Determination of mineral constituents of crossbred animals in different season

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ABSTRACT

Mineral nutrient are used in countless metabolic pathways in dairy cow’s body, and even some mineral deficiency can result in cow’s suboptimal performance. To study the effect of season mineral constituents of cattle, 20 cows were taken, out of which, 10 animals in lactation stage (peak and mid lactation) and 10 in dry period. The study was carried out in and around Rajnandgaon district of Chhattisgarh state. A total 15 ml of blood was collected from each animals analyzed for mineral constituents during different seasons. The data was statistically analyzed to draw the conclusion the average value of calcium, potassium, sodium, iron was high in summer. While, the average magnesium and copper values were higher in rainy and winter season respectively. Average serum iron was lower in dry period. Seasonal variation of serum concentration was non significant. Lactation stage had no significant effect on mineral constituents. Sodium, iron, copper were slightly lower in dry period. The present investigation revealed that mineral constituents of animals varied with season and indicates further scope of manage mental interventions in feeding of animal according to different season.

Key words - Cow, Lactation stage, Mineral, Seasonal variation.

INTRODUCTION

The health and degree of productivity of livestock depend on balanced and adequate quantity of necessary nutrients to meet their requirements for a given physiological condition. Long standing nutritional imbalance may drive a marginally deficient animal or herd in to a major problem. Mineral nutrients are used in countless metabolic pathways in dairy cow’s body, and even small mineral deficiency can result in cow’s suboptimal performance. Mineral imbalance have been reported to inhibit various ruminal production systems (Underwood, 1999) and any marginal blood mineral deficiency without clinically diagnosable will associate with negative effect on general immunity systems and growth of animal (Radostits et al. 2007). Winter having higher values for aluminium, boron, copper, iron magnesium, manganese, zinc, sodium while phosphorus was higher in spring. Crossbred cows yielded higher concentrations of calcium, phosphorus, and magnesium. It was therefore concluded that both milk yield and mineral compositions are affected by genotype and season (Nantapo and amuchenje, 2013)

Macro minerals viz calcium, phosphorus, potassium, magnesium, sodium, chloride and sulphur are extreme interest. It has been observed that most of these minerals are highly regulated in the body through a variety of homeostatis process. Blood concentrations of macro minerals are not reflective of dietary status when homeostatic is functioning properly. Thus mineral constituents of crossbred animals were studied in different seasons and stages of lactation.

MATERIALS AND METHODS

To study the effect of season on mineral constituents of cattle, 20 cows were selected, 10 animals were in lactation stage (peak and mid lactation) and 10 in dry period. The study was carried out in and around Rajnandgaon district of Chhattisgarh state. Blood samples were collected from cows in the morning (approximately 2 hrs. after milking and feeding). The blood samples were collected with a minimum excitement. The bleeding site of cow was cleaned and disinfected before collecting the blood. About 15ml of blood was collected from each cows by puncturing the jugular vein using a 16-20 gauge collection needle in thoroughly cleaned vial. Samples were kept in one plain test tube and allowed to stand in slanting position for overnight at room temperature. Serum was separated, transferred into serum vial and stored in deep freeze until the analysis of various minerals. All The data were analyzed statistically by using completely randomized design as par Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Calcium: The average value of calcium was higher in summer season than rainy and winter season. The difference was highly significant. The serum calcium level was lower in winter season in comparison to rainy and summer season. The serum calcium values were lower in lactating animals as compared to dry period.

The present findings simulated the findings of Shrikhande et al. (2008). This might be due to dietary...
variation and inadequate supply of Calcium through diet. However Pandey et al. (1980) and Mehta and Gangewar (1985) observed non-significant effect of season on calcium values. The blood calcium values were lower in lactating (early and Peak) cows might be increase flow of calcium in colostrum and milk.

**Magnesium:** The average magnesium values were higher during rainy season as compared to summer and winter season. Lactation stage had no significant effect on serum magnesium level. However, Shrikhande et al. (2008) recorded that serum magnesium values did not show any variation in season. The variation intending might be due to different climatic conditions. Radostits et al. (2007) reported that average magnesium values were lowest during winter season. Sivaraman et al. (2002) also observe that the Mg level did not differ significantly among dry, lactation and pregnant cows.

**Sodium:** The average sodium values were higher in summer season in comparison to rainy and winter season. Lactation stage has no significant effect on serum sodium level. The average values of sodium were slightly lower in dry period. Result were simulating the finding of Rowland et al. (1974). Higher serum Na concentration during summer might be due to decrease in plasma volume resulting in an increase concentration of aldosterone which helps in retaining sodium in serum. (Mehta and Gangwar, 1985).

Moreover, elevation of sodium level during summer might be due to dehydration. This finding contradicted with Payne et al. (1974), where in sodium concentration was lower in summer than winter season. Sivaraman et al. (2002) also reported that sodium content was higher during lactation period.

**Potassium:** Average potassium values were non-significantly higher in summer season as compared to rainy and winter season. This finding was in accordance with Poulson (1974). The increase in potassium concentration during summer might be due to temperature stress. Another possibility for the increase in potassium concentration might be due to increase in breakdown of RBC during summer (Mehta and Gangwar, 1985). However observed varying potassium concentration in serum differ between dry and lactating cows.

**Iron:** Average serum iron concentration and their standard error reference with to rainy, winter and summer season and different stages of lactation like dry period and lactation stage. No variation in average serum iron concentration was recorded during lactation stages. However, it was lower in dry period. This variation might be due to differences in manage mental conditions and quantity of feeds and fodder, availability. The findings of present study support the Prasad et al. (1987) and Ghosal and Mathur (1992). Rowlands et al. (1974) also reported that iron value was lower in dry period Shukla et al. (1981). However reported non-significant difference in serum iron in dry and lactating cows.

**Copper:** Average serum copper concentrations were slightly higher in winter season as compared to summer and rainy season. No variation in average serum copper concentration was recorded during lactation stages. However the average serum copper concentration was lower in dry period. The lower copper concentration might be due to low content of copper in feeds and fodder. The present findings are in agreement with Moldovan et al. (1979) and Radostits et al. (2007). Marcos (1982) also reported that average copper concentration was lower in dry cows as compared to lactation caws.

**Zinc:** The seasonal variation of serum Zn concentration was non significant. No variation in average serum Zn concentration was recorded during lactation stage. The variation in observed serum Zn level might be due to differences in feeding practices.

Thus, the present investigation revealed that mineral constituents of animals varied with the season indicated.

<table>
<thead>
<tr>
<th>Mineral</th>
<th>stage</th>
<th>Season (mmol/litre)</th>
<th>Rainy (mmol/litre)</th>
<th>Winter (mmol/litre)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Summer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>Dry stage</td>
<td>10.9 ± 1.01</td>
<td>10.76 ± 0.68</td>
<td>10.67 ± 0.92</td>
</tr>
<tr>
<td></td>
<td>Lactating stage</td>
<td>10.78 ± 1.21</td>
<td>10.69 ± 1.02</td>
<td>10.62 ± 0.86</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Dry stage</td>
<td>2.72 ± 0.24</td>
<td>2.80 ± 0.08</td>
<td>2.72 ± 0.68</td>
</tr>
<tr>
<td></td>
<td>Lactating stage</td>
<td>2.68 ± 0.22</td>
<td>2.78 ± 0.68</td>
<td>2.68 ± 0.64</td>
</tr>
<tr>
<td>Sodium</td>
<td>Dry stage</td>
<td>136.21 ± 0.66</td>
<td>134.27 ± 0.38</td>
<td>133.68 ± 0.62</td>
</tr>
<tr>
<td></td>
<td>Lactating stage</td>
<td>137.68 ± 0.24</td>
<td>134.98 ± 0.36</td>
<td>133.98 ± 0.68</td>
</tr>
<tr>
<td>Potassium</td>
<td>Dry stage</td>
<td>5.14 ± 0.13</td>
<td>4.94 ± 0.22</td>
<td>4.93 ± 0.12</td>
</tr>
<tr>
<td></td>
<td>Lactating stage</td>
<td>4.97 ± 0.82</td>
<td>4.92 ± 0.02</td>
<td>4.92 ± 0.66</td>
</tr>
<tr>
<td>Iron</td>
<td>Dry stage</td>
<td>136.22 ± 0.12</td>
<td>132.82 ± 0.10</td>
<td>132.24 ± 0.15</td>
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<tr>
<td></td>
<td>Lactating stage</td>
<td>138.26 ± 0.82</td>
<td>134.01 ± 0.62</td>
<td>133.05 ± 0.18</td>
</tr>
<tr>
<td>Copper</td>
<td>Dry stage</td>
<td>98.48 ± 0.62</td>
<td>99.05 ± 0.68</td>
<td>101.20 ± 0.62</td>
</tr>
<tr>
<td></td>
<td>Lactating stage</td>
<td>100.28 ± 0.78</td>
<td>101.56 ± 0.78</td>
<td>102.98 ± 0.22</td>
</tr>
<tr>
<td>Zinc</td>
<td>Dry stage</td>
<td>101.26 ± 0.05</td>
<td>100.28 ± 0.22</td>
<td>102.26 ± 0.90</td>
</tr>
<tr>
<td></td>
<td>Lactating stage</td>
<td>98.02 ± 0.02</td>
<td>99.26 ± 0.42</td>
<td>102.06 ± 0.12</td>
</tr>
</tbody>
</table>
further scope of improvement through manage mental interventions in feeding.

CONCLUSION

The quality of feed is a complex of several interrelated factors of evaluated in several ways. An important indicator is the mineral content. Monitoring the mineral content is important in terms of the ecosystem (cycle minerals) but also in term of quality feed. Supplementation of low cations anions manipulated diet to periparturient cow may be beneficial in maintaining blood calcium homeostasis and preventing chances of milk fever (Mohanrao et al, 2016). Seasonal effect were also observed in mineral concentrations.

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REFERENCES