



# **Assessment of Vitamin E and Selenium as a Nutritional Intervention for Control of Subclinical Mastitis in Buffaloes at Farmer's Field**

**P.P. Singh <sup>a</sup>, Gaurav Jain <sup>b\*</sup>, Aslam <sup>c</sup>  
and Prem Singh Verma <sup>d</sup>**

<sup>a</sup> *Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya- Krishi Vigyan Kendra, Morena-476001 (M.P.), India.*

<sup>b</sup> *School of Agriculture, Uttaranchal University, Dehradun-248007 (Uttarakhand), India.*

<sup>c</sup> *Shri Vaishnav Institute of Agriculture, SVVV, Indore- 453555 (M.P.), India.*

<sup>d</sup> *Department of Agriculture Tula's Institute, The Engineering & Management College Dhoolkot, PO- Selaqui, Chakrata Road, Dehradun-248011 (Uttarakhand), India.*

## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author PPS engaged in conducting the On Farm Trial (OFT) data collection, analysis and preparing original draft. Author GJ involved in conceptualization, data curation. Author PSV involved in supervision, draft correction and final editing. Author Aslam involved in conceptualization and supervision. All authors read and approved the final manuscript.*

## **Article Information**

DOI: <https://doi.org/10.9734/acri/2025/v25i81432>

## **Open Peer Review History:**

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://pr.sdiarticle5.com/review-history/141582>

**Short Research Article**

**Received: 29/05/2025**  
**Published: 11/08/2025**

\*Corresponding author: Email: [gauravj888@gmail.com](mailto:gauravj888@gmail.com);

## ABSTRACT

**Aims:** On Farm Trial (OFT) was conducted on graded Murrah buffaloes for assessment of effect of Vitamin E and Selenium as a nutritional intervention for control of subclinical mastitis (SCM) in Morena district of M.P.

**Place and Duration of Study:** The study was conducted in two villages of Morena district of M.P. during the year 2021-22 and 2022-23.

**Methodology:** For OFTs, 20 farmers having advanced pregnant buffaloes with previous history of mastitis were selected from group meeting. The selected farmers were divided randomly in two groups. First group of 10 farmers was designated as Farmers practice group (T<sub>1</sub>) which reared the buffaloes without any supplementation, second group of farmers was designated as supplemented animals group (T<sub>2</sub>) which reared the buffaloes with feeding supplement of vitamin E and Selenium powder @10 gram (containing 1000 IU Vitamin E and 10 mg Selenium) from twenty days prepartum to 20 days postpartum during two successive years 2021-22 and 2022-23.

**Results:** In supplemented animals group (T<sub>2</sub>) a smaller number of animals were found suffering from subclinical mastitis in comparison to farmers practice group (T<sub>1</sub>) during both the year 2021-22 and 2022-23. The milk yield (liter/buffalo/2 month), net return and B:C ratios in supplemented animals group (T<sub>2</sub>) was higher in comparison to farmers practice group (T<sub>1</sub>) during both the year 2021-22 and 2022-23.

**Conclusion:** The result of the trial successfully documented the positive effect of nutritional intervention of supplementation of vitamin E and Selenium for prevention of subclinical mastitis in graded Murrah buffaloes at farmer's field.

**Keywords:** Graded murrah buffaloes; milk yield; OFT; subclinical mastitis; Vitamin E and Selenium.

## 1. INTRODUCTION

India has been the highest milk producer in the world with 221.1 million tones milk production in 2021-22 but the productivity is very less (Annual report DAHD, 2022-23). The average productivity of indigenous cattle, indigenous buffalo and crossbred cattle is only 4.07 kg, 6.62 kg and 8.32 kg per day, respectively (Annual report DAHD, 2022-23). The milk production capacity of the dairy animals has increased due to scientific breeding, improvement in feed technology and other measures from the past few decades, but disease resistance ability of these animals is also compromised leading them more prone for various infectious diseases. Most diseases in dairy cows occur at or just after calving, which is a period associated with immune suppression, resulting in an increased susceptibility to infections (Gomes *et al.*, 2016). Prepartum immune suppression is multifactorial but is associated with endocrine changes and decreased intake of critical nutrients (Zhao *et al.*, 2008). Among the various production diseases mastitis is one of the most common infectious diseases of dairy animals. Mastitis, important production diseases of dairy cattle worldwide, is frequently considered to be most costly and complex disease prevalent in India (Sharma *et al.*, 2006). Mastitis could be categorized as clinical and subclinical (Kumari *et al.*, 2019).

Contrary to clinical mastitis, sub-clinical mastitis shows no visible abnormality in the udder or milk, but milk production decreases with an increase in the somatic cell count (SCC) (Abebe *et al.*, 2016). Various strategies are tried currently for mitigation of the periparturient stress including supplementation of different antioxidants. The findings have been inconsistent at times, with some studies not showing an effect (Abuelo *et al.*, 2019).

Morena district ranks first in milk production in Madhya Pradesh with 914.49 metric ton during 2021-22(Annual Report 2022-23, DAHD, M.P.). Morena district is also having highest number of buffaloes 6, 85,578 as per the 20<sup>th</sup> livestock census 2019 (Annual Report 2021-22, DAHD, M.P.).

### **Management practices prevailing in district:**

Majority of the buffalo farmers (85%) do not feed supplementary mineral mixture to their animals and about 42.5 percent farmers use the mustard oil for feeding to lactating animals at an interval of 7- or 15-days period. The non-feeding of additional supplements to the pregnant animals and of mineral mixture to all animals clearly indicates that productive animals were facing shortages of nutrients which would inhibit exhibiting their performance. All the buffalo farmers allowed their calves to suckle their

mothers before and after milking twice a day and also used the calf to let down of milk from the udder. Majority of the farmers practice the knuckling method of milking (Singh *et al.*, 2018).

Prevailing husbandry practices might be the factors which predisposes the animals for subclinical mastitis just after parturition. Looking to the significant contribution of buffalo in the rural economy of Morena district and prevailing husbandry practices the On Farm Trial (OFT) was undertaken to assess the effect of vitamin E and Selenium as a routine nutritional intervention for control of subclinical mastitis by boosting the immune system in graded murrah buffaloes.

## 2. MATERIALS AND METHODS

### 2.1 Agro Ecological Situation of the District

Morena district falls under zone of Madhya Pradesh. The climate of the zone is characterized as semi arid with extremely hot summer during May-June. Rainfall is 701 mm mostly concentrated in the months of July and August. Normally, onset of SW (South-West) monsoon takes place in first week of July, withdrawal in first fortnight of September. Nearly 90% rainfall is received from SW monsoon during July-September and there is some winter rainfall. The rainfall is erratic in distribution. Mean summer temperature is 30.10°C with maximum temperature 45-48°C and mean winter temperature 17-20°C with minimum temperature 2-4°C. Dust storms are common in the month of May and June.

#### 2.1.1 Selection of animals

Before conducting OFTs, a list of farmers having advanced pregnant buffaloes with previous history of mastitis was prepared from group meeting and specific skill training was imparted to the selected farmers regarding care and management of pregnant buffaloes their feeding and milking management during the initial period of lactation. The necessary step for selection of site and farmers, layout of on farm testing etc. were followed (Choudhary, 1999). Farmers selected for OFTs were trained to adopt the standard managerial practices during the study period (2021-22 and 2022-23). On Farm Trial (OFT) has been conducted on ten graded Murrah buffaloes by offering vitamin E and Selenium powder and other ten were reared under farmer's practice between 2021-22 and

2022-23 at two blocks namely Ambah and Morena of Morena district, M.P. to demonstrate the superiority of the treatment. The selected farmers were divided randomly in two groups. First group of 10 farmers was designated as Farmers practice animals' group (T<sub>1</sub>) which reared buffaloes without any supplementation; second group of farmers was designated as supplemented animals' group (T<sub>2</sub>) which reared the buffaloes with feeding supplement of vitamin E and Selenium powder @ 10 gram/day/buffalo (containing Vitamin E 1000 IU and 10 mg of Selenium) from 20 days prepartum to 20 days postpartum. The animals were tested after 2 months of parturition for subclinical mastitis through commercially available California Mastitis test kit. Data on number of animals found positive for subclinical mastitis, daily milk yield and economic indicators were collected.

The following characteristics were used for economic assessment of the OFT.

1. % Change in Yield =

$$\frac{(\text{Yield in supplemented animals} - \text{Yield in farmers practice animals})}{(\text{Yield in farmers practice animals})} \times 100$$

2. Net Return = (Gross Return – Cost of production)

3. B: C Ratio =  $\frac{(\text{Gross Return})}{(\text{Cost of production})}$

4. Increased cost =

$$(\text{Cost of production of supplemented animals} - \text{Cost of production of farmers practice animals})$$

5. Increased return =

$$(\text{Gross return of supplemented animals} - \text{Gross return of farmers practice animals})$$

6. Effective gain =

$$(\text{Net return from supplemented animals} - \text{Net return from farmers practice animals})$$

## 3. RESULTS AND DISCUSSION

### 3.1 Animals with Subclinical Mastitis

On perusal of data from Table 1 we can see that total seven animals out of 20 buffaloes were found suffering from subclinical mastitis (combine in both the year 2021-22 and 2022-23). The total number of animals affected with subclinical mastitis in supplemented combined during both the years 2021-22 and 2022-23 (Table 1). There is a reduction of 75% and 66.67% in number of animals suffering from subclinical mastitis during

2021-22 and 2022-23 respectively. The present findings are partially in agreement with earlier studies of subclinical mastitis in field condition Kumari *et al.* (2020) where they have found total 97 cows (64.66%) out of 150 suffering from subclinical mastitis. Present results are comparable with results of Panda and Kaur (2008) and Khalifa *et al.* (2016). Similar findings were reported it was concluded that supplementation of Se and Vitamin E is more efficient and has a better stabilizing effect on the antioxidant enzymes in blood plasma and colostrum, thus leading to the reduced incidence of mastitis (Vasil *et al.*, 2022). The high percentage of cases of subclinical mastitis in district Morena may be due to lack of mineral and vitamin mixture feeding (only 15% farmers fed mineral and vitamin mixtures) and use of Knuckling method (practiced by 85% buffalo farmers) of milking in buffaloes.

### 3.1.1 Milk yield

The milk yield (Table 2) for 2 months (Liters/buffalo) under OFT was found higher in supplemented animals group (T<sub>2</sub>) in comparison to farmers practice group (T<sub>1</sub>) during both the years 2021-22 and 2022-23 respectively (Table 2). The increase in milk yield may be attributed to protection of mammary tissue from free radicals. The present results in buffaloes are in agreement with the previous studies (Anwar *et al.*, 2014 & Kandil *et al.*, 2019). The increases in milk yield in dairy cows due to supplementation of vitamin E and Selenium were reported in previous works (Kafilzadeh *et al.*, 2014; Maurya *et al.*, 2016 & Puniya *et al.*, 2022). Results are not in

agreement with Brozos *et al.*, (2009) who did not find any beneficial effect of vitamin E and Selenium on the milk yield.

#### 3.1.1.1 Economics parameters of the OFT

The data clearly revealed that, the gross return and net return from supplemented animals' group were higher than the farmers practice animal group during both the years of On Farm Trial (Table 3). Present results are in agreement with previous reports (Kandil *et al.*, 2019) who advocated that vitamin E supplementation to lactating buffalo rations especially higher level (6000 IU) improved actual milk yield and increased feed and economic efficiency. Since the data of milk yield was taken for only two months after the calving of animals the yield enhancement seems to be moderate. If the data were collected for at least six months then surely the yield enhancement will be more leading to improvement in gross return, net return and benefit cost ratio. The variation in cost benefit ratios during different years may possibly be due to yield performance and input output cost in that particular year.

Effective change in production cost, return and gain will be of interest while convincing the farmers about the superiority. Thus, an average one time increase in the production cost of Rs. 523 per animal for 2 month towards supplementation of vitamin E and Selenium had increased an effective gain of Rs. 985 and 844 in two months during the year 2021-22 and 2022-23, respectively.

**Table 1. Number of animals with subclinical mastitis under OFT of buffaloes on supplementation of Vitamin E and Selenium during 2021-2022 and 2022-23**

Year	Number of animals positive for subclinical mastitis		% Change in subclinical mastitis affected animals over T <sub>1</sub> (Farmers Practice)
	T <sub>2</sub>	T <sub>1</sub>	
2021-22	1	4	75.00
2022-23	1	3	66.67

Where, T<sub>1</sub>= Farmer's practice, T<sub>2</sub>= supplemented animals

**Table 2. Milk yield of OFT of buffaloes on supplementation of Vitamin E and Selenium during 2021-2022 and 2022-23**

Year	Milk Yield (Liter/buffalo/2 month)		% Change in yield over T <sub>1</sub> (Farmers Practice)
	T <sub>2</sub>	T <sub>1</sub>	
2021-22	457.6	428.9	6.69
2022-23	394.8	366.0	7.86

Where, T<sub>1</sub>= Farmer's practice, T<sub>2</sub>= supplemented animals

**Table 3. Economic indicators of OFT of buffaloes on supplementation of Vitamin E and Selenium to buffaloes during 2021-2022 and 2022-23**

Particulars (Rs./animal day)	Year 2021-2022		Year 2022-2023	
	T <sub>2</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>1</sub>
Cost of Production	4460	4460	8000	8000
Cost of supplementation	450	0	596	0
Total cost of production	9370	8920	8596	8000
Gross return	22880	21445	19740	18300
Net return	13510	12525	11144	10300
B:C ratio	2.44	2.40	2.29	2.28

Where, T<sub>1</sub>= Farmer's practice, T<sub>2</sub>= supplemented animals

#### 4. CONCLUSION

The present study has indicated that addition of Vitamin E and Selenium powder @10 gram/day/buffalo (having Vitamin E 1000 IU and Se 10 mg) from 20 days prepartum to 20 days postpartum can reduce the subclinical mastitis cases. Besides reduction in cases of subclinical mastitis there is also increase in milk yield upto 7.86%. Further studies using the different dosages of Vitamin E and Selenium at different locations of the country at farmer's field are necessary for validating the findings of present On Farm Trial.

#### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

#### ACKNOWLEDGEMENT

The authors express gratitude to the Director ICAR-ATARI Zone –IX, Jabalpur (M.P.) for providing the financial support for conducting the study.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

Abebe, R., Hatiya, H., Abera, M., Megersa, B., & Asmare, K. (2016). Bovine mastitis: Prevalence, risk factors and isolation of *Staphylococcus aureus* in dairy herds at Hawassa milk shed, South Ethiopia. *BMC*

*Vet Res*, 12, 270. <https://doi.org/10.1186/s12917-016-0905-3>

Abuelo, A., Hernandez, J., Benedito, J. L., & Castillo. (2019). Redox biology in transition periods of dairy cattle: Role in the health of periparturient and neonatal animals. *Antioxidants (Basel)*, 8(1), 20. <https://doi.org/10.3390/antiox8010020>

Anwar, F., Akhtar, M. S., Lal, C., Lodhi, L. A., Ayaz, M. M., & Ayaz, I. A. (2014). Effect of prepartum administration of selenium and vitamin E on subsequent postpartum performance in first calf *Nili-Ravi* buffalo heifers. *J Anim Plant Sci*, 24(Suppl. 1) 5(8), 1018–7081.

Annual Report DAHD GOI. (2022–23). Available at [https://dahd.nic.in/document/annual\\_report](https://dahd.nic.in/document/annual_report)

Annual Report DAHD M.P. (2021–22). Available at [https://mpdah.gov.in/uploads/20th\\_livestock\\_Districtwise\\_2019.pdf](https://mpdah.gov.in/uploads/20th_livestock_Districtwise_2019.pdf)

Annual Report DAHD M.P. (2022–23). Available at <https://mpdah.gov.in/uploads/Milk-Egg-Meat-Wool-Production.pdf>

Brozos, C. N., Kioussis, E., Georgiadis, M. P., Piperelis, S., & Boscios, C. (2009). The effect of chloride ammonium, vitamin E and Se supplementation throughout the dry period on the prevention of retained fetal membranes, reproductive performance and milk yield of dairy cows. *Livestock Science*, 124(1), 210–215. <https://doi.org/10.1016/j.livsci.2009.01.018>

Choudhary, B. N. (1999). *Krishi Vigyan Kendra – A guide for KVK managers*. Publication, Division of Agricultural Extension, ICAR, New Delhi, p. 73–78.

Gomes, F., & Henriques, M. (2016). Control of bovine mastitis: Old and recent therapeutic approaches. *Curr Microbiol*, 72, 377–382. <https://doi.org/10.1007/s00284-015-0958-8>

- Kafilzadeh, F., Kheirmanesh, H., Shabankareh, H. K., Targhibi, M. R., Maleki, E., Ibrahimi, M., et al. (2014). Comparing the effect of oral supplementation of vitamin E, injective vitamin E and selenium or both during late pregnancy on production and reproductive performance and immune function of dairy cows and calves. *The Scientific World Journal*.  
<https://doi.org/10.1155/2014/165841>
- Kandil, A. M., El-Sysy, M. A. I., & Saad, S. A. (2019). Effect of vitamin E supplementation on milk yield, milk fatty acids profile and economic efficiency in buffalo cows. *Egyptian J Nutrition and Feeds*, 22(1), 1–11.  
<https://doi.org/10.21608/EJNF.2019.75834>
- Khalifa, H. H., Safwat, M. A., El-Sysy, M. A. I., & Al-Metwaly, M. A. (2016). Effect of selenium and vitamin E supplementation as a nutritional treatment for some physiological and productive traits of Holstein dairy cows under Egyptian summer conditions. *J Egypt Acad Soc Environ. Develop.*, 17(1), 97–113.  
<https://doi.org/10.21608/jades.2016.67383>
- Kumari, T., Bhakat, C., Singh, A. K., Sahu, J., & Mandal, D. K. (2019). Low cost management practices to detect and control sub-clinical mastitis in dairy cattle. *Int J Curr Microbiol App Sci*, 8(5), 1958–1964.  
<https://doi.org/10.20546/ijcmas.2019.805.227>
- Kumari, T., Bhakat, C., & Singh, A. K. (2020). Adoption of management practices by the farmers to control sub-clinical mastitis in dairy cattle. *Journal of Entomology and Zoology Studies*, 8(2), 924–927.
- Maurya, P. K., Aggarwal, A., Singh, A. K., & Chaudhari, B. K. (2016). Effect of  $\alpha$ -tocopherol acetate and zinc supplementation on body condition, energy metabolites and milk production in Karan Fries cows. *Indian J Anim Res*, 50(1), 48–52. <https://doi.org/10.18805/ijar.8563>
- Panda, N., & Kaur, H. (2008). Effect of vitamin E supplementation on mastitis and milk quality in buffaloes. *Indian J Anim Nutr*, 25(2), 118–124.  
<https://doi.org/10.5713/ajas.2006.19>
- Puniya, S. R., Prakash, R., & Arora, R. (2022). Effect of vitamin E and selenium supplementation on milk yield of Kankrej cattle. *The Pharma Innovation Journal*, SP-11(7), 2604–2607.
- Sharma, N., Gautam, A., Upadhyay, S. R., Hussain, K., Soodan, J. S., & Gupta, S. K. (2006). Role of antioxidants in udder health: A review. *Indian J Field Vets*, 2, 73–76.
- Singh, P. P., Neeraj, Raghubanshi, B. P. S., & Mishra, R. (2018). Studies on the buffalo management practices in Chambal Region of Madhya Pradesh. *Res J Agric Sci*, 9(2), 244–249.
- Vasil, M., Zigo, F., Farkašová, Z., Pecka-Kielb, E., Bujok, J., & Illek, J. (2022). Comparison of effect of parenteral and oral supplementation of selenium and vitamin E on selected antioxidant parameters and udder health of dairy cows. *Pol J Vet Sci*, 25(1), 155–164.  
<https://doi.org/10.24425/pjvs.2022.140852>
- Zhao, X., & Lacasse, P. (2008). Mammary tissue damage during bovine mastitis: Causes and control. *J Anim Sci*, 86(13), 57–65.  
<https://doi.org/10.2527/jas.2007-0302>

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2025): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

The peer review history for this paper can be accessed here:  
<https://pr.sdiarticle5.com/review-history/141582>