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Serum Biochemical Levels of Repeat Breeder Cross Bred Cows under Rural Condition of Satara District of Maharashtra

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Abstract Present investigation was carried out on 28 repeat breeding cross bred cows during their post-partum period in their second to seventh lactation from different villages of Satara district. Serum was separated from collected blood samples and analyzed for certain biochemical parameters viz. protein, albumin, globulin, cholesterol, calcium, and phosphorus and blood urea nitrogen. These serum biochemical constituents were compared with serum levels in normal cyclical and repeat breeding cattle reported by various researchers.
Keywords *Blood Biochemical; Field Condition; Repeat Breeder Cows*

1. 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. Lactation however places a heavy drain on an animal already deficient especially in certain minerals and in the general level of feeding [1]. Biochemical profile can indicate the nutritional status of the minerals and other constituents, and help in diagnosis and management of infertility in animals. The repeat breeding condition in dairy cows not only affects the fertility of the cattle to a considerable extent but also incurs great economic loss to the farmer. Mineral imbalances or deficiency may be a factor responsible for repeat breeding condition in animals.

Certain biochemical constituents in blood serum during estrus period have found to be associated with the fertility status of cows and their reproductive behaviour. The findings of many authors [2, 3, 4] suggest that normal blood levels of various biochemicals constituent are indispensable for normal function of various systems of body including reproductive system. The present study was undertaken

to elucidate the relationship between certain serum biochemical including mineral status and repeat breeding condition in dairy cows. Changes in the levels of these metabolites have been associated with reproductive failures and might be having a potential to be used for diagnostic purpose.

The attempts have been made to investigate the levels of serum calcium, phosphorus, blood urea nitrogen, cholesterol and protein in repeat breeding cattle so as to ascertain their possible involvement and usefulness as a tool for clinical diagnosis of repeat breeding.

2. Materials and Methods

Present investigation was carried out on 28 repeat breeding cross bred cows during their post-partum period attended during infertility camps at different villages in Satara district. Repeat breeder cows chosen for the study were in their second to seventh lactation selected on the basis of history. Health status was ascertained through clinical examination. All the animals selected were devoid of genital abnormalities. The animals were maintained by the farmers in rural areas under the traditional animal husbandry practices. The animals were fed some concentrate mixture, paddy straw and allowed to graze in the grazing field, mostly dominated by carpet grass.

About 10 ml blood was collected aseptically from jugular vein of each of experimental animal. Serum was separated with help of pasture pipette and collected in small sterilized plastic vials and stored at -20^{0}C temperature till analysis. The serum biochemical constituents like protein, albumin, globulin, cholesterol, calcium, phosphorus and blood urea nitrogen (BUN) were estimated by standard methods [5]. These serum biochemical constituents were compared with serum levels in normal cyclical and repeat breeding cattle reported by various researchers.

3. Results and Discussion

The average circulating levels of serum Total Proteins, Albumin, Globulin, Cholesterol, Calcium, Phosphorus and BUN with standard error recorded in 28 repeat breeding and 8 normal cyclic cross bred cows have been presented in Table 1.

Table 1: *Serum Biochemical Constituents (Mean ± S.E.) in Normal Cyclic and Repeat Breeder Crossbred Cows*

S. N.	Name of the Serum Biochemical Parameter	Normal Cyclic Crossbred Cows (n=08)	Repeat Breeder Crossbred Cows (n=28)
1.	Calcium (mg/dl)	$10.39^{a} \pm 0.31$	$8.49^{b} \pm 0.30$**
2.	Inorganic Phosphorus (mg/dl)	$5.40^{a} \pm 0.30$	$4.44^{b} \pm 0.17$*
3.	Blood Urea Nitrogen (BUN) (mg/dl)	$13.08^{a} \pm 1.76$	$13.44^{a} \pm 1.15$
4.	Total Cholesterol (mg/dl)	$201.46^{a} \pm 16.34$	$142.60^{b} \pm 8.28$**
5.	Total proteins (g/dl)	$6.57^{a} \pm 0.37$	$5.46^{b} \pm 0.17$**
6.	Albumin (g/dl)	$3.84^{a} \pm 0.26$	$3.37^{b} \pm 0.06$**
7.	Globulin (g/dl)	$2.73^{a} \pm 0.12$	$2.09^{a} \pm 0.18$
8.	A:G ratio	$1.40^{a} \pm 0.06$	$1.99^{a} \pm 0.20$

Note: Values with similar superscripts in a row indicate no significant difference.
Values with dissimilar superscript in a row indicate significant difference.
In column two, (*) indicate significant at 5% and (**) indicate significant at 1% level within a row.

Repeat breeding is among reproductive disorders which hinder favourable productivity in buffaloes [6]. In the present study, the concentrations of calcium (Ca) in Normal cyclic (NC) and Repeat breeder (RB) Groups were found to vary significantly at (p<0.01). The concentrations of Ca were found to be lower in Repeat breeders than normal cyclic crossbred cows. These findings are in agreement with the results of many other workers [7, 8, 9, 10, 14]. However, lower serum calcium level in normal cyclical cows and higher level in repeat breeder cross bred cows have also been

reported [15]. Calcium plays a key part in improving the number and size of ovarian preovulatory follicles, and the ovulation rate [11].

In comparison with NC crossbred cows, the concentrations of serum inorganic phosphorus were significantly lower (P<0.05) in RB crossbred cows. Lower inorganic phosphorus concentration in repeat breeder animals has also been reported in many other studies [7, 10, 12, 13].

Synthesis of ovarian steroids is under the control of gonadotropic hormone regulation in which the Ca plays a pivotal role [16]. Regulation of the membrane potential of oocytes is also controlled by the Ca. Further, it is also suggested that Ca is involved in regulation of gap junctions with respect to their numbers between cumulus cells resulting in disruption of cohesiveness of cumulus cells [17], which contributes to the process of ovulation. Disturbances in ovulation along with pituitary-ovarian axis could be caused by marginal deficiency of phosphorus [18]. Moreover, the process of ovulation is inhibited through putting the breaks on the pituitary gland function as a result of disturbed calcium-phosphorus ratio [19].

There was no significant difference between NC and RB crossbred cows in present study with respect to the levels of BUN, Globulin and Albumin/Globulin ratio. However, the reported values of BUN and A/G ratio were lower in NC than RB crossbred cows.

Significantly lower (P<0.01) concentration of serum total protein in the RB crossbred cows in comparison with the NC crossbred cows is comparable to the findings of many workers [20, 12, 21]. However certain others observed no significant variation in the protein levels between normally cycling and repeat breeding cows [22, 23]. Low level of plasma protein resulted in the deficiency of certain amino acids required for the biosynthesis of gonadotropins and gonadal hormones [24, 25] might cause reproductive hormonal disturbances in animals leading to inactive ovaries [26].

The RB crossbred cows showed significantly lower (P<0.01) concentration of albumin when compared to NC crossbred cows. Similar finding is reported [23, 28]. This high level of albumin in normally cycling cows revealed increased demand for amino acids and protein for the biosynthesis of GnRH and LH to initiate ovulation [28].

The total serum cholesterol concentrations in RB crossbred cows were lower (P<0.01) when compared to NC crossbred cows. This is in agreement with the findings of many workers [27, 12, 23, 8].

4. Conclusion

It can be inferred from this study that Blood Urea Nitrogen, Globulin and Albumin/Globulin ratio do not play a significant role in causing Repeat Breeding problem in crossbred cows and underlines the importance of other serum biochemical parameters like protein, albumin, cholesterol, calcium, and phosphorus in diagnosing the cases of RB crossbred cows. However, more detail study of these parameters along with trace minerals like Iron, Copper, Zinc, and Manganese, Selenium etc. in Satara district on organized and non organized farms is needed.

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