



Field and laboratory study of trace elements deficiency in sheep in Al-Najaf province

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Abstract

This study was designed to evaluate the trace elements in the blood of sheep suffering from clinical signs of mineral deficiency . Thousand (1000) ewe were examined clinically and 32 were suffering from sever mineral deficiency, while 10 animals clinically healthy selected as control group . Blood samples were taken, 32 samples from the infected group and other 10 samples from the control group . Blood samples were analyzed by atomic absorption spectrophotometer. The results showed high deficiency in trace elements as well as presence of significant differences between the affected and the control groups at $p<0.05$.The values of Cu, Fe, Co, Zn and Pb in serum of control group were 0.859 ± 0.091 ppm , 2.038 ± 0.016 ppm , 0.519 ± 0.076 ppm , 1.028 ± 0.015 ppm , 0.003 ± 0.0005 ppm respectively and in affected group Cu,Fe,Co,Zn And Pb were 0.209 ± 0.006 ppm, 0.294 ± 0.025 ppm, 0.012 ± 0.001 ppm , 0.190 ± 0.007 ppm, 0.053 ± 0.006 ppm respectively. There was no significant variation in toxic metal Pb between affected and control group.at ($p<0.05$).

Key word :trace elements, sheep, minerals deficiency

دراسة حقليه ومختبريه لبعض العناصر المعدنية في الأغنام في محافظة النجف

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الخلاصة:

أجريت هذه الدراسة لتقييم بعض العناصر المعدنية في مصل الأغنام والتي تعاني من علامات سريرييه تدل على إصابتها بنقص شديد في بعض المعادن في محافظة النجف الأشرف . شملت الدراسة 1000 حيوان تم فحصها سريريا , أظهرت الدراسة ان 32 حيوان منها يعاني من علامات سريرييه شديدة تمثلت بالضعف الشديد (93.7 %) وانعدام الشهية (50%) وتساقط الصوف (87.5%) وفقر القرن (56%) وشحوب الأغشية المخاطية(40.6%) وحالات اسهال بنسبه (28.1%) . أظهرت نتائج فحص عينات الدم ان هناك نقص شديد في المعادن في الحيوانات التي تعاني من اعراض سريرية مقارنة بمجموعة السيطرة وهناك فرق معنوي كبير بين المجموعتين تحت مستوى ($p<0.05$) , حيث كانت قيم العناصر النحاس , الحديد, الكوبلت , الزنك والرصاص, في مجموعة السيطرة , 0.859 ± 0.091 ppm , 2.038 ± 0.016 ppm , 0.519 ± 0.076 ppm , 1.028 ± 0.015 ppm , 0.003 ± 0.0005 ppm وفي مجموعة الحيوانات المصابة سجلت قيم العناصر النحاس والحديد والكوبلت والزنك والرصاص

0.209 ± 0.006 ppm, 0.294 ± 0.025 ppm, 0.012 ± 0.001 ppm , 0.190 ± 0.007 ppm, 0.053 ± 0.006 ppm على التوالي.

Introduction

The body living organism needs many minerals; these are called essential minerals. Essential minerals are sometimes divided up into major minerals (macrominerals) and trace minerals (microminerals). These two groups of minerals are equally important, but trace minerals are needed in smaller amounts than major minerals. The amounts needed in the body are not an indication of their importance. (1).The main trace elements include copper, iron, zinc, cobalt, iodine, manganese and selenium (2). Trace elements are essential for general health and they have important role of various components of the immune system (3,4). The deficiency of trace elements lead to reduced resistance for diseases (5) and affect production and performance of animals as sheep and goat (6, 7).All trace elements have role in growth such as copper, iron, manganese ,cobalt and zinc that reported by (8,9,10,11,12). Concentrations of Cu, Zn, Co, Fe and pb in serum are affected by infection, stress, pregnancy, and erythrocyte hemolysis. Because erythrocytes in sheep have a 150 day life span, concentrations of trace minerals in whole blood change more slowly than those in plasma in response to changes in intakes of trace minerals.

Blood measures are frequently used in assessment because they are significantly correlated to nutritional status of some trace elements (13), The decreased or increased level of trace elements in animals result in serious clinical diseases, the clinical signs of deficiency in animals are anorexia, alopecia, depigmentation, anemia, diarrhoea, impaired movement,

hyperkeratosis, parakeratosis, fertility problems, development problems in young animals, decreased production, tetany, decrease in protein synthesis, abortion not related to infections and pica (14, 15,16, 17, 18,19 , 20, 21) .

The aim of this study is to determine some levels of trace elements in sheep with suspected minerals deficiency in Najaf province .

Materials and methods

samples collection : This study was conducted in the duration from January to July /2015. Total 1000 sheep were examined clinically , thirty two blood samples were collected from sheep suffering from several clinical signs (emaciation ,wool loose, reduced appetite, anemia and poor growth of lambs) and 10 normal sheep used as a control group, the age of ewes ranged 2-3 years .

The blood samples were collected by jugular vein puncture , careful handling of blood samples is needed to prevent hemolysis and contamination of serum, 8ml of blood sample allowed to clot , after centrifugation the serum was separated and store at -20 °c until analyzed . All samples were subjected to the analyses in the laboratory of Veterinary Medicine of Al-Kufa university , serum were taken for evaluation (Cu, Zn, Co, Fe and pb) by using the blood analyzer atomic absorption spectrophotometer.

Statistical analysis

The study data analyzed by SPSSversion 11.5, (22).

Results :

Physical examination: The Clinical examination results revealed that all effected sheep were suffering from several clinical signs such as emaciation (93.7%) ,wool loose

(87.5%), reduced appetite (50%), pale mucous membrane (40.6%), parakeratosis (56.2%), diarrhea (28.1%) and poor growth (40.6%) as shown in Table (1) .

Table (1) : Clinical signs that show in affected sheep

Clinical signs	No.	%
Emaciation	30	93.7
wool loose	28	87.5
reduced appetite	16	50
Aneamia	13	40.6
diarrhea	9	28.1
poor growth	13	40.6
Parakeratosis	18	56.2

Blood analyzer results :Thirty two serum samples (affected group) and 10 serum samples(control group) were analyzed , the results of minerals levels of control and affected ewes are presented in Table(2), the mean value and Standard Error (SE) of serum elements.

The present study showed significant variations of Cu, Zn and Co values between affected and control group, but there is no significant difference between the toxic metal of lead level between the two groups.

The **high** trace elements deficiency was observed in serum of affected sheep. whereas the level of the Fe,Cu,Zn and Co were remarkably below the normal values. The mean and SE values of iron in serum of affected sheep were 0.294 ± 0.025 ppm ,copper value were 0.209 ± 0.006 ppm, cobalt value were 0.012 ± 0.001 ppm and zinc value were 0.190 ± 0.007 ppm . The mean and SE of blood serum lead level were 0.0053 ± 0.0006 ppm and no significant difference between control and affected sheep as show in table (2).

Table 2: Results of some micro elements and heavy metal in serum of the affected and control groups, ppm (Mean ±SE).

Parameter	Control group	Affected group
	Mean± SE	Mean± SE
Fe	2.0380 ± 0.016	0.294 ± 0.025
Cu	0.859 ± 0.091	0.020 ± 0.006
Co	0.519 ± 0.076	0.012 ± 0.001
Zn	1.028 ± 0.015	0.190 ± 0.007
Pb	0.003 ± 0.0005	0.053 ± 0.006

Discussion

In present study 32 ewes were suffering from high minerals deficiency, which have several clinical signs as Emaciation, wool loose, reduced appetite, anemia, diarrhea, poor growth and parakeratosis. This agrees with previous reports (23, 24, 25, 26, 27).

Because the mineral deficiencies may cause clinical disorders, the deficiency of Cu, Zn, Co and Fe lead to impaired immunofunction, increased susceptibility to infections, anemia, wool abnormalities, loss of appetite, alopecia, poor growth, parakeratosis, diarrhea and decrease milk production in line with (28,29,30,31,32,10,12).

Copper amount in the serum is less by 40 times compared to the normal amount and it has been determined copper deficiency. Result of our research which determines 10-16 times less amount proves potential occurrence of copper deficiency.

The copper values of affected sheep were (0.209 ± 0.006) higher than level compared with previous report in Iraq (23), while lower than (33) and other countries as Turkey and Saudi Arabia (34,35) also significant variation $P < 0.05$ when compare control and affected sheep (0.859 ± 0.091) . These variations in Cu level, though Cu is required in very small quantity in biological activity, the liver is the main storage and it appear to be that when little quantity of Cu is depleted the store replaced and when severe depletion of Cu in liver lead to severe clinical signs in line with (36).

In general, high values of Molybdenum in Iraqi soils because Iraq within "international Molybdenum fields" (37). Risk high molybdenum in soils or palant distributed secondary

Cu deficiency in grazing result from Mo-cu antagonism (38). The copper deficiency may be due to the conditions of the environment and the climate and especially the trace element consistency of the soil and to the various breeds of the sheep.

Several studies reported serum zinc levels (34,35,39) in herd which suffered from signs such as anorexia, alopecia, hyperkeratosis and parakeratosis, while our zinc value of mean and SE were less than above mentioned studies. The low levels of zinc may be due to insufficient zinc in diet or high cadmium levels in plant (15,16) and according (36) Iraqi soil and plant have low level of zinc.

The current study showed a low of cobalt level in the serum of affected sheep, which was suffering from reduced appetite, emaciation, poor growth signs and there is a significant variation ($P < 0.05$ when compared with the control group). This value in agreement with research in Basra - Iraq.

Iron amount in the serum is less by 7 times compared to the normal amount and it has been determined iron deficiency. The value of Fe serum affected sheep was (0.294 ± 0.025) and significantly lower than ($p < 0.05$) than normal control sheep (0.294 ± 0.025) , while (34) who found the mean and SE for Fe in sheep 1.786 ± 0.237 in Saudi Arabia and (35) in Turkey 0.881 .

The level of toxic metal (lead) in serum of examined sheep of both control and affected groups were reveal no significant variation. Our result (0.053 ± 0.006) were close from Pb level of sheep blood in Turkey obtained by (34) and (40) in Pakistan.

conclusion

We noticed there is a high deficiency in (Zn,Cu,Co,Fe) in the blood of affected sheep but the values of toxic metal was within normal range in both group.

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