



Original Article

Determine of Some Macro Minerals Potassium and Phosphors in the Blood Serum of Goats Grazing At El-Khuwei Locality, West Kordofan State, Sudan

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ABSTRACT

The main objective was to determine macro minerals of potassium and phosphors in the blood serum of goats grazing at flowering and seed setting stage during 2011 in El-khuwei locality, west Kordofan, Sudan. A completely randomized design was used (CRD). Sampling was done on two stages at flowering and seed setting in selected locations (2 km²). Within each stage 60 goats randomly selected, randomly collected samples of blood serum. Stages had significant (P< 0.0001) effect on blood serum of goats was highly K (5.10-3.88 mmol/L) concentration at flowering stage and least during the seed setting stage respectively. Concentration of P (2.96-3.94mg/dl) were decreased at flowering stage and increased at seed setting stage respectively. It can be concluded that at the flowering stage highly potassium concentration and decreased phosphors concentration. However during the seed setting stage least potassium concentration and increased phosphors concentration.

Key words: Stages, serum, potassium and phosphors.

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INTRODUCTION

Minerals are very important in animal feed, Phosphorus, calcium and potassium play a major role in the life of animals (Abdelhameed, 2000). The physiological role of phosphorus is very important in bones and teeth formation 80% of the phosphorus presented in bones. Moreover phosphorus is very essential for glucose and glycerol absorption, urine formation, metabolism of carbohydrates and protein and molecular fodder crops protein (DNA) which includes (ATP). In addition phosphorus helps in (pH) regulation of the body (Tukrori, 1989). Sabir (2005) mentioned that, deficiency of potassium leads to weak muscles and bones and hormonal defects which appeared in extra secretion of adrenal gland, loss of appetite and

botulism, also the animals eats bones and stones. Furthermore hypopottasia leads to general debility weakness and infertility, that hypo potassium leads to renal shrinkage, blocking heart muscles, hypo blood pressure, acute diarrhea, reduction of gastric juice, Anorexia, delays growth, poor production, calcification of posterior muscles and hypopottasia lead to animal mortality. There is limited information in the mineral nutrition of goats in the natural range of Kordofan. The objective of the study was to determine the levels of macro elements K and P in the blood serum of goats as indicators of their status in the low-rainfall areas of Africa and Asia, small ruminant production represents the principal economic output, contributing a large share of the income of farmers (Ben Salem and Smith, 2008). Sheep and goats are integral component of food production and livelihood systems of many pastoral and agro-pastoral farmers.

MATERIALS AND METHODS

Study Area

This study was conducted at El-khuwei locality. It lies between longitudes 28°:33' to 28°:30'N and latitudes 12°:14' to 14°:12'E, about 105 Km west of El Obeid town, west Kordofan State, Sudan. El-khuwei locality own large export market of animals (Hammer sheep) in west Sudan. The long term average annual rainfall is about 300-mm, consisting of storms of short duration between July and September with the highest rainfall generally occurring in August. The soil of the site lies within the sand dune area locally known as "Goz" soil. During the rainy season, forage biomass is suitable to provide sufficient feed for animals, but during the dry season forage is scarce and small quantities of grain are also fed to animals (MARF, 2009).

Sampling and Experimental Study

Sampling was done on two stages at flowering and seed setting in selected locations (2 km² each). Within each stage 60 goats randomly selected randomly collected samples of blood serums.

Samples Estimating

Blood: Blood serum were collected from 60 goats that were randomly selected from pasture, using 5 ml syringes tubes to be used which filled with anti coagulant; the blood samples were centrifuge at 3000 rpm for 20 minutes to separate the plasma. The plasma samples were stored at -20° C till further analysis.

Sample Preparation

Serum: Random blood samples were taken, using 5 ml syringes Tubes to be used which filled with anti coagulant. A quantity of 5 ml of blood plasma was digested with a 4 ml mixture of perchloric acid and nitric acid (1:1). After digestion, the volume was made to 25 ml with distilled de-ionized water. Further dilution was prepared for macro mineral determination following Kamada *et al.* (2000).

Serum calculated by following equation: $T / S \times 10$

Where: T = titration, S = stander according to (Daly *et al.*, 1972).

Laboratory Analysis

Serum concentrations of phosphorus (P) were analyzed using atomic absorption spectrophotometer, (Singh *et al*, 2005). However potassium (K) was analyzed using flame photometer (AOAC, 1990).

Statistical Analysis

The data were analyzed using a completely randomized design (CRD) with the effect of stages as the whole plots and effects of sampling as the sub-plots (Steel and Torrie, 1980). SPSS (Statistical Package for Social Sciences) was used for the statistical analysis. Statistical significance was tested at 0.05, 0.001 and 0.0001 level of probability using the software.

RESULTS

Blood Serum of Potassium and Phosphorus

Stages had significant ($P < 0.0001$) effect in blood serum of goats was highly K (5.10-3.88 mmol/L) concentration at flowering stage and least during the seed setting stage respectively. Concentration of P (2.96-3.94 mg/dl) were decreased at flowering stage and increased at seed setting stage respectively Table 1.

Table 1. Blood serum K and P during the flowering and seed setting stages at El-khuwei locality, West K0rdofn, Sudan

Minerals	Stages		Means	± SE	Significant
	Flowering	Seed setting			
Potassium K (mm/l)	5.10	3.88	4.49	0.09	***
Phosphorus P (mg/dl)	2.96	3.94	3.45	0.11	***

Means in the same column under the same factor with different letters are significantly different
* = significant ($P < 0.05$), ** = high significant ($P < 0.001$) and *** = highly significant ($P < 0.0001$).

DISCUSSION

Serum Potassium

Significant differences were highly K (5.10 mmol/L) concentration at flowering stage and least K (3.88 mmol/L) concentration at seed setting stage. Grunwaldt *et al.* (2005) who reported season has significant effect on blood minerals of mean mineral concentrations in the blood of the goats are within the normal range of K (6.00mmol/l) concentration; this result is agreement with study. The normal of K 14-100 mg/100ml concentration in the blood serum of goats was observed by Sabir (2005). Albarran *et al.* (2012) reported the K concentration differed during the dry season with highest K (29.50 mg/dl) value and lowest (17.31 mg/dl); this is in agreement with study. NRC (2007) reported the K 15 to 20 mg/dl, goats from our region would not likely be deficient in this mineral. Dominguez and Huerta (2007) reported higher plasma K content ranged from 10.76 mg/L during the rainy season and least 7.94 mg/L at the wet season. Higher Plasma K+ concentration was observed during the flowering stage than those found already by Grunwaldt *et al.* (2005) in Argentina and Khan *et al.* (2009) in different ruminants in Pakistan. Similar concentration of plasma K+ has been observed by Gizachew *et al.* (2002) in Western Ethiopia. This is agreement with study. These differences in plasma K+ may be attributed to the physiological state of animal and different climatic conditions. This is despite K being deficient in some plants during the wet and the cold dry seasons. This may be as a result of different individual preferences for plants as the goats were feeding which may have resulted in goats selecting only those plant that were high in K. Plasma K was significantly higher 18.5 mg/liter in the cold season than in the least 16.3 mg/liter at hot seasons. These findings were in accordance with the Khan *et al.* (2003) who found that plasma K was low in goats as compared to other classes which might be due to the secretion of the K through the milk. The seasonal difference in milk K might also be related to the stage of the lactation.

Serum Phosphorus

During the seed setting stage was increased P (3.94 mg/dl) concentration and decreased P (2.96 mg/dl) level at flowering stage. Albarran *et al.* (2012) determine the P level in blood serum of goats in the south of the State of Mexico during the rainy season highest P (4.79

mg/dl) value and least P (3.05 mg/dl) at dry seasons; this range is in agreement which result. Another studied the average concentration of the P in the goat serum is 2.96 mg/dl (Abdelati, 2005); these levels is similar which result. The animals had blood serum P within the normal range in spite of low forage P concentration. NRC (2007) reported of the P in grazing ruminants 3 to 8 mg/dl. Dominguez and Huerta (2007) reported similar levels, which ranged from 10.7 to 12.1 mg/dl, in animals in an extensive grazing system, which were considered adequate. In our study, there were lower P levels than reported in the literature and it is suggested that the goats could experience productive and reproductive deficiencies caused by the lack of P which could compromise many hormonal, metabolic and structural functions, as well as reduced appetite, which could compromise efficient utilization of the diet. Plasma P levels are partly influenced by dietary selection and the variable uptake and availability of the element in the diet. Plasma P was increased 6.16mg/liter at dry hot season and decreased 3.13mg/liter at cold wet season. The observed deficiency may be attributed to low plant P levels observed during the same season Khan *et al.* (2008).

CONCLUSIONS

It can be concluded that at the flowering stage highly potassium concentration and decreased phosphors concentration. However during the seed setting stage least potassium concentration and increased phosphors concentration.

RECOMMENDATIONS

It can be recommended that need goats supplementation phosphors concentration at the flowering stage, however potassium concentration needed at the seed setting stage of grazing goats with the mixture mineral deficient in the blood serum.

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