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Comparative Studies on Plasma Profile of Calcium, Inorganic Phosphorus and Magnesium in Repeat Breeder and non Cyclic Holstein Friesian and Jersey Cows

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Abstract: Blood minerals level in relation to various stages of estrous was determined in 35 Friesian and jersey cows. The experimental animals were divided in to following 4 groups 1. Friesian cows non cyclic. 2. Friesian cows repeat breeder 3. Jersey cows noncyclic 4. Jersey cows repeat breeder. Blood serum was analyzed for calcium, In organic phosphorus and magnesium. The mean values of calcium 1.96, 2.68, 1.89 and 2.67 m $mols^{-1}$ lit and of phosphorus were 1.46, 1.57, 1.42 and 1.50 m $mols^{-1}$ lit in four above groups respectively. The mean concentration of magnesium was 0.80, 1.03, 0.84 and 0.99 m $mols^{-1}$ lit respectively. The concentration of calcium and inorganic phosphorus was significantly higher in repeat breeder (2, 4 groups) than in non cyclic cows (1, 3 group). The calcium and phosphorus ratio (Ca : P) was significantly wider \lower 1.34:1, 1.33:1 in non cyclic Friesian and Jersey cows than 1.70:1, 1.78:1 in repeat breeder Friesian and. Jersey cows respectively.

Key words: Blood minerals levels, esbrous, Friesian, Jersey cow

Introduction

The minerals nutrition plays vital role in exploitation of reproduction potential and maintenance of functional integrity of the reproductive system in domestic animals (Leathem, 1966).The Calcium (Ca).Phosphorus, (P) and Magnesium(Mg) etc are some of the important minerals in this respect. The exact mechanism by which mineral deficiency reduces fertility is not clear (Lacing *et al*., 1988). The reproductive efficiency of exotic cows in Pakistan is lower than Europe and USA. The mineral profile of exotic cows is not properly known in this climate. Low serum calcium, inorganic phosphorus and magnesium may be responsible for retention of placenta (Bari *et al*., 1996) and it may lead to reproductive failure (Hidiroglo, 1979).The ovarian activities are most prone to minerals imbalances and their deficiency effect ovarian activity in negative manner (Haq *et al*., 1999).The project was therefore initiated to determine the serum mineral profile of cyclic and non cyclic Holstein Friesian and Jersey cows in climatic condition at Livestock Experiment Bhunikey Pattoki Distt., Kasure, Punjab, Pakistan.

Materials and Methods

Selection of animals: A total of 35 cows apparently healthy but suffering from reproductive disorders having 3–10 years of age were available for the study for estimation of serum concentration of calcium, inorganic phosphorus and magnesium in the blood of Friesian and Jersey cows maintained at Livestock Experiment Stations Bhunikey Pattoki Distt Kasure. The animals were grouped in 4 categories. A, Non cyclic Friesian B, Repeat breeder Friesian cows. C, Non cyclic Jersey cows, Repeat breeder Jersey cows. The history of each cow was recorded from history sheet of individual cow as Date of birth, Date of calving, Date of last service, No of inseminations, Date of last estrous etc.

Blood sampling: Blood samples were collected from the jugular vein as described by Pyne e*t al*. (1970). These samples were kept at room temperature for 24 hours for separation of serum. The serum was collected and centrifuged at 3000 rpm for five minutes and stored at -20°C for further studies.

Analytical Procedure

Diagnostic Kits: Diagnostic kits bearing Cat. No. Ca 590, Mag 570 and PH. 1016 (Randox International Lab. Ltd, UK) were used and standard procedures of these kits were applied for estimating concentrations of serum calcium, Magnesium and inorganic Phosphorus.

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

Computation of concentration: Concentration of calcium, magnesium and inorganic phosphorus were computed as following:

Calcium:

$$\text{Concentration (m mole lit}^{-1}) = \frac{\text{Absorbence of sample}}{\text{Absorbence of standard}} \times 2.50$$

Magnesium:

$$\text{Concentration (m mole lit}^{-1}) = \frac{\text{Absorbence of sample}}{\text{Absorbence of standard}} \times 1.00$$

Inorganic Phosphorus:

$$\text{Concentration (m mole lit}^{-1}) = \text{Concentration of standard} \times \frac{\text{Absorbence of sample}}{\text{Absorbence of standard}}$$

The data thus collected was analyzed using standard statistical techniques (Steel and Torrie, 1982).

Results and Discussion

The values for serum concentrations of calcium, inorganic phosphorous and magnesium (Mean±SE) in groups A, B, of Friesian cows being maintained at Livestock Experiment Stations Bhunikey Pattoki Distt Kasure were 1.96±0.20, 1.46±0.13, 0.80±0.80 and 2.67±0.30, 1.57±0.30, 1.03±0.19 mmole^{-1} lits the corresponding values of calcium inorganic phosphorus and magnesium for C and D groups of Jersey cows were 1.89±0.27, 1.42.±0.24 , 0.84±0.10 and 2.68±0.29, 1.506±0.24, .99±0.20 mmols^{-1} lit., respectively as given in Table 1.

The findings of the present investigation regarding serum calcium concentrations 1.96 and 2.67, 1.89, 2.68 m mols^{-1} lit are very close to the earlier reports of (2.03, 1.72 m mols^{-1} lit.) Nemat –U- Allah *et al.* (1983) for repeat breeder and noncyclic buffaloes respectively.

The mean serum inorganic phosphorus 1.46±0.13, 1.42±0.24 and 1.57±0.17, 1.50±0.24 m moles lit for Non-cyclic and repeat breeder Friesian and Jersey cows are close to the findings of (1.65, 1.62 m moles lit) of Namet Ullah *et al.* (1983) for repeat breeder and non cyclic buffaloes respectively. The calcium level was significantly higher in repeater than non cyclic and there is also trend of higher level in Phosphorus and Magnesium in repeat breeder groups than non cyclic cows.

The serum calcium contents in the group of Friesian and Jersey cows non cyclic differed significantly ($P<0.05$) from repeater Friesian and Jersey cows. Whereas concentration of phosphorus and magnesium did not differ significantly. The serum concentration of calcium, inorganic phosphorus and magnesium did not differ in between the Friesian and Jersey breed in both the groups of Non-cyclic and repeat breeder. The results of the study reflects that there is difference in the mineral level in the two groups of study but no difference in the breed. Similarly calcium and Phosphorus ratio of 1.34 : 1 in non cyclic animals was significantly wider/lower than 1.70 : 1 in-cyclic animals is also in line with reports of –Nemat-U-Allah *et al.* (1983) for non-cyclic and repeat breeder.

They also reported that ratio of calcium, phosphorus 1.52:1 has adverse effects on fertility of buffaloes. These results are in agreement to the work of Luca *et al.* (1976) that Ca:P ratio close to 2:1 was required for high fertility of cattle.

The high calcium and inorganic phosphorus concentration in the serum of repeat breeder than the non cyclic Friesian and Jersey cows is in accordance with reports of Parsad and Rao (1998) "that anestrous cows has lowest mineral level and repeat breeder has more mineral level than, an estrous but lower mineral level than normal cows except magnesium. The overall serum concentration of calcium in the (1.90±..27, 2.67±0.03) non cyclic and repeat breeder cows in present study is lower when compared to the values 3.41 mmoles^{-1} lits as reported by Prabha *et al.* (2000) in normal crossbred Fr x Hr cows in India. The same author reported 0.85 mmoles^{-1} lit inorganic phosphorus concentration which is not in line with this report These differences might be due to location, soil chemistry or breed. Kumar *et al.* (2001) reported calcium level 2.64 mmols^{-1} lit in non pregnant crossbred cows that is very close to the finding of this study for repeat breeder.

The results of this study are in accordance with the reports of Quayam *et al.* (1989), that the on set of estrous is related with concentration of P and other minerals in the blood. The results of this study are also supported with the report of (Husnain *et al.*, 1981) that lower profile of calcium and in organic phosphorus is an important cause of non cyclic conditions. It is concluded from the study

Table 1: Level of calcium, inorganic phosphorus and magnesium in cyclic and non cyclic holstein friesian and jersey cows (Mean±SE)m moles^{-1} lit

	Non-cyclic			Repeat Breeder		
Breed	Ca	P	Mg	Ca	P	Mg
Friesian	1.96±0.20	1.46±0.13	0.80±0.20	2.68±0.30	1.57±0.17	1.03±0.19
Jersey	1.89±0.27	1.42±0.24	0.84±0.16	2.67±0.29	1.50±0.24	0.99±0.20
Overall	1.92±.26	1.45±.15	0.82±.20	2.67±.30	1.54±.20	1.02±.20

Table 2: Mean Ratio of Calcium to Phosphorus in Blood Plasma of Cyclic and non Cyclic Holstein Friesian and Jersey

Breed	Fertility	N	Calcium M moles^{-1} lit	Phosphorus m moles^{-1} lit	Ratio Ca:P
Friesian	Cyclic	13	2.68±0.30	1.57±0.17	1.70*:1
Friesian	Non-cyclic	8	1.96±0.20	1.46±0.13	1.34:1
Jersey	Cyclic	8	2.67±0.29	1.50±0.24	1.78*:1
Jersey	Non-cyclic	6	1.89±0.27	1.42±0.24	1.33:1
Overall	Non-cyclic	14	1.92±0.28	1.45±0.25	1.32:1
	Cyclic	21	2.67±0.30	1.54±0.24	1.73:1

that deficiency and imbalance ratio of mineral in the blood of cows is one of the causes of an estrous and repeat breeder in cattle.

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