MINERAL PROFILE AND SERUM ENZYME ACTIVITIES OF NORMAL CYCLING AND REPEAT BREEDING COWS

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ABSTRACT

Blood samples were collected from twenty five normal cycling and twenty five repeat breeding cows of Rangia subdivision, under Kamrup district of Lower Brahmaputra Valley to study the mineral profile and enzyme activities. The animals were maintained under similar nutritional status and management. Different elements viz., Ca, P, Mg, Fe, Cu, Zn and Mn and certain enzymes like ALP, ASAT and ALAT were studied. Among minerals P, Cu, Zn and Mn was observed significantly (P<0.05) higher in normal cycling cows from repeat breeder. The other elements like Ca, Mg and Fe were also observed apparently to be higher in normal cycling cows. The ALP activity was observed significantly (P<0.05) low in normal cycling cows while ASAT and ALAT was observed significantly (P<0.05) high in normal cycling cows from repeat breeding cows.

INTRODUCTION

Low concentration of circulatory minerals results in impaired reproductive function leading to cessation of cyclic activity (Martson et al., 1972). Deficiency of minerals affect various metabolic pathways due to enzymatic disturbances (Underwood, 1977). The present study was carried out to elucidate the possible relationship between the serum mineral profile and enzyme activities in nondescriptive cows of Assam.

MATERIAL AND METHODS

Study was done in non-descript indigenous cows, raised under similar nutritional status and management. Blood samples were collected from twenty-five normal cycling and twenty-five repeat breeding cows (noninfectious aetiology) from Rangia area under Kamrup district of Lower Brahmaputra Valley. Serum was separated and divided into two halves. The first half of the serum samples were processed (Fick et al., 1979) and different minerals namely Ca, Mg, Fe, Cu, Zn and Mn were estimated in Atomic Absorption Spectrophotometer (GBC-932, Australia). Phosphorus was estimated following the method of Taussky and Shorr (1953). The second half of the serum samples were used on the same day of collection for analysis of activities of different enzymes viz., Alkaline Phosphatase (ALP E.C.3.1.3.1), Aspartate Amino Tranferase (ASAT, E.C.2.6.1.1) and Alanine Amino Tranferase (ALAT, E.C.2.6.1.1). Enzyme activities were estimated in Photo-Analyzer (FT-2, Roma-Italy) using commercially available kit. Data generated from the study were compared statistically by ‘t’ test (Snedecor and Cochran, 1973).

RESULTS AND DISCUSSION

Results of the experiment have been presented in Table 1. The mean concentration of serum Ca, P and Mg (mg%) in normal cycling cows were 10.11±0.21, 4.71±0.19 and 2.82±0.11 and in repeat breeding cows were 9.87±0.29, 3.65±0.21 and 2.65±0.13 respectively. Among these macro minerals phosphorus was significantly (P<0.05) low in repeat breeder from normal cycling cows. Phosphorus is the most predominant element effecting reproduction even at lower level (Samanta et al., 1995). Bhaskaran and Abdullah Khan (1981) reported that marginal deficiency of P is sufficient to cause disturbance in pituitary-ovarian-axial without showing any deficiency symptom. Concentration of Ca and Mg in our experiment was corroborated with...
Table 1. Concentration (Mean±S.E) of different Elements and Serum Enzyme activities of normal cycling and repeat breeding cow

<table>
<thead>
<tr>
<th>Group</th>
<th>Ca (mg%)</th>
<th>P (mg%)</th>
<th>Mg (mg%)</th>
<th>Fe (mg%)</th>
<th>Cu (mg%)</th>
<th>Zn (mg%)</th>
<th>Mn (mg%)</th>
<th>ALP (IU/L)</th>
<th>ASAT (IU/L)</th>
<th>ALAT (IU/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal cycling</td>
<td>10.11±0.21a</td>
<td>4.71±0.19a</td>
<td>2.82±0.11a</td>
<td>3.26±0.14a</td>
<td>0.86±0.06a</td>
<td>3.15±0.11a</td>
<td>0.56±0.03a</td>
<td>47.18±6.06a</td>
<td>32.15±3.14a</td>
<td>25.17±4.19a</td>
</tr>
<tr>
<td>Repeat breeder</td>
<td>9.87±0.29a</td>
<td>3.65±0.21b</td>
<td>2.65±0.13a</td>
<td>3.04±0.17a</td>
<td>0.41±0.04b</td>
<td>2.41±0.09b</td>
<td>0.34±0.04b</td>
<td>59.29±5.12b</td>
<td>22.26±3.29b</td>
<td>17.14±2.42b</td>
</tr>
</tbody>
</table>

Mean bearing different superscript in the same column is significant (P<0.05).
the reports of Ramkrishna (1997), who also observed apparently high level of Ca and Mg in normal cycling cows.

The trace elements namely Cu, Zn and Mn were significantly (P < 0.05) high in normal cycling cows. Manickam et al. (1977) and Prasad et al. (1989) also reported a high level of Cu, Zn and Mn in normal cycling cows from repeat breeder. Cu and Zn either singly or in combination play a major role in maintaining reproductive rhythm (Prasad et al., 1989). Inactive ovaries, anoestrous and poor conception rates are the most common expressions consequent upon the deficiency of Cu, Zn and Mn (Chesworth, 1992). Higher concentration of Fe in normal cycling cows in our experiment coincides with the report of Prasad et al. (1989) and Vohra et al. (1995).

The activity of ALP (IU/L) was significantly (P<0.05) high in repeat breeder (59.29±5.12) from normal cycling cows (47.18±6.06). The increase activity of ALP in repeat breeding cow is required to release more phosphorus to maintain calcium-phosphorus ratio in the blood as the concentration of phosphorus in this group is very low (Lehinger, 1990). Kalita et al. (2000) also recorded high ALP activity in goat having low phosphorus concentration in blood. The ASAT (IU/L) and ALAT (IU/L) activity in normal cycling cows were 32.15±3.14 and 25.17±4.19 and in repeat breeding cows were 22.26±3.29 and 17.14±2.42 respectively. Both ASAT and ALAT activities were significantly (P<0.05) high in normal cycling cows and that might be due to increase transaminase reaction as a result of increase concentration of different elements (Boton, 1980; Moassa and Poulsen, 1991 and Kalita et al., 2000). Thus it can be concluded that there are different levels of mineral concentration and enzyme activities in normal cycling and repeat breeding cows and these altered levels may be responsible for loss of production and reproduction in dairy industry. Further study of specific hormone status responsible for metabolism of mineral is required in normal cycling and repeat breeding cows.

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