Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Annals of Biological Research, 2013, 4 (7):115-119
(http://scholarsresearchlibrary.com/archive.html)

Annals of Biological Research
Scholars Research Library
ISSN 0976-1233
CODEN (USA): ABRNBW

Evaluation the serum values of copper in sheep flocks of Kalyebar-Iran

Amin Rahbar*, Amir Parviz Rezaie Saber and Ali Hasanpour

Department of Clinical Sciences, Faculty of veterinary Medicine, Tabriz Branch, Islamic Azad University, Tabriz, Iran

---

ABSTRACT

Cupper plays an important role in synthesis of hemoglobin and activity of respiratory chain enzymes. Cupper deficiency reduces production of red globule. Also cupper deficiency causes to abortion, weakening of body defensive system, skin and secondary infection. From other physiologic roles of cupper, it can be referred to production of blood, bone, formation of connective tissue, central nerves system and skin pigmentation. In this study in middle of each season 10 cc blood was drawn from caudal and neck vessels of apparently healthy sheep. After determination of the age of cow from dental formula in different areas and level of copper was determined by Randox kits by spectrophotometer method and finally the data of each season were compared. The mean of serum copper level according to ppm was 1.06± 0.04 in the spring and 1.48±0.06 in the summer and 0.88± 0.04 in the fall and 0.93±0.3 in the winter. There was a significant difference between serum copper in different seasons and copper level was low in the spring and fall due to increase of rainfall and consumption of low quality grass ($p<0.01$). The highest copper level was obtained in summer that this finding is consistent to studies in other areas. However our results indicated that the highest amount of copper was in the summer, and the lowest one was in fall, and in all areas copper deficiency normally were exist.

Keywords: serum, copper, sheep, Kaleybar, Iran.

INTRODUCTION

Copper (Cu) deficiency in ruminants can occur as a primary deficiency, where copper intake is inadequate, or as a secondary deficiency, whereby other factors in the diet interfere with the absorption and/or metabolism of Cu. Of primary importance as Cu antagonists are the minerals iron (Fe), molybdenum (Mo), and sulfur (S). Molybdenum and S are involved in the formation of thiomolybdates that bind Cu and render it unavailable to the animal (16). The exact mechanism of the interference of Fe is not well understood, but it may involve the formation of ferrous sulfide complexes in the rumen that become soluble in the abomasum, where the sulfide may dissociate and form insoluble complexes with Cu (17).

Sheep are more susceptible to copper toxicosis than other domestic species. Copper levels in the diet of between 5 to 10 mg/kg dry matter are recommended with normal dietary levels of sulphur and molybdenum. This is approximately one quarter of the daily requirements of cattle and one tenth that of pigs (11). The clinical signs of chronic Cu toxicosis in sheep are an acute presentation of anorexia, respiratory distress, severe hemolytic anemia, methemoglobinuria, and jaundice (11). Common sources of excess dietary Cu in sheep are rations or mineral mixes formulated for cattle or swine; accidental contamination of sheep rations with copper-containing feeds; copper

accumulating forages; and, less frequently, from water with a high Cu content (3, 7). Insufficient dietary Mo (less than 1.0 mg/kg dry weight [DW]) may also cause excessive accumulation of Cu in the liver (11). Copper deficiency is not common in some countries. Free ions of nutritionally required metals, such as Cu, Se, iron (Fe), and zinc (Zn), produce oxidative stress when present in excess; these elements are required for the body's antioxidant system. Depending on the age of the animal, pregnancy and the absence of the copper in the diet, the copper values in the blood serum differs (1).

The symptom of zinc and copper are associated with the enzyme defeats. It is suggested that no ingestion of trace elements or in sufficiency of them, may be led to affects on animals and serious problems which may result with death (6). The insufficiency of trace elements, especially copper, stimulates the catabolism of protein, limits the biosynthesis of protein by making differences on the nucleic acid metabolism and as a result of this effects, the regeneration and growing of the tissue is affected (15).

This study was performed with the aim of determining the serum copper values in the Kaleybar sheep and determining whether there are any differences in various seasons.

MATERIALS AND METHODS

In order to be extended the investigation results to the entire region of Kaleybar the blood samples taken from sheep's of different and diffuse areas in Kaleybar city.

For this purpose a random sample of ewes aged 3-5 years were performed in Kaleybar area, the blood from the jugular vein of 182 sheep (10cc from each case) in each season of the year was taken and then blood samples taken in the vicinity of the ice were sent to the laboratory and serum were obtained from samples after centrifugation. Serum samples frozen (-20$^{\circ C}$) in the micro tube, and after completion of sampling, The serum copper in each season measured by spectrophotometric methods by Randox kit, and finally each seasons data were compared with each others. To compare the results of each season, one-way ANOVA was used and the data were analyzed by SPSS software (ver. 18).

RESULTS

The results of the serum levels of copper in different seasons are represented in Table 1.

Table 1: Comparison of mean serum copper in different seasons (ppm)

Season	Mean ± SE	SD	Sig (P Value)
Spring	1.06±0.04^{*b}	0.31	0.001
Summer	1.48±0.06^{c}	0.40	
Fall	0.88±0.04^{a}	0.26	
Winter	0.93±0.03^{ab}	0.24	

** Different alphabets indicated there were statistically differences between groups.*

Based on the results in Table 1, there is significantly differences between seasons in view of the mean serum copper ($p<0.01$), Also the summer mean values of copper was highest between seasons (1.48±0.06), and the lowest levels of copper is in autumn (0.88 ±0.04).

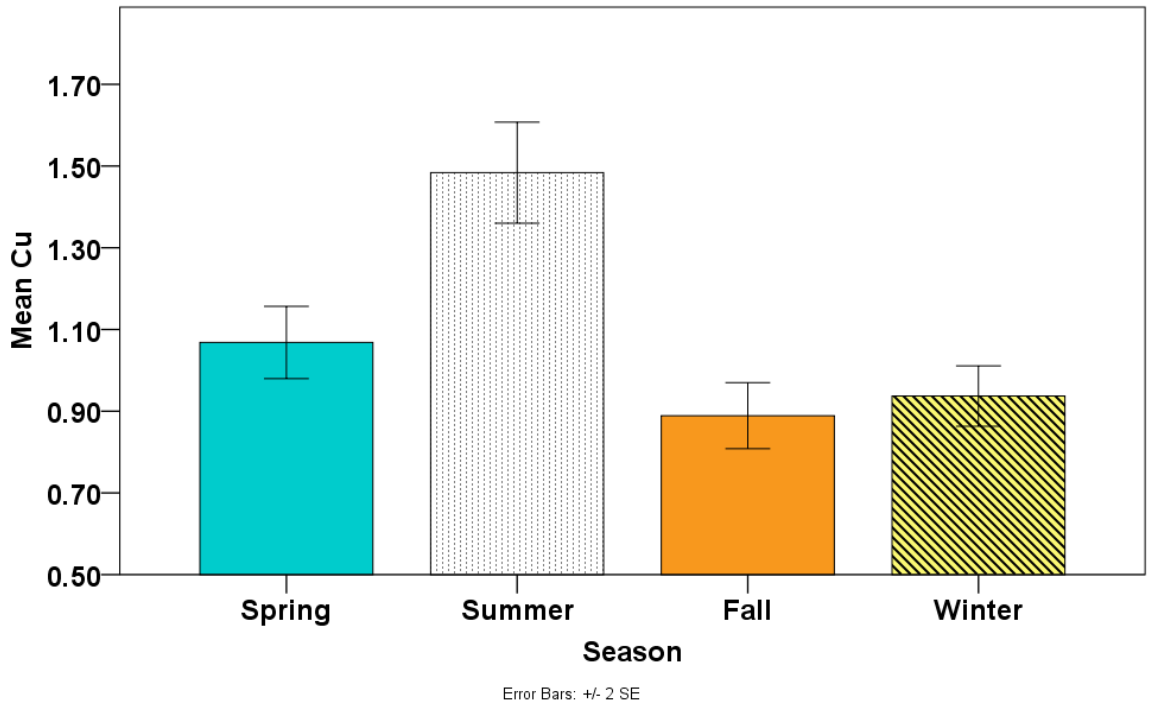

Figure1: Comparison of mean serum copper in different seasons

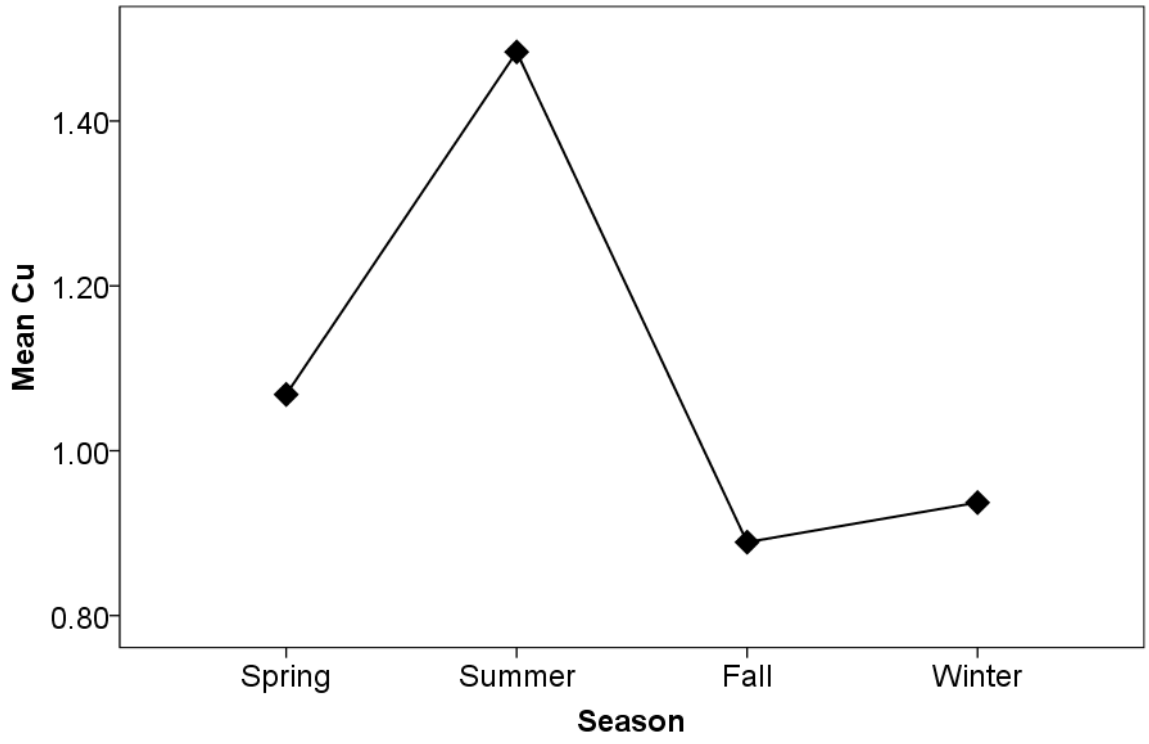

Figure2: Linear graph of mean serum copper in different seasons

DISCUSSION

Copper is one of the most vital elements in the body that plays various roles in, especially in tissues oxidation. Cytochrome oxidase system is the most important antioxidant systems in body that are associated with copper, which as result of deficiency of this element, diseases such as diarrhea, anemia, demyelination, the fibering of wool, osteoporosis and heart muscle degeneration occurs.

According to the results of determination of serum copper that were existence in table1, in different seasons in Kaleybar, there is a significant difference between serum copper levels and it was lowest in cold seasons. This could be due to increased rainfall in the study area. Following rain, the roots flooding in water and it cause an anaerobic environment around the roots and the pH in the root zone is reduced which increases the transport of ions and absorption in the root. Howerver, simultaneously molybdenum gathers around the root, which can have antagonistic effect on copper absorption. Furthmore the rain, causes copper in soil transferred to the lower stratum of soil and are less available to plants.

Different levels of copper in normal, primary and secondary deficiency is as follows (0.7-1.2, 0.1-0.2 and 0.4-0.7, respectively). Ozan , indicating that the examining of copper levels between the healthy group of sheep and the group dropping its spring wool found that, the blood serum copper level was 33.72 ± 0.77 μg/100 ml and in the spring wool dropping group, it was 63.5 ± 1.17 μg/100 ml. This may be due to the conditions of the environment and the climate and especially the trace element concistency of the soil and to the various races of the sheep (9).

Ghavami, studies the sheep with pneumonia and fever referred to Tabriz large animal clinic of Islamic Azad University, and indicated that of 50 adult sheep, in 18 (36%) of cases infected with pneumonia, mean serum copper was 0.27 ppm, which sowed extreme deficiency and 14 cases (28%) with a mean 0.56 ppm involved marginal copper deficiency and 74% of them had pneumonia, that indicating the relationship between copper deficiency and increased disease in sheep of that area (5).

It is showed that the level of plasma copper in sheep shows differences according to the level of the copper and antagonists (Pb, CaCO3, Zn, Mo, S) in the nourishment, environment and seasons, drought and rain, and pregnancy (2). Researchers reported that the plasma copper concentration should be more than 50 μg/dl normally, concentrations below this signals hipocuprosis (8).

Ghanbari's (2008) results indicated that in hamedan there is a secondary copper deficiency due to high sulfur and molybdenum in soil and plants, especially in winter. The decrease in serum copper in the present study in cold seasons was in agreement with ghanbari results (4).

In a study (2012) based on the ppm level of copper in Tabriz, Ahar, Basmenj and Bostanabad in the spring was 0.74, 0.78, 0.70 and 0.70 ppm, respectively. Also in the summer were 0.08, 0.77, 0.75 and 0.75 ppm, respectively. And in fall were 0.78, 0.69, 0.72 and 0.66 ppm, respectively. Finally in winter it was 0.73, 0.78, 0.68 and 0.71 ppm, respectively. The results of their studies indicated that the minimum amount of copper was in winter which could be due to the high magnesium and zinc of soil, as well as high rainfall in the that region. The highest amount of copper was in the summer, the results of the present study are consistent with these data (10).

Salimi and colleagues results showed that serum levels of copper in the spring were normal in sheep (0.786 ppm) and in the summer was (0.799 ppm) which it is normal. In this study in spring and summer, the percent of cases that were higher than 0.7 ppm was 1.06 and 1.48, respectively. This is contradicting with the findings of the present study, because the amount of copper in spring and summer was normal and it was higher than other seasons(14).

Some researchers showed that serum copper levels below 0.7 ppm, respectively, in spring was 49%, summer 20%, fall 7% and in winter was 44%, that these results are seasonally associated with most of the lower levels of 0.7 ppm was in the cold season, that in agreement with current study (13). Some others indicated that lowest serum copper was in winter an it was 0.686 ppm, and the highest levels was in spring (0.754 ppm). The results of malek et al., study are consistent with the findings of the present study (13).

The result obtained in this study was not in agreement with the results of ward (1978) (18). Ward related this results to the low copper and high levels of soluble proteins is the silage (18).

Ramirez and Ferrer (1989) investigated copper deficiency in Argentina (Magdalena) and indicated that copper deficiency is a common problem in summer and spring, but it was solved in fall and winter by itself, however these are inconsistent with our results (12).

CONCLUSION

In all areas that were copper deficiency normally were exist, which was confirmed by blood analysis can suggest; 1) Meadow improvement by adding compounds containing copper, iron and zinc in the soil, 2) In areas where the soil is iron, manganese and zinc reach the copper should be added to the soil. However our results indicated that the highest amount of copper was in the summer, and the lowest one was in fall.

REFERENCES

[1] W. M. Ashton, *Outlook on Agricalture*, **1970**, 6(1)**:** 95-101.
[2] S. Chergariu, International Symposium on Trace Element Metabolism In man and animals, **1978**.
[3] A. J. García-Fernández, G. Motas, I. Navas, P. María-Mojica, D. Romero, *Can Vet J*, **1999**, 40799-801.
[4] M. Ghanbari. DVM, Islamic Azad University.(Tabriz, Iran, **2008**.)
[5] M. Ghavami. DVM, Islamic Aza university.(Tabriz, Iran, **2005**.)
[6] N. Kaya, N. Utlu, B. S. Uyanik, A. Ozcan, *Tr. J. of Veterinary and Animal Sciences*, **1998**, 22399-402.
[7] L. A. Kerr, H. D. Mcgavin, *J Am Vet Med Assoc.*, **1991**, 19899-101.
[8] P. P. Lorentz, F. M. Gibb, *NZ Vet J* **1975**, 23(1)**:** 1-3.
[9] S. Ozan, *Selçuk Üniv Vet Fak Derg*, **1985**, 1(1)**:** 133-142.
[10] M. Pourashour, A. P. Rezaie-Saber, *Annals of Biological Research*, **2012**, 3(3)**:** 1645-1649.
[11] O. M. Radostits, C. C. Gay, D. C. Blood, K. W. Hinchcliff: Veterinary Medicine — a Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses
1599–1603., WB Saunders, **2000**.
[12] C. E. Ramirez , C. G. Ferrer, *Rev A reprod Anim*, **1989**, 9179-184.
[13] S. Razaghi, A. P. Rezaie-Saber, A. Hassanpour, *Life Science Journal*, **2013**, 10(4s)**:** 320-323.
[14] R. Salimi. DVM, Islamic Azad University.(Tabriz, Iran, **2003**.)
[15] J. K. Stephan, *J. Nutr.* , **1973**, 103548-552.
[16] N. F. Suttle, *Annu. Rev. Nutr.*, **1991**, 11(1)**:** 121.
[17] N. F. Suttle, P. Abrahams, I. Thornton, *J. Agric. Sci.*, **1984**, 103(1)**:** 81.
[18] G. M. Wards *J. Anim. Sci* **1978**, 41078-1089.