EFFECT OF SELENIUM SUPPLEMENTATION ON BLOOD METABOLIC PROFILE OF BUFFALO HEIFERS

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ABSTRACT

An experiment was conducted for 120 days on twenty Murrah buffalo heifers (24–30 months, 238.91±16.46 kg), divided into two groups of ten heifers in each. Both the groups received same concentrate mixture (40% maize, 44% mustard cake 8% wheat bran, 5% arhar chuni, 2% mineral mixture and 1% common salt) with ad libitum wheat straw, while in concentrate mixture of treatment group, 0.2ppm of selenium was added. The blood samples were collected on day 0 and 120. Levels of serum total protein, blood urea nitrogen, cholesterol and creatinine were similar in both groups. The level of globulin was higher (P<0.05) and that of albumin was lower (P<0.05) in the treatment group thus the ratio of Albumin: Globulin was lower (P<0.05) in supplemented group. The serum level of enzyme aspartate aminotransferase and alanine aminotransferase were similar (P>0.05) in both the groups. It was concluded that supplementation of 0.2ppm Se had no effect on blood metabolic profile of buffalo heifers, except for increased globulin and reduced albumin levels.

Key words: Selenium, Buffalo heifers, Blood metabolic profile.

INTRODUCTION

Selenium (Se) is considered mainly as a toxic element, however, an essential element for man as well as animals. It is a component of enzyme glutathione peroxidase and performs anti-oxidative defense in body by eliminating hydrogen peroxide (MacPherson, 1994). Selenium is also a component of enzyme type I deiodinase (IDI), which is required for the conversion of thyroxine (T₄) into more active tri-iodothyronine (T₃) (Beckett et al., 1987). A number of studies (Chaudhary et al., 2010; Mudgal et al., 2007; 2008) have shown that the levels of Se were quite low in most commonly fed concentrate mixtures and dry roughages like wheat straw. Therefore, it is desirable to supplement Se in the diet. A dietary level of 0.3ppm Se is established for cattle (NRC, 2001), but information on requirements of Se in buffalo heifers is not available. In view of these facts, present experiment was conducted to study the effect of Se supplementation on blood metabolic profile of buffalo heifers.

MATERIALS AND METHODS

The study was conducted on twenty healthy buffalo (Bubalus bubalis) heifers (24–30 months 238.98±16.46 kg), randomly divided into two groups (n= 10 per group). All the heifers were dewormed with albendazole prior to initiation of the experimental feeding and heifers were housed in a well ventilated, clean and concrete shed having individual feeding arrangements. Proper hygienic and management practices were adapted throughout the experimental period. Clean drinking water was provided ad libitum. Heifers in the control group were fed diet comprising of concentrate mixture (40% maize, 44% mustard cake, 8% wheat bran, 5% arhar chuni, 2% mineral mixture and 1% common salt) and ad libitum wheat straw to meet the requirement for 500g body wt. gain/day (Pathak and Verma, 1993). Heifers of the treatment group were fed same diet except that they were supplemented with 0.2ppm selenium (Se) in their concentrate mixture. The weighed amount of concentrate mixture was provided to all the heifers.

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at 8.30 AM and wheat straw was provided after complete consumption of the concentrate mixture. Experimental feeding was done for a period of 120 days. The blood samples of both the groups were collected at the beginning and at the end of experiment to determine the level of total protein and albumin (Dumas et al., 1971), cholesterol (Wybenga et al., 1970), urea nitrogen (Wybenga et al., 1971), creatinine (Bonses and Tausskay, 1945) and enzymes aspartate aminotransferase and alanine aminotransferase (Reitman and Frankel, 1957) by using automatic blood analyzer.

The data obtained during experiment were analyzed by t-test as described by Steel and Torrie (1992).

RESULTS AND DISCUSSION

The chemical composition of concentrate mixture (CM) and wheat straw (WS) used in the present experiment is presented in Table 1. The level of crude protein (CP) and other nutrients indicates that the diet was sufficient to meet the nutrient requirements of the growing buffalo heifers (Pathak and Verma, 1993).

The mean values of serum total protein, blood urea nitrogen, creatinine, cholesterol and serum enzymes (AST and ALT) did not differ (Table 2) between the two groups and were found within the normal physiological range indicating that Se supplementation had no significant effect on these blood parameters. Kumar et al. (2009) also did not find any effect on the serum total protein, blood urea nitrogen, creatinine, cholesterol and enzymes AST and ALT levels by supplementation of 0.15 and 0.3 ppm Se in male lambs. Similarly, Mudgal et al. (2008) also did not find any effect of 0.3 ppm Se supplementation in buffalo calves on serum total protein, urea and creatinine levels. Similarly, no effect on plasma protein concentration has been reported by Arthur et al. (1988) and Singh et al. (2002) when supplemented 0.1ppm Se in steers and 8.54ppm Se in buffalo calves, respectively.

Supplementation of 0.2 ppm Se in buffalo heifers increased (P<0.05) serum globulin levels and reduced (P<0.05) albumin level and hence A:G ratio. Higher levels of serum globulin are beneficial, as it directly correlates with the immune status of the animals. Mudgal et al. (2008) also observed increased globulin and reduced levels of albumin and A: G ratio in male buffalo calves when supplemented with 0.3ppm of Se. In contrast to the present findings, Arthur et al. (1988) supplemented 0.1 ppm of Se and recorded higher plasma levels of urea and creatinine in steers. The basal diet used in their experiment had very low levels of Se (0.015 ppm), which might be the reason for increased levels of plasma urea and creatinine. Fehrs et al. (1981) did not find any effect on the activity of AST on supplementation of 1 ppm of Se in male Holstein calves.

Contrary to present results, Singh et al. (2002) and Shashidhar and Prasad (1993) observed increased AST and ALT activity when supplemented 8.54ppm of Se in buffalo calves and 0.15–0.3 mg Se per kg body weight in adult goats, respectively. In both these experiments, the level of Se supplementation was too high as compared to the present experiment (0.2 ppm) and that might be the reason of their high values. However, Mudgal et al. (2008) and Kumar et al. (2009) also did not find any effect of selenium supplementation (@ 0.3ppm) on these serum enzyme levels in buffalo calves and lambs.

Supplementation of 0.2 ppm Se in buffalo heifers increased (P<0.05) serum globulin levels and reduced (P<0.05) albumin level and hence A:G ratio. Higher levels of serum globulin are beneficial, as it directly correlates with the immune status of the animals. Mudgal et al. (2008) also observed increased globulin and reduced levels of albumin and A: G ratio in male buffalo calves when supplemented with 0.3ppm of Se. In contrast to the present findings, Arthur et al. (1988)

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**TABLE 2**: Effect of Se supplementation on serum biochemical profile of buffalo heifers.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>T1</th>
<th>T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total protein (g/dl)</td>
<td>6.84 ± 0.13</td>
<td>6.87± 0.13</td>
</tr>
<tr>
<td>Albumin (g/dl)*</td>
<td>3.65 ± 0.12</td>
<td>2.36± 0.11</td>
</tr>
<tr>
<td>Globulin (g/dl)*</td>
<td>3.19 ± 0.18</td>
<td>4.52± 0.18</td>
</tr>
<tr>
<td>Albumin: Globulin*</td>
<td>1.14± 0.09</td>
<td>0.52± 0.06</td>
</tr>
<tr>
<td>BUN (mg/dl)</td>
<td>29.09± 1.43</td>
<td>28.83± 1.47</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>1.81± 0.07</td>
<td>1.83± 0.21</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>97.72±2.48</td>
<td>93.92±2.13</td>
</tr>
<tr>
<td>AST (u/l)</td>
<td>113.97±5.18</td>
<td>112.44±4.20</td>
</tr>
<tr>
<td>ALT (u/l)</td>
<td>27.02±1.90</td>
<td>30.81±1.37</td>
</tr>
</tbody>
</table>

Figures with different superscripts in a row differ significantly* (P<0.05).
and Singh et al. (2002) did not observe any effect on serum globulin levels, which might be due to either very low (0.1ppm) or very high (8.54ppm) levels of Se supplementations. It was concluded that supplementation of 0.2ppm Se had no effect on blood metabolic profile of buffalo heifers, except for increased globulin and reduced albumin levels.

REFERENCES


