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Research Article

Comparative studies on metabolic profile of anestrus and normal cyclic Haryana cows*

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ABSTRACT

Twenty seven Haryana cows were selected (17- anestrus & 10- normal cyclic) from the university farm for the study of metabolic profile in relation to anestrus. Parameter studied were haemoglobin (Hb), serum glucose, total protein, calcium (Ca), inorganic phosphorus (Pi) and calcium to phosphorus ratio (Ca: P). It was found that levels of Hb were significantly higher ($P<0.01$) in normal cyclic cows compared to anestrus. An overall (day 0 to day 20) increase of Hb concentration and serum glucose were non-significantly higher in respective groups. Contrary to these increased values of Hb and glucose in normal cyclic cows, significantly higher levels of Pi ($P<0.01$) and total protein ($P<0.05$) were recorded in anestrus cows compared to normal cyclic cows. Calcium was also non-significantly higher in anestrus cows compared to normal cyclic cows. Calcium to phosphorus ratio was better in normal cyclic cows than anestrus cows which were 2.04:1 and 1.52:1, respectively. Such metabolic profile would be helpful in assessing the status of nutrition and its impact on infertility.

Key words: Metabolic profile, Hb, Serum glucose, Calcium, Inorganic phosphorus, Infertility, Cows.

INTRODUCTION

The problem of anestrus is the largest single cause of infertility both in cows and buffaloes. Among the various factors that cause anestrus, under nutrition predominates (Parker and Blowey, 1976 and Bhaskaran and Patil, 1982). This problem can be assessed on the basis of metabolic profile. Therefore, the study was conducted to assess the impact of nutritional deficiencies on fertility.

MATERIALS AND METHODS

Seventeen post-partum (> 90 days of calving), parous and lactating, Haryana cows aged between 4 to 10 years and having body weight between 170 to 305 kg, belonging to District Dairy Demonstration Farm, College of Veterinary Science, Mathura were employed for this study. Anestrus was confirmed on the basis of their history as well as per-rectal examination of the genital organs twice at an interval of 10 days. Animals having smooth and inactive ovaries with apparently normal genitalia and with no palpable abnormalities were used for this study. The animals were maintained on wheat straw, greens and concentrate. They were also allowed for grazing. The normal cyclic animals were selected from A I center of Veterinary College, Mathura (U. P.) and used for comparative study.

The blood samples from anestrus cows (total=51samples) were collected at an interval of 10 days for three times while samples from cyclic cows (total=10 samples) were taken once at the time of the A I.

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The concentration of Hb was estimated by using Hellige Sahli haemoglobinometer. The glucose was estimated by enzymatic GOD-POD method using kits supplied by Span Diagnostic Ltd. Estimation of total proteins was done by modified Biuret and Dumas method using kits supplied by above mentioned company. Estimation of Pi was done by Gomorri's method using kits. The estimation of Ca was done on AAS (Atomic Absorption Spectrophotometer). Statistical analysis was done as per Snedecor and Cochran (1971) utilizing 't'- test.

RESULTS AND DISCUSSION

The mean values for all the three collections of samples from anestrus animals were calculated and then compared with the normal cyclic animals. The mean values of blood serum constituents are presented in table 1. The normal cyclic animals had significantly ($P<0.01$) higher concentration of Hb than in the anestrus cows. Our findings for a significant difference in concentration between anestrus and the normal cyclic animals are also supported by various workers (Bansal, 1976 and Chetty and Rao, 1986). Though the importance of level of Hb has not been directly implicated in reproductive disorders, yet decrease in its value is indicative of certain systemic disorders which can indirectly affect the functional activity of the reproductive organs (Pradhan *et al.*, 1995). Low Hb levels can influence the tissue oxygenation of reproductive tract and can influence cyclicity (Ramkrishna, 1997).

In our study, the normal cyclic animals had non-significantly higher blood glucose concentration compared to anestrus animals. This non significant variation in the concentration between anestrus and cyclic animals is in accordance with Srivastava *et al.* (1981) and Yadav *et al.* (1995) whereas other workers have reported significantly higher levels of blood glucose in cyclic cows compared to anestrus cows (Chetty and Rao, 1986, Ramkrishna, 1997 and Yadav *et al.*, 2004). Several workers have supported the view that the concentration of glucose reflects energy status and reproductive activity of the animals (Mc Clure, 1965, Morrow, 1969 and Richards *et. al.*, 1987). Relative hypoglycemia in cows might possibly affect the expression of estrus symptoms. Mc Clure (1965) observed that variations in blood glucose were clearly linked to cyclicity and fertility. The loss in ovarian activity in hypoglycemic animals is due to the effect of hypoglycemic state on the release of gonadotrophins from hypophysis (Howland *et al.*, 1966). Richards *et al.* (1987) suggested that the reduced concentrations of glucose and insulin in blood were associated with nutritional anestrus. Contrary to above reports, Morrow (1969) reported that energy deficiency delayed puberty but did not affect estrus activity after puberty unless severe energy restriction occurs.

In our study, the normal cyclic animals had a significantly lower concentration of serum total proteins compared to anestrus cows. Our results thus, suggest that the concentration of total proteins is not related with the exhibition of estrus symptoms as it is also supported by Patil and Deshpande (1979). Our findings are in agreement with the findings of Chandolia and Verma (1987) who reported a marginally higher total proteins concentration in anestrus animals compared to animals in estrus. Also, many other workers did not find any significant change in the concentration of total proteins in anestrus and cyclic animals (Samad *et al.*, 1980) as well as any relationship between protein feeding and reproductive activity (Bond and Wiltbank, 1970).

Serum Ca indicated lower concentration of Ca in normal cyclic animals compared to anestrus animals but the difference was non significant. Findings are in agreement with Pathak and Janakiraman (1987) who reported a lower value in estrus and higher values afterwards, however, our findings are not in agreement with the findings of Dhoble and Gupta (1986) who reported a significantly higher concentration of Ca during follicular phase compared to metestrus and diestrus phase. Roberts (1971) stated that the Ca deficiency may not cause reproductive failure in cattle.

Significantly lower concentration of Pi was recorded in normal cyclic compared to anestrus cows. Our results for Pi concentration in cyclic and anestrus animals are in contrast to other reports (Chetty and Rao, 1986 and Yadav *et al.*, 2004). In cattle, its deficiency as well as excess is known for impairing fertility (Lottammer *et al.*, 1974).

The ratio of Ca: P in normal cyclic animals was 2.04:1 compared to 1.52:1 in anestrus cows. Manston (1966) reported that the absorption of Ca and P was better from diet having Ca: P ratio as 2:1 than 1:1. Even higher Ca: P ratio has been reported to be associated with infertility (Hignett, 1959). In our study, Ca: P ratio in anestrus animals was 1.52:1 which is lower than the proposed ratio. This suggests that animals having a ratio near to 2:1 have better chances of exhibiting estrus.

There were no observable clinical signs of deficiencies. Sub-clinical nutrient inadequacies are most probable cause for clinical anestrus and an integrated approach for treatment of multiple deficiencies is needed.

Table 1. Comparative metabolic profile of anestrus and normal cyclic animals.

Metabolic Profile	Anestrus animals	Cyclic animals
Hb (g/dl)	10.04±0.22[a] (6.6-12.6)	14.9±0.20[b] (14.0-16.0)
Glucose (mg/dl)	51.67±2.24 (25.0-100.0)	58.33±6.22 (33.3-100.0)
Total protein (g/dl)	7.08±0.09[c] (6.04-8.31)	6.55±0.21[d] (5.73-7.16)
Calcium (mg/dl)	11.59±0.83 (2.83-23.43)	10.17±0.52 (8.47-14.18)
Inorganic phosphorus (mg/dl)	7.97±0.32[e] (3.75-11.6)	5.4±0.40[f] (2.69-6.74)
Ca: P ratio	1.52: 1[g]	2.04:1[h]

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Appeal to Editorial Board Members and Reviewers

We had put draft of the june issue, 07 on-line. We had requested all the Editoriral Members and Executive members to view it and give their suggestions. Except a few none responded. We are thankful to those who responded well in time. We request all those who shall be on the Editorial board for December issue to kindly give their comments. We are thankful to those reviewers who have reviewed the articles. Some of them have not promptly responded while as others have send us their comments within the stipulated time. This is a honourary job. We shall expect quick response otherwise it delays the publication of the journal. We are maintaining a list of reviewers who are prompt and wish to issue appreciation letter to them.

Thanks

Editor