

COMPARATIVE BIOCHEMICAL PROFILE OF BLOOD SERUM AND ESTRUAL MUCUS IN NORMAL AND REPEAT BREEDING KANKREJ COW

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The study was carried out on twenty normal and ten repeat breeder female Kankrej cows. The blood serum as well as the estrual mucus discharge was collected to estimate the inorganic phosphorus, total cholesterol, total proteins and glucose levels during estrus period. The serum levels of inorganic phosphorus and total protein were significantly ($p < 0.01$) higher in normal breeder, whereas serum total cholesterol and glucose were found significantly ($p < 0.01$) higher in repeat breeder Kankrej cows. All the biochemical parameters studied for estrual mucus were significantly higher in normal breeder as compared to repeat breeder Kankrej cows.

Key words: Biochemical, Estrual mucus, Kankrej cow, Repeat breeder

Repeat breeding of bovines has been recognized as one of the most serious reproductive problem. Problem of sub-fertility or infertility is rather economically more serious than complete sterility. High incidence of this reproductive disorder resulting in economic loss in dairy herds (Katagiri and Takahashi, 2004). The

incidences of repeat breeding have been reported vary in several studies, ranging from 5% to 30% (Bartlett *et al.*, 1986; Moss *et al.*, 2002 and Yusuf *et al.*, 2010). Deficiency or excess of certain biochemical constituents during estrus in blood serum and cervical mucus may affect fertility of cows (Dutta *et al.*, 1991). Therefore the

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present investigation carried out to study the biochemical profile of blood serum and estrual mucus in repeat breeding Kankrej cow.

MATERIALS AND METHODS

Thirty cyclic and apparently healthy female Kankrej cows maintained at Livestock Research Station, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar were utilized for this study. From this twenty cows exhibiting regular cycle but not conceived even after two or more inseminations after calving and without any detectable uterine infection were identified as repeat breeding cows. Ten cows having regular estrous cycle with herd record of high conception rate were designated as normal cycling cows. Blood samples of each repeat breeding and normally cycling cows was collected before artificial insemination and serum was separated. The mucus samples were collected aseptically before breeding by aspiration using a sterilized glass pipette (10 mL), whose pointed end was connected to a syringe with rubber junction. The glass pipette was followed per rectally to pass through the cervix or near the vaginal fold.

The cervical mucus was diluted with triple glass distilled water at the rate of 1: 3 using vortex machine. The diluted mucus was used for the biochemical estimation.

Glucose, inorganic phosphorus, total protein and total cholesterol were estimated in serum and inorganic phosphorus, total protein and total cholesterol in estrual mucus using standard kits (Lab-care Diagnostic Pvt. Ltd., Sarigam, District: Valsad, Gujarat, India). The data were studied statically by a well known statistically method of two sample "t" test (Snedecor and Cochran, 1994).

RESULTS

The overall average values of inorganic phosphorus, total cholesterol and total proteins in cervical mucus were significantly ($p < 0.01$) higher in normal breeder (1.92 ± 0.02 mg/dL; 45.08 ± 0.68 mg/dL and 3.52 ± 0.18 g/dL) respectively as compared to repeat breeder (1.16 ± 0.04 mg/dL; 38.73 ± 0.41 mg/dL and 2.70 ± 0.05 g/dL) respectively Kankrej cows (Table 1). The overall average mean \pm SE values of inorganic phosphorus and total proteins in blood serum of normal breeder cows were

Table 1. Mean ($\bar{X} \pm$ SE) inorganic phosphorus, total cholesterol and total protein in estrual mucus of normal breeder and repeat breeder Kankrej cows during estrus

Sr. No.	Estimation	Normal (N=10)	Repeat breeder (N=20)
1.	Inorganic phosphorus (mg/dL)	$1.92 \pm 0.02^{**}$	1.16 ± 0.04
2.	Total cholesterol (mg/dL)	$45.08 \pm 0.68^{**}$	38.73 ± 0.41
3.	Total protein (g/dL)	$3.52 \pm 0.18^{**}$	2.70 ± 0.05

** $P < 0.01$

Table 2. Mean (\bar{X} + SE) inorganic phosphorus, total cholesterol, total protein and glucose concentration in blood serum of normal breeder and repeat breeder Kankrej cows during estrus

Sr. No.	Estimation	Normal (N=10)	Repeat breeder (N=20)
1.	Inorganic phosphorus (mg/dL)	5.23 ± 0.11**	4.12 ± 0.15
2.	Total cholesterol (mg/dL)	122.01 ± 0.49**	154.61 ± 1.06
3.	Total protein (g/dL)	9.48 ± 0.27**	6.72 ± 0.12
4.	Glucose (mg/dL)	45.42 ± 0.59**	52.34 ± 0.31

** P<0.01

significantly ($p<0.01$) higher as 5.23 ± 0.11 mg/dL and 9.48 ± 0.27 g/dL compared to repeat breeder cows as 4.12 ± 0.15 mg/dL and 6.72 ± 0.12 g/dL, whereas values of total cholesterol and glucose were significantly lower ($p<0.01$) in normal breeder cows (122.01 ± 0.49 mg/dL and 45.42 ± 0.59 mg/dL) than that of repeat breeder (154.61 ± 1.06 mg/dL and 52.34 ± 0.31 mg/dL) (Table 2).

DISCUSSION

In the present study, highly significant ($p<0.01$) lower value of inorganic phosphorus was record in estrual mucus of repeat breeder cows compared to normal cows. The present findings are in agreement with Salphale *et al.* (1992) and Shukla and Sharma (2006) who reported significantly higher inorganic phosphorus concentration in genital secretion of normal cows as compared to repeat breeder cows. Cellular metabolism is essential for energy transformation at cellular level, sperm

glycolysis and respiration. The inorganic phosphorus also helps in spermatozoa motility. Thus, lower inorganic phosphorus in repeat breeders might attribute to conception failure by affecting sperm motility and respiration adversely in the present study while reverse might be true for normal breeder cows.

Total protein value of estrual mucus was significantly lower in repeat breeder cows when compared to normal cows. Similar significant difference in the protein values between normal and repeat breeding cows have been reported by Pankaj *et al.* (2000) and Shukla and Sharma (2006). However, contrary to the present findings Mouli Krishna *et al.* (2006) reported that mean total proteins contents of the uterine flushing in repeat breeder cows was significantly higher than the control group. The higher concentration of total proteins in normal cyclic animals may be due to higher level of estrogen, which alters the secretary activity of genital epithelium. It is also apparent that proteins in cervical

mucus improve sperm transport and regulate its osmolarity, consistency, threadability and buffering capacity.

Cholesterol was recorded to differ significantly ($p < 0.01$) and remained higher in estrual mucus of normal cows in comparison to repeat breeders. Similar observations were reported by Manjunatha *et al.* (2001). However, Salphale *et al.* (1992) observed non-significantly higher concentration in normal as compared to repeaters crossbred cows. The high level of lipids in normal cows might provide better environment for spermatozoan metabolism and thus may also provide a conducive environment for the transit of spermatozoa.

The inorganic phosphorus concentration in blood serum during oestrus in the present study was significantly ($p < 0.01$) higher in normal as compared to repeat breeder cows. The present findings are corroborated well with the earlier reports of Shrikhande and Vhora (2000); Das *et al.* (2002); Meltem *et al.* (2002); Dhama *et al.* (2005); Chaurasia *et al.* (2010); Das *et al.* (2012) and Mukund *et al.* (2014). Contrary to the above findings Kavani *et al.* (2005) observed almost similar values of plasma inorganic phosphorus concentration in infertile Surti buffaloes. The low level of phosphorus might be one of the causes leading the estrus to become a non-fertile one. Marginal deficiency of phosphorus was sufficient to cause disturbance in pituitary ovarian axis.

A positive correlation between disturbance of estrus cycle and phosphorus deficiency and a significant decrease in inorganic phosphorus in infertile cows has been reported.

Serum total proteins was significantly ($p < 0.01$) higher in normal than repeat breeder cows. The results were in close agreement with Manjunatha *et al.* (2001) and Mukund *et al.* (2014). Contrary to the present findings Meltem *et al.* (2002) observed significantly higher level of total protein in repeat breeder than normal cows. Low level of serum proteins has been reported to be associated interference with the peri-implantational changes in the blastocyst and also with the process of implantation.

The value of serum total cholesterol in normal cows was lower than repeat breeder cows and the difference was observed to be highly significant ($p < 0.01$). This finding conform the earlier report of Manjunatha *et al.* (2001). However, Das and Bisoi (2005) and Mukund *et al.* (2014) reported higher serum total cholesterol value in normal as compared to repeat breeder cows.

The serum glucose value in repeat breeder cows was higher than normal cows and the difference was observed to be statistically highly significant ($p < 0.01$). Similar findings also observed by Meltem *et al.* (2002). However, Manjunatha *et al.* (2001) and Chandraraj *et al.* (2003) observed

higher glucose value in normal cows compared to repeat breeder whereas Awasthi and Kharche (1987) did not find any significant difference in blood glucose level between repeat breeder and normal fertile cows. The elevated glucose in these animals might be suggestive of stress factors as reported earlier by Parmar *et al.* (1986).

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CONFLICT OF INTEREST

Authors declare that there is no conflict of interest regarding the present research work.

ACKNOWLEDGMENTS

Authors are thankful to the Principal of the College and Research Scientist of the Livestock Research Station, SDAU, Sardarkrushinagar.

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