



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(4): 1313-1315
Received: 19-05-2018
Accepted: 24-06-2018

Suneel Singh
Livestock Production
management Animal, ICAR-
National Dairy Research
Institute, Karnal, Haryana,
India

SS Lathwal
Livestock Production
management Animal, ICAR-
National Dairy Research
Institute, Karnal, Haryana,
India

RK Baithalu
Animal Reproduction,
Gynaecology and Obstetrics,
ICAR-National Dairy Research
Institute, Karnal, Haryana,
India

Vaibhav Purwar
Livestock Production
management Animal, ICAR-
National Dairy Research
Institute, Karnal, Haryana,
India

Latika Jaiswal
Molecular Reproduction cum
Teaching Lab, ICAR-National
Dairy Research Institute,
Karnal, Haryana, India

Shashikumar NG
Animal Reproduction,
Gynaecology and Obstetrics,
ICAR-National Dairy Research
Institute, Karnal, Haryana,
India

Correspondence

Suneel Singh
Livestock Production
management Animal, ICAR-
National Dairy Research
Institute, Karnal, Haryana,
India

Assessment of vitamin E and Selenium administration on udder health and milk yield in crossbred Karan Fries cows

Suneel Singh, SS Lathwal, RK Baithalu, Vaibhav Purwar, Latika Jaiswal and Shashikumar NG

Abstract

The present study was conducted on 14 crossbred cows in NDRI Karnal. These 14 crossbred cows were divided randomly into two groups of 7 animals each; untreated control and vitamin E and Se treatment group (5 doses of vitamin E (550 IU) and Se (15mg) administered through subcutaneously on day -30, -15, on the day of calving (day 0), day 15 and 30 of calving. CMT and electrical conductivity of milk and milk yield was monitored during postpartum period in cows. Per day milk production was increased ($P < 0.05$) in treated group than control group. Electrical conductivity was significantly ($P < 0.05$) higher on day 7 and day 35 in cows of control group than cows of treatment group. CMT score was observed lower in treatment group. Altogether, present study highlights the beneficial effect of administration of vitamin E and Se during peripartum period on milk yield and udder health of cross bred cows.

Keywords: milk yield, udder health, peripartum, crossbred cows

Introduction

The peri-parturient period in dairy cows is the most critical period of the production cycle of cows (Grummer, 1995) [7]. During this period several physiological changes takes place, that often disrupts the homeostatic mechanisms and depresses the defense mechanisms and renders her more susceptible towards mammary infections during postpartum period (Mateus *et al.*, 2002) [8]. Oxidative stress is a significant factor in the development of dysfunction of animal immunity and inflammatory response and it may increase the individual susceptibility to different health problems (Sordillo, 2005) [13].

Vitamin E and Selenium are important components of antioxidant system and related to immune function in domestic animals (Finch & turner, 1996) [5]. Although, earlier studies indicated supplementation of vitamin E and Se alone or in combination during peripartum period improve mammary health and reduce other health issues in dairy cows by reducing oxidative stress during postpartum period. However supplementation of vitamin E and Se in feed is cumbersome and till date there is no consensus among researchers regarding dosage of vitamin E and Se during peripartum period in cows. Further, effect of vitamin E and Se administration on udder health of crossbred cows is not properly studied.

We hypothesized that peripartum administration of vitamin E and Se improves mammary health during postpartum period in cows. Thus the aim of the present study was to study the effect vitamin E and Se on postpartum mammary health in cross bred cows.

Materials and Methods

The study was conducted at Livestock Research Centre, National Dairy Research Institute (NDRI), Karnal, Haryana, India. The experiment was conducted between mid of September to end of March, 2017.

Experimental Animals

A total of fourteen crossbred cows (Holstein Friesian×Tharparkar) between 2 to 6 parity, uniform body condition and apparently healthy cows were selected at 30 days before expected date of calving and divided in two groups; treatment and control of seven each. Treatment group of cows were administered five doses of vitamin E (DL α -tocopherol acetate: 550 IU and Sodium Selenite: 15 mg) through S.C route at day -30, -15 before expected date of calving, on the day of calving (day 0), day 15 and 30 post calving. All the experimental cows were maintained under iso-managerial conditions and the nutrient requirement of the animals was mostly met with ad lib green fodder and measured amount of concentrate as per NRC

requirement. All experimental cows were kept in general herd in open housing system throughout the period of experiment. The experiment was conducted as per the guidelines of institute ethical committee.

Milk parameters analysis for monitoring mammary health

The milk samples from individual cows were collected after proper disinfection of teat surface with 70% ethyl alcohol and after discarding few streams of milk. Milk sample were collected on day 7, 14, 21, 35 and day 42 post calving. California mastitis test and electrical conductivity of milk was performed using standard procedures.

Statistical analyses

Descriptive statistics were calculated for different parameters for both control and treatment group animals and the results were expressed as mean \pm SEM. Group wise comparisons were performed using paired T test. One way ANOVA using general linear model was performed to find out the effects of period. Group wise multiple comparisons were performed using Tukey's post hoc test. The difference of means was considered significant when the probability (P value) was <0.05 . All the analyses were performed using Sigma Plot 11@software (Systat software Inc., USA).

Results and Discussion

The present study was conducted to potentiate the immune status of animals during transition period by administration of vitamin E and selenium and to see their effect on udder health and milk yield in crossbred cows.

California mastitis test (CMT) and Electrical conductivity of milk

The results of California mastitis test (Table 1) revealed that on day 7, 57.14% cows in untreated control group and only 28.57% in treated group were positive subclinical mastitis. On day 14, 28.57% cows again found positive for subclinical mastitis in untreated control group, however, none of the animal in treatment group found positive. Further, on day 35 and day 42, 14.28% and 14.28% cows were found positive for subclinical mastitis, however none of the animal found positive for subclinical mastitis in treatment group.

The electrical conductivity of milk during postpartum period in untreated control and vitamin E and Se treated cows is presented in Table 2. Electrical conductivity was significantly ($P<0.05$) higher on day 7 and day 35 in cows of control group than cows of treatment group.

Table 1: California mastitis test (CMT) of milk of crossbred cows of control and vitamin E and selenium treated group

		CMT Score (%)				
Group	Score	Postpartum Period				
		7 day	14 day	21 day	35 day	42 day
Control	Score 1	28.57	28.57	42.85	42.85	14.28
	Score 2	14.28	42.85	42.86	42.85	71.42
	Score 3	57.14	28.57	14.28	14.28	14.28
	Score 4	0	0	0	0	0
Treatment	Score 1	42.85	28.57	42.85	42.85	28.57
	Score 2	42.85	71.42	42.85	57.14	71.42
	Score 3	28.57	0	14.28	0	0
	Score 4	0	0	0	0	0

CMT scoring of milk indicated high level of sub-clinical infection in both untreated control and treated cows in the present study. However, CMT score with 3 was significantly

higher during postpartum period in untreated control cows than treated cows. This result suggests that vitamin E and Se administration during peripartum period reduced the intensity of sub-clinical mastitis in treated cows than untreated control cows. Ceballos-Marquez *et al.* (2010) [4] and Bayril *et al.* (2015) [2] have also recorded decrease in the incidence of subclinical mastitis by enhancing the anti-oxidative defense mechanisms in the cows treating with vitamin E and Se. Changes in electrical conductivity are reported to be a good indicator of udder health for the detection of sub-clinical mastitis. During inflammation of mammary epithelium (mastitis), transfer of sodium and chloride ions to milk from the blood takes place causing an increase in the electrical conductivity of the milk (Nielen *et al.*, 1992) [10].

Table 2: Electrical conductivity (E.C) of milk of crossbred cows of control and vitamin E and selenium treated group.

E.C of milk					
Groups	Days in early lactation				
	Day 7	Day 14	Day 21	Day 35	Day 42
Control	5.15 \pm 0.31 ^A	5.02 \pm 0.35	4.64 \pm 0.37	5.29 \pm 0.35 ^A	4.90 \pm 0.25
Treatment	4.20 \pm 0.19 ^B	4.36 \pm 0.32	4.22 \pm 0.22	4.36 \pm 0.27 ^B	4.22 \pm 0.26

Values with different superscripts ^{A, B} differ significantly ($P<0.05$) in a column

In the present study electrical conductivity was significantly higher on day 7 and day 35 after calving in cows of control group than cows of treatment group. Altogether, results indicate that administration of vitamin E and Se although not able to completely preventing occurrence of subclinical infection in cows but have reduced the intensity of inflammation and infection in treated cows.

Milk Yield

Daily milk yield (mean \pm S.E.) of untreated control and vitamin E and Se treated cows are presented in table 3. The average milk yield was significantly higher ($P<0.05$) in treatment group (15.48 \pm 0.76 Kg/day/animal) compared to control cows. Milk yield analysis on monthly basis revealed, 11.8% improvement in milk yield in first month, 24.4% in 2nd month, 23.7% in 3rd month and 12.2% in 4th month in crossbred cows of treatment group compared to untreated control cows.

Beneficial effect of vitamin E and Se might be due to better utilization of nutrients (Tufarelli *et al.*, 2011) [14] and the overall reduction of oxidative stress in treated cows. Earlier reports also recorded a significant improvement in milk yield by supplementation of vitamin E and Se during peripartum period in dairy cows (Phipps *et al.*, 2008; Moenini *et al.*, 2009; Bayril *et al.*, 2015) [11, 9, 2].

Table 3: Average daily milk yield of crossbred cows of control and vitamin E and selenium treated group

Milk Yield (Kg/day/animal)					
Groups	Postpartum period (months)				
	1	2	3	4	Overall mean
Control	12.09 \pm 1.38	13.410 \pm 1.72	13.47 \pm 2.11	13.40 \pm 2.48	13.09 \pm 0.33 ^A
Treatment	13.52 \pm 1.60	16.694 \pm 2.20	16.67 \pm 2.33	15.035 \pm 2.60	15.48 \pm 0.76 ^B

Values with different superscripts ^{A, B} differ significantly ($P<0.05$) in a column.

However, Bourne *et al.* (2008) [3] could not observe any significant effect of vitamin E and Se supplementation on milk yield which is attributed to differences in the pretreatment selenium status of the animals, the frequency of the treatment given or the dose rate (Awadet *et al.*, 1985) [1].

Conclusions

In conclusion, the present study has highlighted the beneficial effect of administration of vitamin E and Se on improvement in mammary health status in crossbred cows. Hence, high magnitude of oxidative stress produced during peri-partum period can be ameliorated by administration of vitamin E and Se and could be the possible strategy for improving the postpartum mammary health in dairy cows.

Conflict of interest

None

Acknowledgements

The authors thank the Indian Council of Agricultural Research, Government of India, the Director, ICAR-National Dairy Research Institute, Karnal, Haryana for providing necessary facilities for the research.

References

1. Awad YL, Youssef H, Mikhali M. Influence of prepartum selenium treatment on the reproductive pattern of Egyptian buffaloes and on the born calves. *Egypt J Vet. Sci.* 1985; 22:55-60.
2. Bayril T, Yildiz AS, Akdemir F, Yalcin C, Köse M, Yilmaz O. The technical and financial effects of parenteral supplementation with selenium and vitamin E during late pregnancy and the early lactation period on the productivity of dairy cattle. *Asian-Australasian journal of animal sciences.* 2015; 28(8):1133.
3. Bourne N, Wathes DC, Lawrence KE, McGowan M, Laven RA. The effect of parenteral supplementation of vitamin E with selenium on the health and productivity of dairy cattle in the UK. *The Veterinary Journal.* 2008; 177(3):381-7.
4. Ceballos-Marquez A, Barkema HW, Stryhn H, Wichtel JJ, Neumann J, Mella A *et al.* The effect of selenium supplementation before calving on early-lactation udder health in pastured dairy heifers. *Journal of dairy science.* 2010; 93(10):4602-12.
5. Finch JM, Turner RJ. Effects of selenium and vitamin E on the immune responses of domestic animals. *Research in Veterinary Science.* 1996; 60(2):97-106.
6. Gitto E, Reiter RJ, Karbownik M, Tan DX, Gitto P, Barberi S, Barberi I. Causes of oxidative stress in the pre- and perinatal period. *Neonatology.* 2002; 81(3):146-57.
7. Grummer RR. Impact of changes in organic nutrient metabolism on feeding the transition dairy cow. *Journal of animal science.* 1995; 73(9):2820-33.
8. Mateus L, Da Costa LL, Bernardo F, Silva JR. Influence of puerperal uterine infection on uterine involution and postpartum ovarian activity in dairy cows. *Reproduction in Domestic Animals.* 2002; 37(1):31-5.
9. Moeini MM, Karami H, Mikaeili E. Effect of selenium and vitamin E supplementation during the late pregnancy on reproductive indices and milk production in heifers. *Animal reproduction science.* 2009; 114(1-3):109-14.
10. Nielen M, Deluyker H, Schukken YH, Brand A. Electrical conductivity of milk: measurement, modifiers, and meta-analysis of mastitis detection performance. *Journal of Dairy Science.* 1992; 75(2):606-14.
11. Phipps RH, Grandison AS, Jones AK, Juniper DT, Ramos-Morales E, Bertin G. Selenium supplementation of lactating dairy cows: effects on milk production and total selenium content and speciation in blood, milk and cheese. *Animal.* 2008; 2(11):1610-8.

12. Politis I. Reevaluation of vitamin E supplementation of dairy cows: bioavailability, animal health and milk quality animal. 2012; 6(9):1427-34.
13. Sordillo LM. Factors affecting mammary gland immunity and mastitis susceptibility. *Livestock Production Science.* 2005; 98(1, 2):89-99.
14. Tufarelli V, Laudadio V. Dietary supplementation with selenium and vitamin E improves milk yield, composition and rheological properties of dairy Jonica goats. *Journal of dairy research.* 2011; 78(2):144-8.