EFFECT OF ANOMIN® SUPPLEMENTATION DURING PREPARTUM PERIOD ON PERIPARTURIENT DISORDERS IN DAIRY ANIMALS

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ABSTRACT

A study was conducted to determine the effect of prepartum supplementation of anionic salt mixture (Anomin®) on incidence of periparturient disorders in dairy animals of individual farmers under field conditions. Total 80 advanced pregnant animals were selected about to calve during the period from 1st March to 10th April and were divided equally into treatment and control groups. The animals in control group were fed with concentrate mixture, green fodder and dry fodder as per availability, whereas animals of treatment group were fed with additional anionic salt mixture (Anomin®) @ 100 gm/animal/day (50 gm each in the morning & evening) for 20 days before expected date of calving. The periparturient disorders compared between anionic salt (Anomin®) supplemented (treatment) and control group revealed reduced incidence of retention of foetal membranes (7.50 vs 17.50%), genital prolapse (2.50 vs 5.00%), milk fever (0.00 vs 2.50%) and metritis (0.00 vs 10.00%) in anionic salt supplemented group as compared to control group (overall 10 vs 35%). Serum concentrations of both calcium (10.73±0.21 vs. 10.26±0.26 mg/dl) and phosphorus 5.55±0.12 vs. 4.89±0.14 mg/dl) at 6 hrs postpartum were higher in anionic salt (Anomin®) supplemented group than the control calving group, with significant difference in phosphorous levels only. The results depicted beneficial effect of anionic salt supplementation to advanced pregnant dairy animals in terms of reduced periparturient disorders and thereby better health and productivity.

KEY WORDS: Anionic salt (Anomin®), Periparturient Disorders, Calcium, Phosphorus.

INTRODUCTION

Anionic salts are defined as those containing greater amounts of negatively charged fixed anions Cl^- and $SO4^{--}$ relative to positively charged cations Na^+ and K^+. The pregnant cow's metabolism is under severe stress as she transitions to lactation. The transition period is considered the most traumatic time of the annual cycle of the dairy cow, where dramatic physiological changes are occurring (Keady *et al.,* 2001) determining the cows health, production and reproduction in the subsequent lactation. Many of these prepartum changes and the management response to them influence the risk of a spectrum of disease conditions of early lactation. Diseases associated with parturition, viz. dystocia, uterine prolapse, retained placenta, metritis, milk fever are estimated to account for 8% of all diseases in dairy cows (Roine and Saloniemi, 1978). To meet requirements for milk production, her body has a high nutrient demand making her most susceptible to some diseases and metabolic disorders. Several studies have demonstrated that feeding anionic salt during the prepartum period can result in decline in the incidence of milk fever (Block, 1984; Oetzel *et al.,* 1988; Joyce *et al.,* 1997). The stress incurred at parturient period results in increased susceptibility to metabolic disorders and immune-suppression and is frequently associated with varying degree of hypocalcaemia (Curtis *et al.,* 1983; Horst *et al.,* 1997). Cows that experience calving-related disorders have significant metabolic changes reflected in blood concentration of some metabolites (Goff and Horst, 1997). Therefore, the present study was planned to evaluate whether the prepartum supplementation of anionic salt mixture to dairy animals can reduce the periparturient disorders.

MATERIALS AND METHODS

This study was conducted on 80 advanced pregnant dairy animals of individual farmers due for calving from 1st March to 10th April, 2015 in Nana Kalodra Village of Anand District of Gujarat. The animals were randomly and equally divided into two groups, i.e. control group and treatment group;Anomin® (Amul Research & Developmemt Association,C/o Amul Dairy,Anand) each of 40 animals. The animals of both the groups were fed with concentrate mixture, green fodder and dry fodder regularly. In addition, the animals of treatment group received anionic salt mixture (Anomin®) supplement @ 100 gm/animal/day (50 gm each in the morning & evening) for 20 days before expected date of calving. All the animals were monitored individually for periparturient complication, if any and managed suitably. Owners of all 80 animals were also approached personally one month postpartum to know and record the incidence severity and type of periparturient disorders experienced, if any, by the animals of control and treatment group. Serum calcium and phosphorus concentrations were estimated from the blood samples collected 6-12 hrs after calving by ICP-OES method. The incidences of periparturient disorders, mainly retention of foetal membranes, genital prolapse, milk fever and metritis as well as serum profiles of calcium and phosphorus were compared statistically between treated and control groups.

RESULTS AND DISCUSSION

The beneficial effect from feeding of Anomin® during periparturient period is to reduce the incidence of clinical and subclinical hypocalcemia. The principle behind feeding anionic salt is to acidify the dry cow diet to modify the electrical charge of the blood. As a result, the cow is enabled to mobilize calcium from bone to meet the demands of lactation. The most common anions (electrolytes negatively charged) are chloride (Cl^-), sulfate (SO_4^{2-}) and phosphate (PO_4^{3-}).

Incidence of Periparturient Disorders

The incidences of retention of placenta (ROP), genital prolase, milk fever and metritis studied in a group of 40 dairy animals after prepartum Anomin® supplementation for 20 days over their control counterpart of 40 animals are presented in Table 1.

Out of 40 anionic salt supplemented animals in treatment group, only four (10.00%) cows experienced postpartum ailments. Among these, three (7.50 %) animals suffered from retention of foetal membrane and one (2.50%) from postpartum prolapse of the uterus, whereas rest 36 animals (90.00%) did not require any veterinary intervention. In contrast, 14 out of 40 (35.00%) animals in control calving group required some degree of veterinary intervention around parturition. Seven (17.50%) animals exhibited retention of foetal membrane and two (5.00%) postpartum prolapse of uterus. Further one (2.50%) animal suffered from milk fever/ hypocalcaemia and four (10.00 %) from postpartum meteritis. It has been observed that the incidence of retention of foetal membrane, genital prolapse, milk fever & metritis were reduced in anionic salt mixture (Anomin®) supplemented calving group compared to control calving group.

Table 1: Incidence of periparturient disorders in prepartum Anomin® supplemented dairy animals

Disorders / Groups	ROP (%)	Genital Prolapse (%)	Milk fever / Hypocalcaemia (%)	Metritis (%)
Control Calving Group (n=40)	7 (17.50%)	2 (5.00%)	1 (2.50%)	4 (10.00 %)
Anomin® Supplemented Calving group (n=40)	3 (07.50%)	1 (02.50%)	0 (0.00%)	0 (0.00%)

Oetzel *et al.* (1988) reported reduced incidence of retained foetal membranes after anionic salts supplementation to prepartum cows. However, Gaynor *et al.* (1989) noted a high occurrence of retained placenta (28%) across diets, which were thought to be due to the high Ca content (1.2%) inhibiting selenium uptake. Patel *et al.* (2011) reported that the overall incidence of peripartum disorders (mainly retention of placenta, uterine prolapse, endometritis and milk fever) was much less in crossbred cows following prepartum Rovimix-Hy-D® supplementation as compared to control group (15 vs 45%), which supported well the present observation with Anomin® supplementation (10 vs 35%).

Blood Calcium Profile

The precalving supplementation of anionic salt induces metabolic acidosis which helps to enhance the release of calcium ions from bone, which in turn maintains blood calcium concentration at calving when demand for calcium in colostrum is increased. The mean plasma calcium concentrations were well within the normal range in both the groups under study. The serum calcium level on the day of calving in animals of control calving group and Anomin® supplemented group varied from 8.5 to 12.5 and 9.6 to 12.6 mg/dl, with means of 10.26±0.26 and 10.73±0.21 mg/dl ($P>0.05$), respectively. It is important to note that though the serum calcium concentration did not differ significantly between two groups, the cows in control calving group suffered more from periparturient disorders. The use of the specific precalving supplement for a short period prior to calving clearly improved the overall health and immune-competence of the animals. Moreover, it was also observed that the supplemented animals exhibited better-feed intakes after calving and reached peak milk yield sooner than their control calving counterpart group (4-5 weeks vs 5-6 weeks).

The concentration of total calcium is not directly related in cows with abnormal Ca status (Kvart *et al.,* 1982), such that the correlation between ionized and total Ca can change during milk fever (Carlstrom, 1970). Tucker *et al.* (1992) and Won *et al.* (1996), used diets that were negatively balanced for their cation-anion levels during the dry period in order to prevent the development of milk fever. Gulay *et al.* (2008) reported that the cows fed the prepartum cationic or anionic diets had similar mean postpartum serum concentrations of Ca (9.34 vs. 9.35 mg/dl), though the use of anionic salt during the prepartum period has repeatedly been shown to prevent hypocalcemia in multiparous cows at or near calving (Block, 1984; Horst *et al.,* 1997; Joyce *et al.,* 1997). Cows fed anionic salt tend to have higher plasma Ca concentrations than cows fed without anionic salt (Oetzel *et al.* 1988; Goff *et al.,* 1991) and may have a lower susceptibility to hypocalcemia. Muhammed *et al.* (2000) reported that anionic diets feeding during prepartum period reduced the incidence of milk fever by stimulating PTH and 1,25-$(OH)_2D_3$ which increase intestinal Ca^{+2} absorption, bone Ca^{+2} resorption and renal tubular reabsorption of Ca^{+2}.

Blood Phosphorus Profile

The mean serum phosphorus concentrations were well within the normal range in both the groups. The serum phosphorus levels on the day of calving in animals of control and treatment anionic salt mixture supplemented groups varied from 3.8 to 5.3 and 4.9 to 6.0 mg/dl, respectively, with significantly ($P<0.01$) higher mean value in anionic salt (Anomin®) supplemented (5.55±0.12 mg/dl) than control calving (4.69±0.14 mg/dl) group. The circulating phosphorus concentration appeared improved at calving in salt supplemented group when compared with control calving group. Typically, decrease in serum or plasma phosphorus concentration occurs after calving concomitantly with calcium. The highly significant difference in phosphate concentrations at calving was achieved by dietary use of anionic salt. Kocabauli *et al.* (2001) reported that serum phosphorus levels were significantly higher ($P<0.05$) in the anionic diet and probiotic groups than in the other groups one week prior to calving. This finding can be explained by the mobilisation of P along with Ca from bone tissues since these two minerals are chemically bound in bone tissues. DeGroot *et al.* (2010) concluded that the prepartum plasma phosphorus tended ($P<0.08$) to be greater for multiparous

cows fed on anionic diet prepartum.

The current study focused on evaluating diets that included feeding of Anomin® during the short dry period prepartum that provided required nutrients, energy and reduced the incidence of peripartum milk fever and associated diseases. In view of the high incidence of reproductive disorders in milking cows and their serious economic impact on profitability (Jeyakumari *et al.,* 2003 and Taraphder, 2005), the use of a short term supplementation primarily targeted at alleviating these disorders is a low cost, easy management option to help achieve maximum profitability for the dairy farmers.

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