SERUM CONCENTRATION OF CALCIUM, INORGANIC PHOSPHORUS AND MAGNESIUM IN CYCLIC, NON CYCLIC AND REPEAT BREEDER BUFFALOES

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ABSTRACT

Nutritional deficiency including mineral deficiency may decrease reproductive efficiency in buffaloes. Therefore, aim of the present study was to assess effect of minerals Calcium (Ca) Magnesium (Mg) and inorganic phosphorus (Pi) on cyclicity of Nili Ravi Buffaloes. The present experiment was performed at Livestock Experiment Station, Bhunikey. The female buffaloes (n=90) were divided into 3 groups; cyclic (n=30), non-cyclic (n=30) and repeat breeders (n=30). Mineral profile was measured through serum of the buffaloes under study. Calcium and Magnesium were measured through calorimetric method while inorganic phosphorus was measured through UV method. The level of calcium was significantly ($P<0.05$) higher in normal cyclic buffaloes than that of the non-cyclic and repeat breeders. The level of magnesium was non-significant in normal cyclic and non-cyclic buffaloes, while it was significantly ($P<0.05$) higher in repeat breeders as compared to cyclic and non-cyclic buffaloes. Phosphorus was not in balance in non-cyclic and repeat breeders. It is concluded from the present study that Ca: P should be 2:1.

Keywords: repeat breeder, non-cyclic, calcium, inorganic phosphorus, magnesium

INTRODUCTION

Reproductive efficiency is the primary factor affecting productivity of a dairy buffalo and is greatly influenced by late attainment of puberty, seasonal breeding, long calving intervals, increased number of services per conception, increased days open, uterine infections and various obstetrical problems (Samad *et al*., 1987). Anoestrus and repeat breeding are the biggest factor decreasing reproductive efficiency. Among the various factors that cause anoestrus and repeat breeding, major one is under-nutrition (Francos *et al*., 1977; Bhaskaran and Patil, 1982). The minerals play vital role in development of reproductive potential and maintenance of functional integrity of the reproductive system in domestic animals (Leathem, 1966). The calcium (Ca), Phosphorus, (P) and Magnesium (Mg) are important minerals in this respect. The exact mechanism by which mineral deficiency reduces fertility is not clear (Luca *et al*., 1977). Calcium, inorganic phosphorus and magnesium may lead to reproductive failure (Hidiroglo, 1979). The ovarian activities are most prone to minerals imbalances and their deficiency suppresses ovarian activity (Haq *et al*., 1999). Therefore, this study was conducted to assess the effect of minerals (Calcium, Phosphorus, and Magnesium) on anoestrus and repeat breeding in

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buffaloes.

MATERIALS AND METHODS

Nili-Ravi buffaloes (n=90) of 3-10 years of age having similar BCS (Body Condition Score) were selected from Livestock Experiment Station, Bhunikey.

Buffaloes were grouped into three categories; Cyclic (n=30), Non Cyclic (n=30) and Repeat Breeder (n=30). Buffaloes having smooth and inactive ovaries in 10 days interval of rectal palpation were called as non cyclic. Buffaloes having no abnormality on palpation and not being pregnant after artificial inseminations in three consecutive estrus period were called as repeat breeder.

Blood samples were collected from the jugular vein of the animal aseptically. The samples were kept at room temperature for 24 h for serum separation. The serum were collected and stored at -20ºC for further studies.

Analytical procedure

i) **Diagnostic kits:** Diagnostic kits bearing cat. No. Ca 590, Mag 570 and PH. 1016 (Randox International Lab. Ltd, UK) were used and standard procedures were applied for estimating concentrations of serum calcium, magnesium and inorganic phosphorus.

ii) **Analyses of samples:** Colorimetric method was used for the estimation of serum calcium (Sarkar, 1967) and magnesium and UV method was applied for inorganic phosphorus concentration (Teiz, 1983). All these analyses were performed through spectronic-21.

iii) **Computation of concentration:** Concentration of calcium, magnesium and inorganic phosphorus will be computed as following.

Calcium

$$\text{Concentration (mg/dl)} = \frac{\text{Absorbance of sample}}{\text{Absorbance of standard}} \times 9.82$$

Magnesium

$$\text{Concentration (mg/dl)} = \frac{\text{Absorbance of sample}}{\text{Absorbance of standard}} \times 2.31$$

Inorganic phosphorus

$$\text{Concentration (mg/dl)} = \frac{\text{Absorbance of sample}}{\text{Absorbance of standard}} \times 5.18$$

Statistical Analysis

The data thus collected was analyzed by Analysis of Variance (ANOVA) by using SPSS version 13 (Steel and Torrie, 1982).

RESULTS AND DISCUSSIONS

Mean ± S.E values of calcium, magnesium, and phosphorus among different Buffalo group at LES Bhunikey, Pattoki shown in Table.1.

Normal cyclic buffaloes had significantly ($P<0.05$) higher calcium than non cyclic and repeat breeder buffaloes. The results of the present study are in line with Pasha *et al*. (2012) who reported similar (9-11 mg/dl) calcium levels in the serum of buffaloes in Punjab. Results are not in coincidence with Husnain *et al*. (1981), who reported the calcium level in serum of milking buffaloes were slightly lower (6.70- 8.00 mg/dl). These results are not in line with the study of Hedaoo *et al*. (2008) who reported that there is no difference of calcium between normal cycling and anoestrus buffaloes.

Normal cyclic buffaloes had similar levels

of magnesium to that of non cyclic, while repeat breeder buffaloes had higher levels of magnesium as compared to both cyclic and non cyclic buffaloes. Results of the present study are in line with Hedaoo *et al*. (2008) who reported that magnesium has no effect on cyclicity of the buffaloes. Magnesium values in buffaloes blood were slightly higher than Pasha *et al*. (2012) who reported 2.68 mg/dl in Punjab, Iqbal. (1990), who reported 2.57-2.58 mg/dl magnesium in blood serum of cattle and Hussain (1991) who reported 1.75-280 mg/dl in blood serum of cattle. Results are similar to Oba and Ramos (1988), who reported 3.84±1 mg/dl magnesium in serum of cattle.

Normal cyclic buffaloes had low levels of inorganic phosphorus than that of non cyclic and repeat breeder buffaloes. Calcium and phosphorus should be 2:1 in mammals. In the present in anoestrus and repeat breeder buffaloes, this ratio was high. Results in the present study were in line with Hignett. (1959) who reported that phosphorus higher than 2:1 may result in infertility.

It's concluded from the above trial that calcium and phosphorus imbalance may result in infertility while magnesium may have no effect on fertility. It's further suggested that further studies comprising blood mineral profile, fodder mineral profile and soil mineral profile should be measured to sort out exact problem of the nutritional deficiency.

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Table 1. Mean ± S.E values of calcium, magnesium, and inorganic phosphorus among different buffalo groups.

Groups	Calcium (mg/dl) Mean ± SE	Magnesium (mg/dl) Mean ± SE	Inorganic Phosphorus (mg/dl) Mean ± SE
Non cyclic	10.55±0.43[a]	4.76±0.22[a]	5.39±0.28[a]
Repeat breeder	10.01±0.42[a]	5.36 ±0.38[b]	5.55±0.32[a]
Cyclic	11.77±0.37[b]	4.98±0.38[a]	4.64±0.33[b]

Mean values with in the same column bearing different superscripts differ significantly ($P<0.05$) among groups.

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