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## Study on the effect of supplementing mineral mixture on the productive and reproductive performance of non-descript cows in tribal district of Madhya Pradesh

**Pranay Bharti, KV Sahare, Biswajit Roy, Rameshwar P Ahirwar and Ketki Dhumketi**

### Abstract

The present study was performed to study the effect of supplementing mineral mixture on the Productive and Reproductive Performance of non-descript Cows in tribal district Mandla of Madhya Pradesh, India. Total 24 cows in advanced gestation period were chosen and allocated in to two different groups of 12 cows each. One group (C) was kept control without supplementing with mineral mixture which was farmer practice in the location of study while other treatment group (T) was supplemented daily till 90 days of lactation with 50 gm mineral mixture per cow. The owners were asked to record the milk yield and the data collected were averaged for fortnightly interval. The parameter of milk production like peak yield, average daily milk yield and days to peak yield and reproductive parameter like service period, days to first post-partum heat and number of A.I. per conception were recorded and compared among both control and treatment groups. From the study it was found that peak yield, average daily milk yield and days to peak yield were significantly ( $p < 0.05$ ) higher in group which were supplemented with mineral mixture. Besides, the reproductive performance was found significantly ( $p < 0.05$ ) better in mineral mixture supplemented group. The present study concluded that mineral mixture supplementation had a substantial effect on the dairy animals in terms of their productive as well as reproductive performance.

**Keywords:** Indigenous cows, milk production, mineral mixture, reproduction

### Introduction

India ranks first in milk production attaining an annual production of 239 million metric tons in the year 2024 with annual growth rate of about 4%. However, in the country, the overall productivity of cattle is low and it is very low in terms of indigenous cow which is mainly due to poor feeding management and unbalanced rationing in addition to poor genetic characters; eventually it affects profitability from the animals which leads to involuntary culling. Balanced rationing is very crucial to maintain animal body in healthy condition so that they can be push to achieve as well as maintain their optimum performance. Previous study had shown that out of all nutrients available in feed, vitamin and minerals play a vital role in metabolism, lactation, reproduction and also in microbial fermentation in rumen (Bindari, Garg *et al.*, 2014) [2]. Minerals plays vital role in animal's body for normal physiological functions, growth, health as well as reproduction of animals. Previous findings also described that reproductive performance of cattle can be improved with the help of trace minerals (Kumar *et al.*, 2011) [3]. Due to the reduced amount and low bioavailability of some vital macro and microminerals in different feed and fodder, numerous workers have documented issues with mineral deficiencies and metabolic disorders in all types of dairy livestock.

In the majority of the country, area-specific vitamin and mineral mixture supplements are not practiced (Garg *et al.*, 2004) [6]. Reported mineral deficiencies caused reduced animal output and poor reproductive behavior, which were resolved by supplementing with different minerals. A survey conducted by the National Dairy Development Board (NDDB) across multiple states revealed deficiencies in zinc, copper, sulfur, manganese, and cobalt within the feed of dairy livestock.

Many of the feed components accessible for livestock nutrition lack one or more essential minerals. Therefore, keeping in view the aforesaid, this study was designed with objective of study the effect of supplementing mineral mixture on the Productive and Reproductive Performance of non-descript Cows.

### Materials and Methods

The present study was performed in the Mandla district of Madhya Pradesh, India. Two villages were selected to identify 24 Indigenous cows in their advanced pregnancy period. All cows in advanced gestation period were allocated in to two different groups of 12 cows each. One group (C) was kept control without supplementing with mineral mixture which was farmer practice in the location of study while other treatment group (T) was supplemented daily till 90 days of lactation with 50 gm mineral mixture per cow (mineral mixture composition is presented in Table 1).

**Table 1:** Composition of mineral mixture (Each Kg Contains)

S. No.	Items	Quantity (Each Kg Contains)
1	Calcium	35%
2	Phosphorus	17.5%
3	Magnesium	6000 mg
4	Iron	1500 mg
5	Copper	1200 mg
6	Zinc	9600 mg
7	Manganese	1500 mg
8	Iodine	350 mg
9	selenium	1.0 mg
10	Energy	2000 K Cal
11	Vitamin A	1000000 IU
12	Vitamin D3	100000 IU
13	Vitamin E	350 mg

During the study the various parameters for milk production characteristic and different aspects of reproductive characteristics were recorded. Daily milk yield (lit./day), days to reach peak yield and peak yield (lit.) were the parameters recorded during the whole 90 days for milk production characteristic. Likewise, to study the reproductive performance, various parameters like service period (days), days to come in first heat after parturition (days), no. of animals conceived in given time (conception rate) and no. of service per conception were noted for every animal during the course of study. The recorded data on various parameters were analyzed statistically using SPSS for Windows (version 16.0; for statistical differences by Analysis of Variance (Snedecor and Cochran, 1989) [14] and Duncan's Multiple Range Tests (Duncan, 1995) [4].

### Results and Discussion

#### Production Parameters

The observation for production performance was analyzed and data are presented in Table 2. In the present study it was found that daily milk yield was significantly ( $p \leq 0.05$ ) higher in group which was supplemented with mineral mixture i.e. treatment group ( $3.07 \pm 0.10$ ) in comparison to the control group ( $2.66 \pm 0.10$ ) which shows 15% rise in daily milk yield in cows mineral mixture supplemented cows as compared to control group. Gupta *et al.* (2017) [7], Singh *et al.* (2016) [13] and Noeek *et al.* (2006) [9] have also reported milk yield rise in dairy animal supplemented with mineral mixture which also supports present study findings. Average peak milk yield in treatment group and control group were ( $4.35 \pm 0.30$ ) and

( $3.71 \pm 0.26$ ) respectively which were significantly ( $p \leq 0.05$ ) differ. Similarly, days to achieve peak production was also found significant ( $p \leq 0.05$ ) higher in group which was provided with mineral mixture in comparison of control group.

Higher milk production in mineral supplemented group might be due to fulfillment of their nutrient requirement through mineral supplementation which might help in reaching their optimum production through micro and macro element having impact on the mammary cells responsible for milk production in the udder. Due to having effect of minerals at cellular level in mammary gland, the cow which were provided with mineral mixture were reaching peak yield in more days and were also able to hold their peak yield for longer extent when same was compared with the other control group.

**Table 2:** Effect of supplementing mineral mixture on milk production parameters in indigenous cows (Mean  $\pm$  SE)

Milk Production Parameters	Control	Treatment
Average Peak Milk Yield (lit.)	$3.71 \pm 0.26a$	$4.35 \pm 0.30b$
Days to reach peak yield (days)	$42.25 \pm 1.63a$	$47.58 \pm 1.10b$
Avg. Daily Milk Yield (lit.)	$2.66 \pm 0.10a$	$3.07 \pm 0.10b$

Means within rows with different superscript are significantly differ ( $p < 0.05$ )

#### Reproductive Performance

The observation for days taken to first post-partum heat, service period, number of services to conceive, conception rate and number of conceived animals in a group were recorded in this study to find out reproductive proficiency in dairy cows. The analyzed observation for reproductive parameters is depicted in Table 3.

**Table 3:** Effect of supplementing mineral mixture on reproductive performance in indigenous cows (Mean  $\pm$  SE)

Reproductive characteristics	Control	Treatment
Days to First Post-Partum Heat	$63.58 \pm 1.74 a$	$51.25 \pm 2.25b$
AI/conception	$2.16 \pm 0.20$	$1.75 \pm 0.17$
Service Period (Days)	$136.16 \pm 3.39a$	$120.41 \pm 4.55b$
Cow Conceived	07	05
Conception Rate (%)	58	42

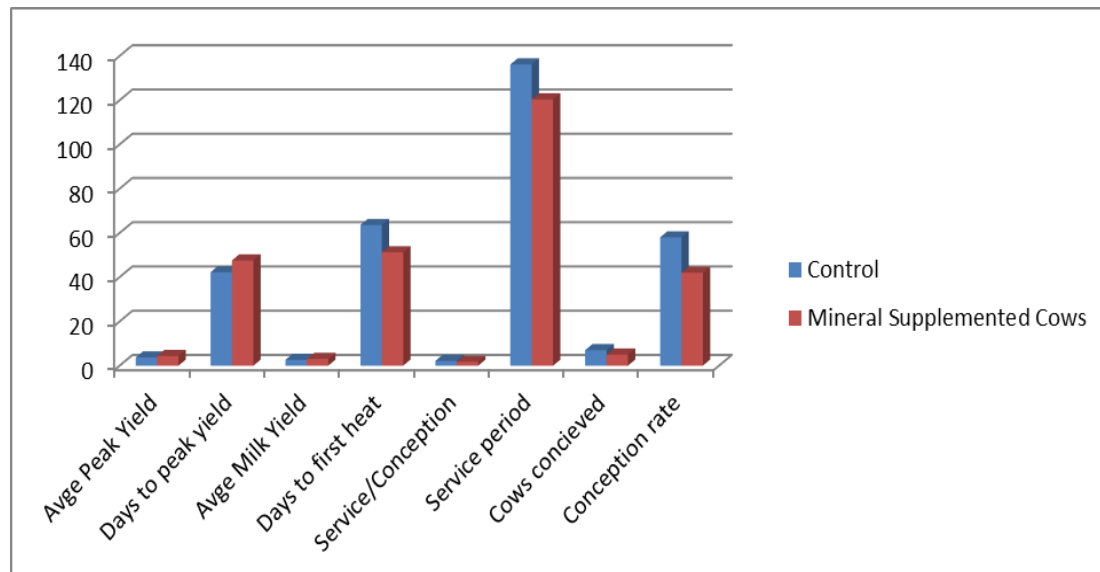
Means within rows with different superscript are significantly differ ( $p < 0.05$ )

In the present study indigenous cow which were provided with mineral mixture took on an average less day (51.25 days) to show first post-partum heat sign whereas it took more days for non-supplemented group (63.58 days) significantly ( $p < 0.05$ ). Similar to the present finding, Gupta *et al.* (2017) [7] and Mudgal *et al.* (2014) [8] also described that mineral supplemented dairy animal took less days to show first post-partum estrous. The results on Number of AI per conception indicated that cows supplemented with mineral mixture has slightly a smaller number of AI per conception although the difference was non-significant. Beside this, cows supplemented with mineral mixture had significantly ( $p \leq 0.05$ ) lower service period (120.41 days) than the cow kept as control (136.16 days).

Findings of the present study describes that the service period reduced by 15.75 days in group of cows supplemented with mineral mixture in early lactation phase of animals which is supported by the results of previous studies (Gupta *et al.*, 2017; Sahoo *et al.*, 2017 and Puvarajan and Vijayarajan, 2013) [7, 12, 10]. During the observation period, 05 and 07 cows were conceived in control and treatment group respectively

out of 12 animals from each group. Conception rate was 16% higher in cows provided with mineral mixture in comparison of control group. In support of present study, Gupta *et al.*

(2017) [7] and Behera *et al.* (2012) [1] also suggested that mineral supplemented animals had improved conception rate.



**Fig 1:** Effect of mineral mixture supplementation on production and reproduction parameters in indigenous cows

### Conclusion

The results of present study conclude that milk yield and conception rate can be enhanced and first post-partum heat can be achieved early through supplementation of mineral mixture to dairy animals. Therefore, it is recommended to provide mineral mixture to dairy animals to fulfil their requirement for better production and reproduction potential of dairy animals.

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### Conflict of Interest

Not available

### Financial Support

Not available

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