



## Effect of Supplementation of Mineral Mixtures on Haematological and Serum Mineral Profile in Beetal Kids

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### ABSTRACT

Sixteen healthy male Beetal goat kids of three months old were selected and divided into 2 groups of eight animals each in order to assess the comparative efficacy of feeding university (LUVAS) prepared mineral mixture and commercial mineral mixture on haematological parameters and serum mineral profile of kids. Animals were maintained on green fodder available at that time, gram straw, concentrate mixture comprising of maize, GNC and barley. Concentrate mixture was supplemented with university (LUVAS) prepared mineral mixture fed to group-1 and in group-2 concentrate mixture was supplemented with commercial mineral mixture. Haematological parameters like haemoglobin, total leucocyte count, differential leucocyte count and total erythrocyte count and serum parameters like triglyceride, cholesterol, high density lipid and low density lipid were found similar and no significant differences were found in between the treatment groups. Serum calcium, phosphorus, zinc, iron and copper mineral profiles were found better in university (LUVAS) prepared mineral mixture supplemented group than commercial mineral mixture supplemented group. It can be concluded from this study that better absorption of minerals was found in university supplemented mineral mixture.

### HIGHLIGHTS

- Inclusion of mineral mixture did not show any significant effect on haematological parameters.
- Serum calcium, phosphorus, zinc and copper mineral profiles in kids were found better.

**Keywords:** Beetal, Mineral mixture, Haematology, Serum, Serum mineral profile

India is predominantly an agricultural country, where livestock and agriculture are closely associated with each other. In spite of 2% of geographical area, India has the pride of place on the livestock map of the world due to enormity of livestock wealth with amazing genetic diversity (Meel *et al.*, 2018). Goats were the first domesticated ruminant animal. In rural areas goats are mainly reared by landless and small marginal farmers and their feeding is mainly dependent on the availability of native grasses, herbs, shrubs, legumes, tree leaves and agricultural by-products (Singh, 2020). These types of feeds are usually deficient in energy, protein, vitamins and minerals. Still there is tremendous potential to be projected it as the 'Future Animal' for rural prosperity under the changing agro-geo-

climatic conditions (Arivezahagan *et al.*, 2020). Mineral deficiency is an area-specific problem and is related to the genus, species of plant, water availability, climate or seasonal variations, type of soil and type of fertilizer applied on soil (Shinde *et al.*, 2006). Minerals are essential to the animals, participating as structural components of various tissues, in maintaining the acid-base balance, the osmotic pressure and permeability of cell membranes (Kumar, 2015). They act as cofactors for several enzyme systems

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of living organisms. To overcome mineral deficiency in goats during pregnancy and lactation, supplementation in the form of a concentrate feed and/or mineral mixture, in addition to grazing, may be adopted. Now-a-days it is very difficult to assess which mineral mixture is best for the animals since different mineral mixtures are available commercially with different brand names and formulations. Usually, commercial mineral mixtures are made without considering the actual deficiency or excess of minerals in animals as a result animals have to spend extra energy in their excretion. In present study, two different mineral mixtures were assessed for their influence on haemato-biochemical parameters and serum mineral profile.

### MATERIALS AND METHODS

The study was carried out at Animal Genetics and Breeding farm in Lala Lajpat Rai University of Veterinary and Animal Sciences (LUVAS), Hisar. Sixteen healthy male Beetal kids of three months old were selected on the basis of their body weight and divided into two groups having eight replicates each. All goats were fed on green fodder available at that time, gram straw, concentrate mixture comprising of one-third equal proportions of maize, GNC and barley mineral mixture and salt were added 2% and 1% respectively in both the groups. The only difference was supplementation of mineral mixture only, in first group university (LUVAS) prepared mineral mixture was supplemented and in second group commercial mineral mixture was supplemented. Trial was conducted for a period of four months. Blood samples were collected at the end of the experiment via jugular venipuncture in the morning before feeding and watering and serum was separated from it by using centrifugation machine at 3000 rpm for 15 minutes and stored at -20°C for further analysis. Blood parameters were analyzed by fully automated access clinical chemical analyzer (EM 200™ Erba Mannheim- Germany). Mineral extracts of serum samples were prepared by using di- acid (perchloric acid and HNO<sub>3</sub> in 1:4 ratio) and analyzed by using atomic absorption spectrophotometer. The data were statistically analyzed (Snedecor and Cochran, 1994).

### RESULTS AND DISCUSSION

The chemical composition of concentrate mixtures and roughage offered to both the groups were similar with

regard to their proximate nutrients except composition of mineral mixtures supplemented in the respective groups. The composition of LUVAS mineral mixture and commercial mineral mixture was provided in table 1.

**Table 1:** Composition of different mineral mixtures supplemented in ration of kids

Element	LUVAS M.M.	COMMERCIAL M.M.
Calcium Min. (%)	20.00	24.00
Phosphorus Min.(%)	12.00	12.00
Copper Min. (%)	00.10	00.12
Zinc Min. (%)	00.80	00.96
Iron Min. (%)	00.40	00.50
Manganese Min. (%)	00.12	00.15
Total ash Max.(%)	80.43	84.61

**Table 2:** Mean value of blood parameters of kids under different dietary treatments

Attributes	T <sub>1</sub>	T <sub>2</sub>
Haemoglobin (g/dl)	8.30±0.67	8.05±0.34
Total leucocyte count (m/mm <sup>3</sup> )	12.20±0.60	12.56±0.68
Lymphocyte (%)	69.93±3.74	67.88±2.66
Monocyte (%)	04.03±0.09	04.10±0.33
Neutrophil(%)	36.00±0.81	36.75±0.82
Total erythrocyte count (m/mm <sup>3</sup> )	17.20±1.27	17.40±0.53

The mean values of blood parameters of kids under different dietary treatments is presented in table 2. The mean values of haemoglobin, total leucocyte count, lymphocyte, monocyte, neutrophil, and total erythrocyte count obtained in kids under different dietary treatments T<sub>1</sub> and T<sub>2</sub> were 8.30 and 8.05 (g/dl), 12.2 and 12.56 (m/mm<sup>3</sup>), 69.93 and 67.88 (percent), 4.03 and 4.10 (percent), 36.00 and 36.75 (percent), 17.20 and 17.40 (m/mm<sup>3</sup>) respectively. No significant differences were observed in blood haematological parameters under different dietary treatments in kids in between treatment T<sub>1</sub> and T<sub>2</sub> (Table 2). Sejian *et al.* (2013) and Swain *et al.* (2019) also reported that supplementation of inorganic and nano zinc had no significant effect on blood haemoglobin profile in goats.

**Table 3:** Mean value of serum parameters of kids under different dietary treatments

Attributes	T <sub>1</sub>	T <sub>2</sub>
Triglyceride (mg/dl)	34.25±4.57	37.3±4.14
Cholesterol (mg/dl)	73.25±3.94	79.37±5.44
High density lipid(mg/dl)	46.83±3.54	49.7±3.92
Low density lipid(mg/dl)	25.35±1.23	28.84±2.07

The mean values of serum triglyceride (mg/dl) obtained under different dietary treatment groups in T<sub>1</sub> and T<sub>2</sub> were 34.25 and 37.3 respectively, of cholesterol (mg/dl) were 73.25 and 79.37 respectively, of high density lipid were 46.83 and 49.7 (mg/dl) respectively, of low density lipid were 25.35 and 28.84 (mg/dl) respectively. No significant differences were observed in different blood biochemical parameters in kids under different dietary treatment groups.

**Table 4:** Mean value of serum mineral profile in kids under different dietary treatments

Attributes	T <sub>1</sub>	T <sub>2</sub>
Ca (mg/dl)	11.14 <sup>b</sup> ±0.19	09.68 <sup>a</sup> ±0.02
P (mg/dl)	05.30 <sup>b</sup> ±0.34	04.65 <sup>a</sup> ±0.01
Zn (mg/dl)	02.03 <sup>b</sup> ±0.007	01.39 <sup>a</sup> ±0.07
Mn (mg/dl)	00.42±0.03	00.39±0.008
Cu (mg/dl)	01.36 <sup>b</sup> ±0.010	00.87 <sup>a</sup> ±0.006
Fe (mg/dl)	01.66 <sup>b</sup> ±0.01	01.03 <sup>a</sup> ±0.01

<sup>ab</sup> Means bearing different superscripts in a row show significant(p<0.05) difference statistically.

The mean values of serum mineral profile in kids under different treatments is presented in table 4. The mean values of calcium (mg/dl) present in serum under different dietary treatments T<sub>1</sub> and T<sub>2</sub> were 11.14 and 09.68 respectively. It showed a significant difference (p<0.05) in between treatments. This may be due to better absorption of calcium in group 1 as comparison to that in group 2. The average values of phosphorus (mg/dl) in the respective groups were 05.30 and 04.65. It also depicted a significant difference (p<0.05) in between the groups in serum phosphorus values. The values obtained on the comparison of level of zinc (mg/dl) in serum in kids under different dietary treatments were 02.03 and 01.39. And the values obtained are showing significant difference (p<0.05) statistically in

between treatment T<sub>1</sub> and T<sub>2</sub>. It may be because of better fiber digestibility in group-1 than in group-2. The values obtained for copper (mg/dl) mineral level in kids under different dietary treatments were 01.36 and 00.87 in treatment 1 and treatment 2 respectively. And the values obtained from the results represented that a significant difference was present in between two dietary treatments of copper mineral profile of kids. The values in case of serum manganese level were 0.42 and 0.39 in treatment T<sub>1</sub> and T<sub>2</sub> respectively. And it did not show significant difference in between the groups. The values obtained for iron (mg/dl) mineral profile of kids in treatment 1 and 2 were 01.66 and 01.03 respectively and showed significant differences between the treatment groups under different dietary treatments of kids. Kumar *et al.* (2003) observed that supplementation of mineral mixture in conventional diets lead to significant increase in serum mineral level of Ca, P, Cu, Mn, Fe and Zn. Kalita *et al.* (2003) did not observe any significant difference in the level of serum mineral profile in mineral supplemented group than non-supplemented group (that may be probably due to shorter duration of the experiment). Maan and Sihag (2014) observed that the supplementation of zinc to a concentrate mixture increased growth performance, improved feed efficiency and zinc level in blood serum and hair in goats.

## CONCLUSION

Serum calcium, phosphorus, zinc, copper and iron profile was found significantly better in LUVAS mineral mixture supplemented group than commercial mineral mixture supplemented group. Haemoglobin, Total lymphocyte count, Differential Leucocyte Count and Total Erythrocyte Count were found similar in both the groups. Absorption of calcium, phosphorus, zinc and iron was found better in university prepared mineral mixture supplemented treatment group.

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