COMPARATIVE STUDIES ON METABOLIC PROFILE OF ANESTROUS AND NORMAL CYCLIC MURRAH BUFFALOES

Sharad Kumar¹, Atul Saxena² and Ramsagar²

ABSTRACT

Two groups consisting 14 anestrous buffaloes (4-10 years), body weight (230-375 kg) with smooth and inactive ovaries and 10 normal cyclic buffaloes were studied to determine the impact of metabolic profile on infertility. Blood samples from anestrous buffaloes were collected at an interval of 10 days apart three times (42 samples), whereas from cyclic buffaloes blood samples were taken only at the time of A. I (a total of 10 samples). The normal cyclic animals had significantly (P<0.01) higher concentrations of haemoglobin, serum protein and inorganic phosphorus than did the anestrous buffaloes. However, the concentration of serum glucose and calcium differ red non significantly between these two groups. The ratio of Ca:P in normal cyclic animals was lower (2.51:1) as compared to the anestrous animals (4.59:1). It can be concluded from the present study that the level of haemoglobin, serum protein and inorganic phosphorus play major role in animal reproduction. The ratio of Ca:P should also be near to 2:1 for better reproduction.

Keywords: anestrous, haemoglobin, serum protein, calcium, inorganic phosphorus

INTRODUCTION

Low breeding efficiency is one of most serious and frustrating problems confronting the dairy industry: serious because of economic losses frustrating because the problem is well concealed and difficult to correct (Pelissier, 1976). Anoestrous is the most prevalent form of infertility encountered in buffaloes and is the most frustrating and challenging problem. Sreemannarayana and Narashimha Rao (1977) reported the incidence of anoestrus in rural buffaloes to be as high as 61% of cases, whereas Luktuke et al. (1973) reported 14.67% of cases of true anoestrus in non-discript buffaloes of Uttar Pradesh. Amongst the various factors that causes anestrus, under-nutrition is a major problem (Francos et al., 1977 and Bhaskaran and Patil, 1982). To some extent these problems can be detected through metabolic profile tests. Therefore, this study was conducted to assess the impact of nutritional deficiency on anestrus in buffaloes.

MATERIALS AND METHODS

Fourteen post partum (>90 days of calving), parous and lactating Murrah buffaloes aged between 4 to 10 years and having body weights between 230 kg to 375 kg belonging to the District

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Dairy Demonstration Farm, College of Veterinary Science and Animal Husbandry, Mathura, were employed for the study.

Anestrus in these 14 animals was confirmed on the basis of their history and per-rectal examination of the genital organs twice at an interval of 10 days. All the animals had smooth and inactive ovaries with apparently normal genitalia without any palpable abnormalities on per-rectal examination. These animals were maintained on wheat straw, grain and concentrate ration and they were also allowed grazing. Normal cyclic animals selected from the A.I. center of the College of Veterinary Science and Animal Husbandry, Mathura, were used for comparative study.

The blood samples from the anoestrous buffaloes were collected at an interval of ten days three times (total 42 samples), whereas from the cyclic buffaloes, blood samples were taken only at the time of A. I (a total of 10 samples).

Haemoglobin concentration (g/dl) was estimated by using Shahlie’s haemoglobinometer, glucose (mg/dl), total protein (g/dl) and inorganic phosphorus (mg/dl) were estimated by GOD/POD methods, modified Burette, Duma’s method and Gomorrie’s methods respectively by using kits supplied with a Span Diagnostic Ltd. The estimation of calcium was done with a atomic absorption spectrophotometer. The mean values for all the three collections of samples from anestrous animals were calculated and then compared with the normal cyclic animals. Statistical analysis was done as per Snedecor and Cochran (1967) utilizing paired ‘t’ test.

### RESULTS AND DISCUSSION

The mean serum values of different parameters have been presented in Table 1.

<table>
<thead>
<tr>
<th>Metabolic Profile</th>
<th>Anestrous Buffaloes</th>
<th>Cyclic Buffaloes</th>
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<tbody>
<tr>
<td>Hb (g/dl)</td>
<td>12.20±0.23a</td>
<td>13.60±0.51b</td>
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<tr>
<td>Glucose (mg/dl)</td>
<td>54.17±3.88c</td>
<td>63.33±11.04c</td>
</tr>
<tr>
<td>Total Protein (g/dl)</td>
<td>6.32±0.22d</td>
<td>8.76±0.48e</td>
</tr>
<tr>
<td>Calcium (mg/dl)</td>
<td>7.91±0.48c</td>
<td>8.39±1.36c</td>
</tr>
<tr>
<td>P (mg/dl)</td>
<td>2.44±0.16f</td>
<td>3.96±0.25g</td>
</tr>
<tr>
<td>Ca:P</td>
<td>3.46±1h</td>
<td>2.15±1i</td>
</tr>
</tbody>
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a vs b; t=2.08 (P<0.05)  
d vs e; t=4.16 (P<0.01)  
f vs g; t=4.79 (P<0.01)  
h vs i; t=2.24 (P<0.05)
The normal cyclic animals had significantly (P<0.05) higher concentrations of Hb than those in the anestrous buffaloes. Significant differences in Hb concentration between anestrous and normal cyclic animals have also been reported by various earlier investigators (Dhoble and Gupta, 1981; Srivastava and Kharche, 1986; Yessein et al., 1964). Though the importance of the Hb level has not been directly implicated in reproductive disorders, yet a decrease in Hb value is indicative of certain systemic disorders which could indirectly affect the functional activity of the reproductive organs. A low level of Hb influences tissue oxygenation of the reproductive tract, which in turn could affect the cyclicity (Ramakrishna, 1997).

In the present study, the normal cyclic animals had non-significantly higher glucose concentrations as compared to the anestrous animals, which is in accordance with Murthy et al., (1981); Devasri et al., (1984); Srivastava and Kharche (1986); Umesh et al., (1995). Several workers have supported the view that the concentration of glucose reflects the energy status and reproductive activity of the animals (Mc Clure, 1965; Morrow, 1969; Richards et al., 1987). Relative hypoglycemia in cows might possibly affect the expression of stress symptoms. Mc Clure (1965) observed that variations in blood glucose were clearly linked to cyclicity and fertility. The loss of ovarian activity in hypoglycemic animals is due to the effect of hypoglycemic state on the release of gonadotrophins from hypothalamus (Howland et al., 1966). Richards et al., (1987) suggested that the reduced concentration 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.

The normal cyclic animals had a significantly (P<0.01) higher concentration of serum protein as compared to the anestrous buffaloes. Similar findings have been reported by other workers (Devanathan and Quayam, 1983; Umesh et al., 1995; Amanullah et al., 1997).

The serum calcium level was lower in the normal cyclic animals than in the anestrous animals, but the difference was non-significant (P>0.01). This finding is in agreement with Pathak and Janakiraman (1987) who reported a lower value in estrus and higher values afterwards. However, Dhoble and Gupta (1987) reported a significantly higher concentration of Ca during the follicular phase as compared to the metestrus and diestrus phases. Roberts (1971) stated that the Ca deficiency may not cause reproductive failure in cattle.

Significantly higher (P<0.01) concentration of Pi was recorded in normal cyclic buffaloes compared to anestrous buffaloes. Higher P values in normal cyclic animals have also been recorded by several earlier workers (Ventaswarlu et al., 1994; Umesh et al., 1995; Jani et al., 1995; Newar et al., 1999). Lottammer et al. (1974) observed the role of P in the fertility in cattle and reported that both deficiency and excess can cause impaired fertility.

The ratio of Ca:P in normal cyclic animals was 2.15:1 compared to 4.59:1 in the anestrous animals. It has been reported that absorption of Ca and P was better from a diet having a Ca:P ratio of 2:1 than one in which the ratio was 1:1. Even higher Ca:P ratios have been reported to be associated with infertility (Webster, 1932 and Hignett, 1959). Many others have also supported the similar views (Cornahan, 1974 and Luca et al., 1976). Our findings were well supported by Umesh et al. (1995) and Jani et al. (1995). They observed a disturbed Ca:P ratio in cyclic and noncyclic animals.

There were no observable clinical signs of deficiency. Subclinical nutrient inadequacies are the most probable cause for clinical anestrous and an integrated approach for treatment of multiple deficiencies is needed.
ACKNOWLEDGEMENT

The authors wish to express gratitude to the Dean, College of Veterinary Science and Animal Husbandry, Mathura, U.P. for providing necessary facilities for conducting this work.

REFERENCES


