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Research Article

PREPARTUM ADMINISTRATION OF VITAMIN E AND SELENIUM INJECTION AND ITS ABIDING EFFECT ON CALF WEIGHT, PLACENTAL WEIGHT AND EXPULSION TIME OF FETAL MEMBRANE IN SURTI BUFFALOES

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A study was conducted on twenty (20) Surti buffaloes during their transient period categorized into two groups; treatment (n=10) and control (n=10) groups. In treatment group of animals to which 10 mL DL-α tocopheryl acetate I.P. equivalent to tocopherol (vitamin E) base -50mg, sodium selenite U.S.P. equivalent to selenium base -1.5mg in each mL (E-CARE Se) and in control group animals 10 mL normal saline injected i/m on 60th, 45th, 30th and 15th day before expected date of parturition and after parturition on 15th and 30th day. The mean expulsion time of fetal membranes in the treatment group was found to be significantly shorter than that of control group. The mean placental weight in the treatment group was found to be non-significantly lower than that of control group. The calf weight in the treatment and control group did not differ significantly.

Key words: Buffaloes, Calf weight, Placental studies, Prepartum, Selenium, Vitamin E

The transition or periparturient period, from 3 weeks before to 3 weeks after parturition, is a stressful time for dairy cows (Drackley, 1999). During gestation oxidative stress plays a role in the initiation of pre-term labor (Pressman *et al*., 2003) and during normal parturition (Fainaru *et al*., 2002) assuring ovulation, ovarian steroidogenesis, oocyte maturation, blastocyst formation, luteolysis and luteal maintenance in pregnancy (Sugino *et al*., 2000). Vitamin E is an important

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antioxidant that has been shown to play an important role in immuno responsiveness and health in dairy cows (Weiss and Spears, 2006). In vitamin E and selenium deficiency condition, free radicals accumulate and not only damage cell membranes, but also disrupt several processes linked to the synthesis of steroids (Segerson and Libby, 1982), prostaglandins (Harrison and Conrad, 1984), sperm motility and the development of the embryo (Goff, 1999). It is not surprising therefore that negative impacts of vitamin E and selenium deficiencies have been observed on various components of the reproductive events, including ovulation rate (Goto *et al*., 1992), uterine motility, sperm motility and transport (Robinson, 1996), conception rate and post-partum activities (Jie *et al*., 2004), fetal membrane expulsion (Talavera *et al*., 1985), embryo survival, milk production and post natal growth (Garcia *et al*., 2001). Hence, present study was planned to observe the effect of periparturient injection of vitamin E and selenium on calf weight, placental weight and fetal membrane expulsion time in Surti buffaloes.

MATERIALS AND METHODS

The present study was performed as a part of PG research work, which was approved by Director of Research, Navsari Agricultural University, Navsari, Gujarat. The study was conducted between May 2014 and April 2015 at Livestock Research Station (LRS), Navsari Agricultural University (NAU), Navsari, Gujarat, India. For the investigation, twenty (20) Surti buffaloes during their transient period i.e. two month before their expected date of parturition to two month after parturition selected from LRS, NAU, Navsari and dividing into two groups; treatment (n=10) and control (n=10) groups. In treatment group of animals to which 10 mL DL-α tocopheryl acetate I.P. equivalent to tocopherol (vitamin E) base -50 mg, sodium selenite U.S.P. equivalent to selenium base -1.5 mg in each mL (E-CARE Se) and in control group animals 10 mL normal saline injected i/m on 60^{th}, 45^{th}, 30^{th} and 15^{th}day before expected date of parturition (prepartum) and after parturition on 15^{th} and 30^{th} day. The time taken for the expulsion of fetal membrane in each buffalo following a complete parturition was recorded in hours. Each of entire expelled placenta was carefully collected and weighted in kilogram (Kg) with the help of electronic weighing balance. After the parturition, the weight of new born calf was carried out in kilogram (Kg) with the help of weighing machine. The tests of significance for treatment vs. control groups were made by Standard Student's paired't' test.

RESULTS

The mean expulsion time of fetal membranes in the treatment group was found to be significantly ($P<0.01$) shorter (3.220 ± 0.199; range 2.30 to 4.45 hrs) than that of control group (4.370 ± 0.104; range 2.55 to 5.10 hrs) with the overall mean of 3.795 ± 0.171 hrs. Further, overall mean times for expulsion of placenta did not differ significantly ($p>0.05$) between birth of male (3.81 ± 0.27 hrs) and female (4.08 ± 0.39 hrs) calves (Table 1).

Table 1. Expulsion of fetal membranes, placental weight and calf weight in antioxidant treated and control group of Surti buffaloes (Mean ± SE)

Parameters	Treatment group (n=10)	Control group (n=10)	't'- value
Expulsion of fetal membranes (hrs)	03.220 ± 0.199	04.370 ± 0.104	5.119**
Placental weight (Kg)	03.373 ± 0.100	03.442 ± 0.052	0.611
Calf weight (Kg)	20.700 ± 1.065	20.450 ± 1.071	0.166

**p<0.01 between treatment and control group

The mean placental weight in the treatment group was found to be non-significantly lower than that of control group (3.373 ± 0.100; range 3.10 to 4.10 Kg vs. 3.442 ± 0.052; range 3.20 to 3.83 Kg) with an overall of 3.408 ± 0.056 Kg in Surti buffaloes (Table 1).

The mean calf weight in the treatment group was found to be 20.70 ± 1.07 (range from 16 to 27) Kg and that of control group 20.45 ± 1.07 (range from 13.50 to 24) Kg with an overall mean of 20.58 ± 0.74 Kg. The calf weight in the treatment and control group did not differ significantly (Table 1).

DISCUSSION

The mean expulsion time of fetal membranes in the treatment (vitamin E and selenium) group in the present study was found significantly (p<0.01) earlier as compared to control group (3.220 ± 0.199 vs. 4.370 ± 0.104 hrs). This observation agreed with Deori *et al.* (2014) in Indian yaks; and Panda *et al.* (2006) and Amer and Badr (2008) in buffaloes, they all found significantly (p<0.05) shorter mean expulsion time of fetal membranes in the vit-E selenium treatment group as compared to control group of animals. The mean placental expulsion time in the present study was found shorter than the normal physiological range of 6.0 to 8.0 hrs.

According to Youssef *et al.* (1985), pregnant animals are more susceptible to selenium deficiency than non-pregnant animals, which increase the incidence of prepartum and postpartum reproductive disorders. The shorter placental expulsion period in the vitamin E-selenium treated animals may have been due to improved uterine muscular function (Youssef *et al.*, 1985). The mechanism by which selenium enhances expulsion of the fetal membranes after parturition is not well-defined but could involve effects on steroidogenesis (Staats *et al.*, 1988) or prostaglandin synthesis (Marshall *et al.*, 1987). Furthermore, vitamin E and selenium might act by promoting function of neutrophils, as the cows which experienced retained fetal membranes had reduced neutrophil function postpartum. Further, selenium

could influence contractility of the uterus after parturition/during expulsion of the fetal membranes because injection of selenium or vitamin E and selenium was shown to increase contractile activity of the ovine uterus.

Singh *et al*. (1994) reported higher mean weight of placenta as 3.83 ± 0.19 Kg in buffaloes, whereas comparatively lower weight than the present one has been documented by Pugashetti *et al.* (2002) in HF X Deoni cows; and Murugeppa *et al.* (1998) in Surti buffaloes. Moreover, Pugashetti *et al*. (2002) in HF X Deoni cows with male and female calves reported 3.14 ± 0.12Kg vs.3.00 ± 0.6 Kg and 2.82Kg vs. 2.69 Kg weight of placenta, respectively, which were also found comparatively lower than the present findings.

The higher and lower weight of placenta as compared to present findings reported by different research workers might be attributed to breed, species, gestation length and parity of those animals in addition to birth of male or female calves.

These results in terms of calf weight in treatment and control group were in line with various research workers, who compared vitamin E and selenium with various dose rate, regiment and route and reported non-significantly ($p>0.05$) higher birth weight of calves in treatment group as compared to control group of cattle (Moeini *et al*., 2009) and buffaloes (Khan *et al*., 2015).

Moreover, non-significant difference in birth weight of calf reported in vitamin E and selenium injection group, vitamin E and selenium plus oral vitamin E supplementation group and only oral vitamin E supplementation group of Holstein cows by Kafilzadeh *et al*. (2014) could be because of the sufficiency of vitamin E and selenium level in all experimental groups. The overall non-significant ($p>0.05$) effect of vitamin E and selenium on calf birth weight suggested that vitamin E and selenium treatment did not affect the calf performance. In contrast to this study, Panda *et al*. (2006) observed significantly ($p<0.05$) higher average birth weight of calves (37.17 Kg vs. 33.16 Kg) in α-tocopheryl acetate supplemented than control group of buffaloes.

So it can be concluded that differences among placental weight and calf weight were not observed between treatment and control groups, but the time of expulsion of fetal membranes was significantly shorter in peripartum vitamin E and selenium treated group as compared to control group of buffaloes.

Conflict of interest: Authors declare that there is no conflict of interest regarding the present research work.

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