COMPARATIVE ASSESSMENT OF SOME MINERALS IN SOIL, FORAGE AND SHEEP SERUM IN TWO REGIONS IN THI-QAR PROVINCE

Aamir M. Abed Al-Ghareebawi

College of Agriculture and Marshes, Thi-qar University, Thi-qar,Iraq.

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ABSTRACT

The objective of this investigation is to evaluate the level of the some minerals (sodium, potassium and calcium) in the soil, forage and sheep serum, the specimens were 1 Kg of soil and forage and 10 blood samples taken from each district (Nasriya and Shatra) in Thi-Qar province.

The results show that significant ($p \leq 0.05$) increase in the sheep serum sodium concentration in Nasriya region (44.21±14.9) Mmol/L compared with the Shatra (34.84±6.61) Mmol/L, while the potassium concentration in sheep serum appeared a significant ($p \leq 0.05$) decrease in Nasriya district (6.23±1.00) Mmol/L compared with Shatra(13.16±2.42) Mmol/L but there is no significance ($p \leq 0.05$) change found in sheep serum calcium between the two studied areas in Nasryia was (0.40±0.12) Mg/dl but Shatra was (0.24±0.05) Mg/dl.

The sodium level in the forages is high but not significant($p \leq 0.05$) in the Nasriya(0.369±0.101)when compared with Shatra(0.321±0.011) g/Kg The potassium in forages is higher in Nasriya (0.411±0.011) g/Kg but not significant ($p \leq 0.05$) when compared with Shatra (0.255±0.011) g/Kg Calcium of forage was decreased in Nasryia (0.136±0.012) g/Kg but in Shatra was (0.355±0.044) g/Kg with no significancy ($p \leq 0.05$).

In soil sodium of Nasryia is high (0.942±0.051) g/Kg but not significant ($p \leq 0.05$) and in Shatra was (0.887±0.032) g/Kg, the potassium in soil of Nasryia was (0.418±0.023) g/Kg but not significant ($p \leq 0.05$) and in Shatra was(0.424±0.022) g/Kg

Calcium is higher in Nasriya soil (0.602±0.043) g/Kg but lower in soil of Shatra was (0.657±0.048) g/Kg with no significancy ($p \leq 0.05$).

INTRODUCTION

There are 15 minerals that have been demonstrated to be essential in sheep nutrition. They are: sodium, chlorine, calcium, phosphorus, magnesium, potassium, sulfur, cobalt, copper, iodine, iron, manganese, molybdenum, selenium and zinc. Although relatively precise requirements have been published for the different minerals, it should be recognized that in practice the true dietary requirements vary greatly depending on the nature and amount of these and associated minerals in the diet(1). Mineral status of soil-plant- animal is interrelated (2). Hence deficiency or excess of one may affect the status of other and vice versa. There appears to be a definitive role of mineral deficient soils to cause deficient levels in ration (3). Based on the abundance in the body, the minerals are divided into macro minerals and micro minerals, the latter sometimes referred to as trace elements. (4).

In sheep that the efficiency of calcium uptake from the diet was higher when dietary calcium was low(5). Elemental concentration of different forages is mostly affected by soil characteristics including pH, fertilization practices, drainage system, plant species forage stage of maturity and, various types of interactions among different mineral elements (6)(7). When animals depend exclusively on forage plants to fulfill their fodder requirements it is necessary to identify various attributes that may change forage composition and to measure strategy program to improve livestock productivity and performance (7). the availability of minerals in the soil depends upon the effective concentration in soil solution (8), which is influenced by pH, moisture, organic matter, leaching, presence of other elements and microbial activity of soil (9)(10).

MATERIAL AND METHODS

The present study was conducted in two district in Thi-Qar province (Shatra and Nasriya) during October 2013. The Soil, forage and blood samples of rams were collected and centrifuged to obtain serum , The Soil, forage and serum samples labelled and stored till further processing. Ten serum samples collected from sheep of

each district, Samples were randomly chosen in the parts of the animal grazing land where animals were presently grazing. one Kg of soil and forage also taken from each district ,The processed samples were use for estimation of serum minerals (Ca, K, and Na) of sheep in agriculture college laboratories in Thi-Qar university by using Spectrophotometer (T 80) manufactured by UK, and Human Kit, (Germany) to estimation of minerals of sheep serum.

Soil samples were taken from below the clipped swards at 0 – 30 cm depths, the soil texture was loamy with pH ranging from 7.5 to 8.4.

The determination of calcium done by titration with (EDTA) (0.01 N) according to (11), sodium and potassium are determined by Flam photometer 410 (CORNING, United Kingdom) according to (12).

STATISTICAL ANALYSIS

For statistical evaluation, sheep serum minerals were expressed as mean ±Sd (number of specimens=10) and T-test were performed. Average values of three replicates were taken for each determination and were subjected to statistical analysis using statistical software (SPSS , version 19).

RESULTS

In Table (1) show the concentration of sodium, potassium and calcium in serum of sheep in different locations of Thi-Qar province ,The results observed significance ($p \leq 0.05$) differences in concentration of sodium between serum of sheep of Nasriya and Shatra region, also there are significant ($p \leq 0.05$) decrease appear in case of potassium concentration of sheep serum of Nasryia region compared with Shatra region, Finally the significance ($p \leq 0.05$) differences not found in the calcium concentration between Nasriya and Shatra regions but in Nasryia sheep serum was higher than that found in the sheep of Shatra region.

Table (1) show the concentration of sodium, potassium and calcium of sheep serum in different locations of Thi-qar province (n=10)

Parameters Location	Sodium Mmol/L	Potassium Mmol/L	Calcium Mg/dl
Nasriya	44.21a ±14.94	6.23b ±1.00	0.40a ±0.12
shatra	34.84b ±6.61	13.16a ±2.42	0.24a ±0.05

- **Table-t(0.05,18)=1.734**
- **n=Number of specimens**

Table (2) show the concentration of sodium , calcium and potassium in the one kilogram of forages taken from the studied areas in the Thi-Qar province which appear that the concentration percentage of sodium is higher in Nasriya(0.369±0.101)g/Kg of forage than that found in the Shatra region (0.321±0.011) g/Kg.

The calcium concentration in Nasriya (0.136±0.012) g/Kg lower than Shatra (0.355±0.044) g/Kg in high differences , The potassium concentration is high in the Nasriya (0.411±0.011) g/Kg but is very low in the Shatra region (0.255±0.011) g/Kg.

Table (2) show some minerals concentration percentage in the forage of Thi-Qar province (Nasria and Shatra) (n=3).

Elements Location	Sodium g/Kg	Calcium g/Kg	Potassium g/Kg
Nasryia	**0.369a ±0.101**	**0.136a ±0.012**	**0.411a ±0.011**
Shatra	**0.321a ±0.011**	**0.355a 044±0.**	**0.255a ±0.011**

- t-table(0.05,2)=2.92
- n=number of replicates

Table (3) appear the concentration of the studied minerals in the soil which represented in the table (3) appear nearly equal in the two studied districts, in which there are no high differences between them.

In which the concentration of sodium in nasryia was (0.942 ±0.051)g/Kg, and in Shatra was (0.887±0.032)g/Kg of soil, potassium concentration in the Nasryia(0.418±0.023) g/Kg and in Shatra was (0.424±0.022)g/Kg, at the same time the calcium concentration in Nasryia was (0.602±0.043)g/Kg and in Shatra region was (0.657±0.048).

Table (3) show some minerals concentration percentage in the one kilogram of Soil of Thi-Qar province (Nasriya and Shatra)(n=3)

Elements Location	Sodium g/Kg	Calcium g/Kg	Potassium g/Kg
Nasryia	**0.942a ±0.051**	**0.602a ±0.043**	**0.418a ±0.023**
Shatra	**0.887a ±0.032**	**0.657a ±0.048**	**0.424a ±0.022**

- t-table(0.05,2)=2.92
- n= number of replicates

DISCUSSION

In the studied area the level of sodium was high in the sheep serum, plant and soil in the Nasriya region that can be explained as sodium, were higher during December (13) and this agree with the time of sample collection of sheep serum in present study. Elevation of the sodium level in the soil, plant and sheep serum agree with (13) who supposed that the variation in season enhanced the amount of sodium, along with decline the organic matter of soil in which the studied areas undergo from decline of the organic matter.

The calcium level in the studied sheep serum was high, plants was low and soil was high in Nasriya which explained by (5) who demonstrated in sheep that the efficiency of calcium uptake from the diet was higher when dietary calcium was low. also, (14) said that High amounts of potassium in the diet were associated with increased risk of high milk fever incidence and visa versa in which the high level of calcium in this study associated with low level of potassium in sheep serum at same areas and the sheep in the studied area undergo from calcium deficiency like milk fever in the cow .

Also, (15) suggest that the metabolism of calcium is dependent on the diet, mainly the level of dietary calcium, and the absorption is regulated by calcitriol (active form of vitamin D).The level of minerals in forages varies according to properties of the soil, level and type of fertiliser applied to the crop, botanical composition, and maturity of the plant (16). Generally, forages contain high levels of potassium, fairly high levels of calcium (14).

The level of potassium has reverse proportion with the calcium level in sheep serum, plant and soil and this agree with (17) who assumed that increasing potassium in the diet causes hypocalcaemia.

Also the aldosterone, a hormone regulating sodium metabolism, exerts an indirect influence by regulating the potassium concentration in saliva and thus in the rumen (18),so the relation between the sodium and potassium in the serum of sheep has reverse proportion as we see in table (1).

تقييم مقارن لبعض المعادن في تربة، أعشاب و مصل أغنام منطقتين في محافظة ذي قار

عامر مكطوف عبد الغريباوي

قسم الثروة الحيوانية ، كلية الزراعة والاهوار، جامعة ذي قار ، ذي قار ،العراق .

الخلاصة

الهدف من التجربة هو لتقييم مستوى بعض العناصر(الصوديوم، البوتاسيوم و الكالسيوم) في التربة والاعشاب و مصل الاغنام في منطقتين من محافظة ذي قار(الناصرية و الشطرة). حيث اخذ واحد كيلو من التربة والاعشاب و عشرة عينات دم اغنام من كلا منطقتي الدراسة.

أظهرت النتائج ان هناك ارتفاع معنوي ($p\leq0.05$) في مستوى عنصر الصوديوم في مصل الاغنام في منطقة الناصرية Mmol/L (14.9±44.21)مقارنة بمنطقة الشطرةMmol/L (6.61±34.84)، وكان هناك انخفاض معنوي ($p\leq0.05$) في عنصر البوتاسيوم في مصل اغنام منطقة الناصرية (1.00±6.23) Mmol/Lمقارنة بمنطقة الشطرةMmol/L (2.42±13.16)، بينما لا يوجد أي فرق معنوي($p\leq0.05$) في مستوى عنصر الكالسيوم في مصل الاغنام بين المنطقتين حيث كانت في الناصريةMg/dl (0.12±0.40) اما الشطرة فكانت .Mg/dl (0.05±0.24).

أظهرت النتائج ان عنصر الصوديوم كان مرتفعا بصورة غير معنوية ($p\leq0.05$)في التربة g/Kg (0.051±0.942)و الاعشاب (0.101±0.369) g/Kg في منطقة الناصرية مقارنة بمنطقة الشطرة حيث كان في التربةg/Kg (0.032±0.887) وفي الاعشاب (0.011±0.321) g/Kg بينما كان عنصر البوتاسيوم في الاعشاب اعلى(0.011±0.411) g/Kg وفي التربة اوطئ (0.023±0.418) g/Kg في الناصرية مقارنة بمنطقة الشطرة حيث كان g/Kg (0.011±0.255)في الاعشاب و(0.022±0.424) g/Kg في التربة ، عنصر الكالسيوم كانت على العكس حيث كانت اوطئ في الاعشاب(0.012±0.136) g/Kg واعلى في التربة (0.043±0.602) g/Kg التابعة لمنطقة الناصرية مقارنة بمنطقة الشطرة حيث كان في الاعشاب(0.044±0.355) g/Kg وفي التربة(0.048±0.657) g/Kg.

الكلمات المفتاحية: الصوديوم، البوتاسيوم، الكالسيوم، الاغنام، التربة، الاعشاب

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