, however, there was no difference in gestation length between the 2 treated groups ($p>0.05$). The effect of misoprostol to induction of parturition, as reported in women (Carlan *et al*., 2001), nanny goat (Alan and Tasal, 2002) and sheep (Tasal *et al*., 2001), was confirmed in cows. We defined successful induction as parturition occurring within 72 h after administered misoprostol. All induced cows (except for one cow administered 400 μg misoprostol) calved between 24 and 72 h after administered misoprostol. Dams receiving the induction treatment had an insertion-delivery time of >24 h. The overall duration between commencements of treatment to induction of parturition was 38.44±2.78 h in group I and 36.22±3.07 h in group II. The 400 μg dosage of misoprostol resulted in induction failures of 11.1%. In this cow, the cervix did not dilate any further and the cow did not enter the expulsive stage. Therefore, caesarean section was performed. Induction of parturition insignificantly reduced calf birth weights ($p>0.01$). The low birth weights were a direct result of the 9.0 days shorter gestation length that resulted from the induction treatment. The insignificant decrease in birth weight resulting from induction of parturition was not associated with calf viability or vigor ($p>0.05$). Although, it was expected that a decreased birth weight might decrease dystocia, that was not the case. Assistance during calving was administered to five of 9 untreated cows (55.5%), 5 of 9 cows in group I (55.5%) and 4 of 9 cows in group II (44.4%) but induction, by itself, did not caused any increase in dystocias. These differences were not significant ($p>0.05$) among groups. Several of the dystocia was admittedly related to abnormal presentations of the calves. Abnormal presentations occurred in 2 of 9 cows in group I, 1 of 9 cows in group II and 1 of 9 cows in the untreated group. Usually, the head or leg was doubled backwards. Approximately, half of calves born to all groups were delivered unassisted. Meyer *et al*. (2001) estimated a primiparous and multiparous dystocia rate (score >1) of 28.6 and 10.7%, respectively. Lombard *et al*. (2007) reported that over 35% of calves required assistance during birthing. It was informed that the proportion of calvings that required assistance in the studied dairies was large, especially for primiparous dams, in which >50% needed assistance at calving in that study. Results of Meyer *et al*. (2001) suggested a smaller incidence of dystocia than reported in this study (Lombard *et al*., 2007). In this study, the calf mortality was observed in none in all groups. It could be argued that the calves survived within 24 h of birth because of optimal care. Because dystocia has been shown to have detrimental effects on adaptation of calves to extrauterine life, calves exposed to dystocia required additional attention than calves delivered without assistance (Bellows and Lammoglia, 2000; Berger, 1994; Meyer *et al*., 2000). The calf mortality may be reduced to some extent by careful observation and prompt

assistance. In this study, the calves was routinely given colostrum shortly after birth, provided a dry, clean environment and received care for adverse circumstances. One calf in group I, 2 in group II and 1 in control group were required assistance to nurse.

The rate of placental retention did not differ among groups. Average incidence of RFM for normal dairy cows ranges from 4-18% (Han and Kim, 2005). The incidence of retained placenta in this study was 33.3% in group I, 22.2% in group II and 22.2% in group III. It was recorded that the overall incidence of retention of fetal membranes was higher than the normal limits, but the incidence was lower than the reported induction of parturition with prostaglandin F2 alpha and/or corticoids (Allen and Herring, 1976; Murray *et al*., 1984). Increased occurrence of retained placenta in cows in this study might be due to lack of tone and slow involution or damage to the uterus by mechanical stress resulting from calving difficulty (Klerx and Smolders, 1997). In agreement with other reports (Erb *et al*., 1985; Pelissier, 1972; Thompson *et al*., 1983), the dystocia was associated with the incidence of retained placenta in this study. Chassagne *et al*. (1996) and Joosten *et al*. (1987) on the relationship between gestation length and the incidence of retained placenta showed that shorter gestation lengths are associated with a higher incidence of retained placenta. Short gestations were not related to an increased risk of developing retained placenta in this study. Sex of the calf had no influence on the retained placenta rate. A similar pattern was found by Muller and Owens (1974). Joosten *et al*. (1987) founded that the retained placenta for male calves were associated with 0.2% higher rates. It is debatable whether this statistically significant difference is indicative of a real difference or the number of cases analyzed.

CONCLUSION

The rate of placental retention, birth weights, calving difficulty and calf viability did not differ among groups.

The results suggested that misoprostol is a cost-effective and safe alternative by vaginal administration for induction of parturition in the cow. The optimal dose, regime and route of administration needs further investigation.

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