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Serum biochemical profile of repeat breeder crossbred cows

DEEPAK CHANDRAHAR[1], R.P. TIWARI[2†], M.K. AWASTHI[3] AND G.K. DUTTA[4]

Department of Obstetrics & Gynaecology
College of Veterinary Science & A.H , Anjora, Durg - 491 001

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ABSTRACT

Glucose, inorganic phosphorus, total protein, albumin, cholesterol and alkaline phosphatase were estimated in blood serum of repeat breeder crossbred cows and their levels were compared with that of normal fertile cows. The repeat breeder cows had significantly lower ($P < 0.01$) level of blood glucose and inorganic phosphorus while serum calcium, albumin and alkaline phosphatase were at significantly higher level ($P < 0.01$). The difference in total protein and serum cholesterol levels between two groups were non-significant.

Key words : Albumin, alkaline phosphatase, cholesterol, inorganic phosphorus, glucose, repeat breeder crossbred cows

Specific nutrients influence the fertilizability of ovum in most species of domestic animals (Lamond, 1970). Certain biochemical constituents in blood serum during estrus period have been found to be associated with the fertility status of cows and their reproductive behaviour (Kumar *et al.*, 1986). There is paucity of information regarding studies on biochemical profiles in repeat breeder crossbred cows in the plains of Chhattisgarh. In the present paper biochemical profile in repeat breeder cows has been presented.

MATERIALS AND METHODS

The present investigation was carried out on 20 repeat breeder crossbred and 10 normal fertile cows at Govt. Veterinary Hospital, Durg (CG). Blood samples (20 ml) were collected by veinpuncture before insemination or treatment on the day of estrus. The serum was separated and stored at -20°C till analysis. Blood glucose (Folin and Wu, 1920) serum calcium (Stern and Lewis, 1957) mrethod, serum inorganic phosphorus (Henry, 1974), total protein and albumin (Dhumas, 1971), serum cholesterol (Wybenga and Pileggi, 1970) and alkaline phosphatase (Kind and King, 1954) were estimated.

RESULTS AND DISCUSSION

The serum levels of various biochemical indices in repeat breeder and normal fertile cows are presented in Table 1.

Glucose : The average blood glucose level was significantly lower in repeat breeder cows than in normal fertile cows. The present findings are in agreement with reports of Roychoudhary *et al.* (1986), Dutta *et al.* (1991) and Ramakrishna (1996) who recorded lower blood glucose level in repeat breeder cows. However, Sharma *et al.* (1983), Kumar *et al.* (1986) and Awasthi and Kharche (1987) did not note significant difference in blood glucose level between repeat breeder and normal fertile cows. Hypoglycaemia during estrus may lead to lack of energy to spermatozoa, ovum and embryo (McClure, 1968, Goel *et al.*, 1974). Thus, blood glucose level may denote the fertility status of cows.

Calcium : The mean serum calcium level was found to be significantly higher in repeat breeder crossbred cows than in normal fertile cows. This is in contrast with earlier reports where significantly lower levels (Ashturkar *et al.*, 1995 and Burle *et al.*, 1995) or non significant difference between two groups were observed (Sharma *et al.*, 1984; Ramakrishna, 1996 and Singh and Patil, 1998). Calcium dependent mechanisms are involved in steroid biosynthesis in ovaries and LH release from pituitary (Hurley and Doane, 1989). Higher level of serum calcium in present study might be due to common practice of administering calcium preparations to enhance milk production. The higher serum calcium level may probably alter the biochemical environment of the uterus which may not be conducive for fertilization and embryo survival and this aspect needs further studies.

Inorganic phosphorus : In the present study, the serum inorganic phosphorus level was found to be significantly at lower level in repeat breeder cows. Similar observations were also reported by Kumar *et al.* (1986) and Singh and Pant (1998).

[1]Vety.Asstt.Surgeon, I/c A.I. Centre, Raipur (Chhattisgarh)
[2]Assoc.Prof. & I/c Dept. of Vety. Obst. & Gynae.
[3]Asstt. Professor, Dept. of Vety Obstetrics & Gynaecology
[4]Asstt. Professor, Dept. of Veterinary Biochemistry

[†]Corresponding author

Table 1. Macro elements in blood and blood serum of normal fertile and repeat breeder crossbred cows

Parameters	Normal fertile cows		Repeat breeder cows	
	Range	Mean±SE	Range	Mean±SE
Glucose mg %	66 - 75	70.41±0.87	55.88 - 67.64	60.43±0.73*
Calcium mg %	5.29 - 7.05	6.17±0.17	6.6 - 12.94	9.63±0.36*
Phosphorus mg %	4.43 - 4.83	4.6±0.04	3.48 - 4.40	3.98±0.05*
Total protein gm %	6.27 - 9.86	8.02±0.3	6.5 - 8.06	6.94±0.08
Albumin gm %	1.56 - 2.23	1.94±0.06	2.57-3.68	2.80±0.05*
Cholesterol mg %	95.23 - 219	165.75±11.1	142.85 - 247	182.37±6.29
AKP KA units	3.84 - 7.69	6.22±0.34	9.23 - 13.84	11.14±0.22*

* Significant $P < 0.01$

Inorganic phosphorus has been reported to be essential for energy transformation at cellular level and is associated with the maintenance of sperm glycolysis and respiration (Krishnaswami and Uthappa, 1984). Significant reduction in fertility and higher number of services per conception have been reported by Morrow (1969) in phosphorus deficient animals.

Total protein : The mean value of total serum protein was apparently lower in repeat breeder than in normal fertile cows, difference between two groups was non significant. However, Dutta *et al.* (1991) and Ramakrishna (1996) recorded significantly lower level of total serum protein in repeat breeder cows, while Sharma *et al.* (1984) recorded higher level of serum protein. Lower serum protein level may lead to deficiency of certain amino acids which are essential for gonadotrophin synthesis (Vohra *et al.*, 1995).

Albumin : The mean serum albumin level was significantly higher in repeat breeder cows. This finding differed with the report of Ramakrishna (1996) who recorded non significant difference in serum albumin levels between repeat breeder and normal fertile cows. The serum albumin concentration in inversely related to the number of services per conception (Rowlands *et al.*, 1977). However, the finding of higher level of albumin in repeat breeder cows in present study indicates that some other factors might be responsible for higher number of services per conception.

Cholesterol : The serum cholesterol level was non-significantly higher in repeat breeder cows than the normal ones. Similar observation was recorded by Sharma *et al.* (1984) and Awasthi and Kharche (1987). However, significant lower cholesterol level in repeat breeder cows was reported by Kumar *et al.* (1986) and Singh and Pant (1998). Rowlands *et al.* (1977) suggested that the poor fertility is unrelated to the cholesterol level. The non-significant difference in the level of cholesterol in both the groups indicates that the cholesterol level is not a direct cause for repeat breeding.

Alkaline phosphatase (AKP) : In the present study serum AKP was significantly higher in repeat breeder as compared to normal fertile cows. These results are in agreement with the findings of Sinha *et al.* (1986). Contrary to this, Salphale *et al.* (1993) and Dhabale (1995) recorded significantly lower level of serum AKP in repeat breeder cows. In normal cyclic animals, lower serum AKP level might have enhanced the folliculogenesis and fertility (Devraj, 1983). Low activity of AKP is more conducive for fertility (Sinha *et al.*, 1986). Significant higher levels of serum AKP in repeat breeder cows recorded might be due to subserosal escape of AKP into serum due to cellular disintegration which may be one of the cause for repeat breeding.

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