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## Role of macro minerals (Ca, p) in reproductive health of infertile crossbred cattle

**Dheeraj Kumar, Rajendra Kumar, Tushar Rajendra Bhosale, Mahendra Kumar, VK Paswan, Keshav Kumar, Vijay Laxmi Yadav, Shilpa Kumari and Anjali Nagori**

### Abstract

Reproduction is the important productive parameter which affects the profitability of dairy industry. Micro minerals play an important role in animal's reproductive physiology and its imbalance causes various problems leading to lowered reproductive efficiency. Therefore, adequate trace minerals supplementation and its absorption are required for various metabolic functions including reproduction and growth. Often correcting an imbalance in mineral levels may improve the reproductive performance, fertility and health of the animals. The present study shows total 24 infertile crossbred cows were selected to induce oestrus taken for correction of anoestrosity with incorporated mineral. Total 8 out of 24 animals exhibited oestrus symptom after the treatment. Among the animals received incorporated mineral (treatment group) 50% showed the oestrus symptoms. Among the animals under control 16.66% came into heat.

**Keywords:** Ca, P, crossbred cows and infertile.

### Introduction

Minerals play an intermediate role in the promotion of action of hormones and enzymes at sub cellular levels in an integrated fashion and thus regulate functions of reproduction and production of domestic animals. Minerals like calcium, phosphorus, magnesium influence the ability of animal to utilise other micro minerals. Nutritional deficiencies in animals result into depletion of minerals and deranged enzymatic activity affecting the normal reproductive behaviour. Modie (1965) [15] described the role of calcium in sensitising the tabular genitalia for the action of hormones. A very high percentage of calcium and phosphorus is located in the bone and most of these minerals can be mobilized when needed for use in the metabolic events of body tissue. In dairy cows requirements of calcium must be met within stipulated times to avoid production loss and reproductive problems. Ca: P ratios between 1.5:1 and 2.5:1 is adequate for lactating cows. The ration for dairy cow should preferably contain 0.75 to 0.80 per cent calcium on dry matter basis (Schweigert and Zucker, 1988) [21].

The usual symptoms of phosphorus deficiency are delayed onset of puberty in heifers and failure of oestrus in cows (Roberts, 1971). Its deficiency can also lead decreased ovarian activity, irregular or anestrus and lower conception rates. It has been reported that animals with reproductive disturbances are deficient in phosphorus. Therefore, it is recommended that adequate supply of phosphorus must be made to the cattle to avoid fertility related problems. The ration should contain a minimum of 0.45-0.50% of phosphorus on dry matter basis (Schweigert and Zucker, 1988) [21].

### Place of work and animals

The study was planned and conducted on 24 cross-bred non-cyclic, non-pregnant cattle of B.H.U. dairy farm. Cattle, which were not observed in estrus for atleast six months considered as non-cyclic animals. On the basis of clinical observations, cattle affected with any kind of infectious causes or structural pathological abnormalities were excluded from the study.

### Selection of cattle

Cattle were selected of same breed, all cattle are cross bred (sahiwal×H.F.) Age of all cattle was around 3-6 years. Body weight of all cattle around 350-500 kg. Body condition of cattle is good muscular, attractive, shiny hair coat and active eyes.

**Feeding**

The nutrient requirements of all experimental animals were mostly met with *ad. libitum* green fodder and measured amount of concentrate. The green fodders, grown in the Institute farm, were supplied according to the seasonal availability. During summer and rainy seasons predominantly maize and sorghum were fed whereas in winter, fodders like barseem, oat etc. were fed. Feedings were spread in 3 to 4 feeding during day and night.

The concentrate was fed @1.5 kg/day/animal for body maintenance in general. Concentrate mixture had 20% CP and 70% TDN consisted of 33% maize, 21% ground nut cake (oiled), 12% mustered cake (oiled) 20% wheat bran, 11% de-oiled rice bran, 2% mineral mixture and 1% common salt.

**Supplementation of feed**

**Table 1:** Rovimix Cal-P strong (DSM nutritional product) (each 100 g contain)

Sr. No.	Minerals / Ingredients	Quantity
1.	Calcium	26g
2.	Phosphorus	14.25g
3.	Rovimix vitamin B <sub>12</sub>	400mcg
4.	Rovimix vitamin D <sub>3</sub>	16000 IU

**Treatment Details**

50 gm Rovimix Cal-P strong (DSM nutritional product) in morning

**Collection of blood**

About 10 ml of blood samples were drawn from the Jugular vein with 18g sterilized needles from each animal, (both experimental and control). Blood samples were transferred immediately in dry, sterilized glass test tubes and kept at 45° angle in room temperature after proper coding.

**Collection of serum**

Serum samples were collected carefully into different sterilized micro-centrifuse tubes with the help of sterilized Pasteur pipettes and kept at -20°C temperature till analysis.

**Estimation of serum Macro minerals (Ca, P)**

**Serum Calcium**

Serum calcium was estimated (Trudeau and Freier, 1967) with 1 ml of serum sample diluted to 1: 50 in 0.1% (w/v). Lanthanum chloride which was used in the standard solution as well as in the blank serum samples were kept in plastic vials for subsequent analysis by atomic absorption spectrophotometer (A.A.S.). The result was expressed in µg/100 ml.

**Serum phosphorus**

Colorimetric method (Fiske and Subba Row, 1925) was used to estimate the phosphorus in serum samples quantitatively and the result was expressed in mg/100 ml.

**Observations used for heat detection**

All the cows were checked and parameters like duration of onset of estrous post protocol, total duration of estrous and the signs of estrous like-restlessness and mounting behavior, discharge and its amount, bellowing and tonicity of uterus were recorded.

**Breeding**

All cows were artificially inseminated with frozen semen of high fertility.

**Statistical analysis**

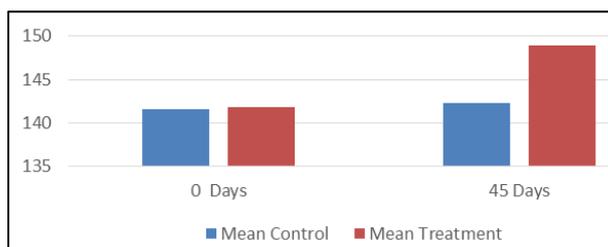
The Data obtained during investigation were subjected to statistical analysis using independent t-test.

**Results and discussion**

**Calcium**

**Table 2:** Status of Ca (mg %) level in blood serum

Days	Mean±SE		P-value
	Control	Treatment	
0	9.31±0.24	9.23±0.06	0.389
45	9.79±0.21	10.01±0.10	0.080



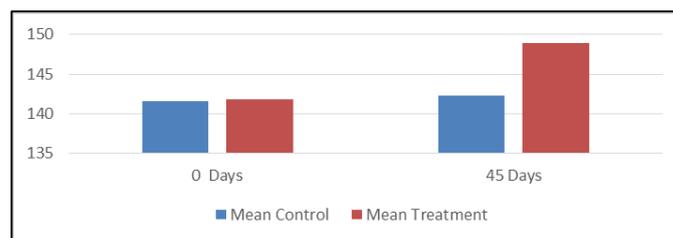
**Fig 1:** Diagram showing the status of Ca (mg %) level in blood serum.

The serum calcium level in anoestrus and oestrus conditions were 8.9786 ± 0.6532 mg% and 10.5286 ± 0.4848 mg% respectively. The results were corroborated with the findings of Prasad *et al.* (1984), Ramkrishna *et al.* (1997), Tandle *et al.* (1997), Joe Arash *et al.* (1998) and Dutta *et al.* (2001) [16, 17, 23, 6, 3]. The observation is higher than the observation of Samad *et al.* (1980), Sahukar *et al.* (1984), Sood *et al.* (1999) [18, 19, 22], but present value has been found lower than the findings of Dutta *et al.* (1988) and Kumar *et al.* (2000) [4, 11].

**Phosphorus**

**Table 3:** Status of P (mg %) level in blood serum

Days	Mean± SE		P-value
	Control	Treatment	
0	4.71±0.26	4.68±0.08	0.466
45	4.83±0.24	5.23±0.08	0.103



**Fig 2:** Diagram showing the status of P (mg%) level in blood serum

The serum phosphorus level in anoestrus and oestrus conditions were 4.6114 ± 0.3218 mg% and 5.3957 ± 0.3295% respectively. Similar results were also reported by Chetty and Rao (1985), Ramkrishna *et al.* (1997), Kumar *et al.* (2000), Das *et al.* (2002) and Jain *et al.* (2003) [1, 17, 11, 2, 8].

**Summary and Conclusion**

In the present study, total 24 infertile crossbred cows were selected to induce oestrus taken for correction of anoestrosity with incorporated mineral. Total 8 out of 24 animals exhibited oestrus symptom after the treatment. Among the animals received incorporated mineral (treatment group) 50% showed

the oestrus symptoms. Among the animals under control 16.66% came into heat.

Estimation of serum major elements (Ca and P) were performed At 0 days and 45 days. In treatment group (incorporated mineral) 6 animals came into heat. The Serum Ca, P show their elevation in oestrus condition over the anoestrus condition but this elevation is not statistically significant.

In control group only 2 animal came into the heat. Here no parameter show any significant change in between the anoestrus and oestrus condition.

The observations for 12 cows of treatment group, provided with mineral mixture:

- a) The blood serum level of Ca rose from  $9.23 \pm 0.06$  mg% at day 0 to  $10.01 \pm 0.10$  mg% at day 45 of feed supplementation.
- b) The blood serum level of P rose from  $4.68 \pm 0.08$  mg% at day 0 to  $5.23 \pm 0.08$  mg% at day 45 of feed supplementation.

Blood serum mineral (Ca, P) concentration improve towards optimum health after supplementation of incorporated Mineral. Estimation of macro minerals in blood is a satisfactory index for diagnosing the mineral deficiencies and may be used as a parameter for pre-assessment of reproductive abilities of crossbred cows.

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