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Study of Some Heavy Metals Residues in Liver and Kidneys of Awassi Sheep in Sallah Al-Din Province

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ABSTRACT

In present study, heavy metal residues concentrations of lead, cadmium , copper and zinc in liver and kidney have been determined in sheep in three areas, in Sallah Al-Din province (Tikrit , Samarra and Baiji) . The most values of heavy metal residues have been found higher in Beiji in Cu was 7.00ppm while in Tikrit was 4.56ppm and Samarra 4.34ppm . Significant differences was record in lead between two season(Winter , Summer) concentration was (1.35 and 0.50)ppm respectively , as well as cadmiums in winter 0.27ppm and in summer was 0.41ppm. Interaction showed low concentration of lead in Summer than Winter in three areas , and high level of copper in Winter and Summer in Baiji than Tikrit and Samarra.

دراسة متبقيات العناصر الثقيلة في كبد وكلى الاغنام العواسية في محافظة صلاح الدين

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الخلاصــة

تناولت هذه الدراسة التغيرات الفصلية والمكانية في تركيز بعض العناصر الثقيلة (الرصاص ، الكادميوم ، النحاس ، الزنك) في بعض أعضاء الاغنام (الكبد والكلى) المأخوذة من ثلاث مناطق في محافظة صلاح الدين هي تكريت وسامراء وبيجي . تم تسجيل اعلى تركيز لعنصر النحاس في الكليه في مدينة بيجي حيث بلغ 7.00ppm بينما في تكريت بلغ 4.56ppm وسامراء 4.34ppm . ظهرت فروقات معنوية بين فصلي الشتاء والصيف في مستوى الرصاص حيث كان تركيزه اعلى في الشتاء 1.35ppm بينما في الصيف 0.50ppm ، وكذلك بالنسبه لعنصر الكادميوم فقد بلغ تركيزه في الشتاء 0.27ppm بينما في الصيف 0.41ppm . أما بالنسبة للتداخل بين الموقع والفصل فقد اظهر انخفاض مستوى الرصاص في الصيف عن فصل الشتاء في المناطق الثلاث ، واظهر ارتفاع مستوى النحاس في فصلي الشتاء والصيف في بيجي عن باقي المناطق.

الكلمات المفتاحية :
متبقيات العناصر ، الثقيلة ، كبد ، كلى ، الاغنام ، العواسية .

للمراسلة :
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Introduction:

pollution today is one of the most serious problems facing the human health like air, water, soil, and the problem of desertification (Afifi , 2000) The environment has suffered in lraq during the past long years of
Neglect for several reasons , mainly that the decision for as those concerned with the environmental Taken to reform and reality of the situation and the introduction of new concepts as the infrastructure that
has declined in the years after the last of the time when increasing numbers of souls as well as the increasing number of automobiles.(Al-Omar,2006).

Polluted lraqi environment many wars experienced by lraq because of the use of depleted uranium ammunition and violating the oil wells and the leakage of contaminants from industrial facilities

and leave the waste landfill without a healthy economic blockade also caused the biggest damage in planting and Livestock , (Scientific conference for the Iraqi Environment ,2005).

As pollution is a global problem of concern to the whole world and specialists with the knowledge of the environment and especially that of what follows this problem of dire consequences to humans and the ecosystem components and the impacts on its balance(Duruibe et al.,2007) Pollution produced mainly for human intervention in the environmental laws enacted by the almighty creator and now the chemical contamination of meat is particularly important because of property accumulation in living cells with increasing concentration of chemical contaminants such as peiticides and heavy metals , tens and hundreds of times during the passage through the food chains to humans than double the concentration in the tissues of meat day after day with increased consumption. The type of pollutionis depended on the nature of the materials because there is contamination of heavy elements, for example oil or hydrocarbons or radioactive materials or pesticides or organic materials and other (Alagarsamy and Zhang,2005). Taking of these pollutants cause deposition of animals in meat residues as recorded high levels of heavy metals in the meat of cattle, sheep and this is because farm animals grazing in pastures contaminated soils and which gives an indication of environmental pollution (Saber et a1.,2003) or by breathing contaminated air and eating food contaminated with these metal, it is moved with food and made their way into tissue (Qiu et a1.,2003)

Heavy metals enter the milieu through air emanation from coal burning
plants, smelters and other industrial amenities (Beavington *et al.*, 2004; Al-Masri *et al.*, 2006). Other than civil, natural processes also play an important role in decaying heavy metals in the ground water, e.g. naturally occurring geological deposits of arsenic in ground water (Sanyal and Nasar, 2002; Ghosh *et al.*, 2004).

This study aimed to determine the level of heavy metals contamination(Pb , Cd , Cu , Zn) in liver and kidney lambs.

Materials and Methods:

We used Awassi sheep organs(Male, ages ranged from 1 -2 years) were obtained from three areas in Salah Al-Din :Tikrit Samarra and Baiji organs samples were collected from the mentioned areas in two seasons (Winter , Summer) Winter represented by January and February , July and August represented Summer. Organs samples were taken from liver and kidney**.**

Heavy Metals Determination:

Heavy metals estimated by way (ROPME,1983):

1- Taking weight 2g of organs samples put it in a muffle furnace on (500-600°C).

2- Weight remaining ash and add 5 ml solution of nitric acid (HNO3)

3- Absorption was read using Atomic Absorption Spectrophotometer (Japanese origin).

4- The metals which read are: Lead , Cadmium, Copper and Zinc for both liver and kidneys.

5- Calculated the concentration of heavy metals in the samples by the following equation:

Heavy metals (ppm) = $R_x V/D$

R = Reading in atomic absorption spectrophotometer

V = The final sample volume

D = Dry weight of the sample

Statistical analysis:

Two way factorial design was performed to analyse the data using the following mathematical model:

$$y_{ijk} = \mu + Ri + Sj + RSij + eijk$$

Where:

Y_{ijk} : the observation of the season and region

μ : The overall mean .

$\boldsymbol{Ri}$: Represented the effect of region (A)
$\boldsymbol{Sj}$: Represented the effect of season (B).
$\boldsymbol{RSij}$: is the interaction between region and season ,
$\boldsymbol{eijk}$: The random error which independent normally distributed with zero mean and variance .σ^2e

Results and Discussion:

Heavy metals in liver:

Table (1) showed the levels of heavy metals in the three regions during Winter and Summer in the liver of sheep , there were no significant differences in the proportion of lead between regions even between seasons and also the interaction did not showed any significant differences. because lead is always presented and movable in the air, so it is no differences between Winter and Summer.

Also Cadmium showed significant differences in samarra than Tikrit and beiji : Tikrit , Samarra and Baiji the results was: 0.37 , 0.50 , 0.37ppm respectively .In Winter the level of cadmium was less significantly than in Summer 0.33 and 0.50 ppm respectively. Interaction showed a low level of cadmium in the liver in the Winter than Summer in each of Tikrit and Baiji but in Samarra the interaction did not showed significant differences .

The highest concentration of copper was in Baiji :5.92ppm compared with Tikrit and Samarra the results was 4.42 , 5.00ppm. respectively . Seasons did not showed significant differences in copper concentration, and the reason of the high level of copper in Baiji due to the presence of Baiji refinery.

Interaction showed highest value of copper in Baiji during winter. there were no significant differences mentioned In Tikrit and Samarra. in Tikrit the ratio was higher during the Summer, but less than the level of copper in Baiji through two seasons.

Zinc level was high in Tikrit 56.15ppm but in Samarra and Baiji the concentrations was 34.87ppm , 34.01 ppm respectively. there was no significant differences between winter and summer zinc residue was 41.45 , 41.90ppm the interaction showed the high level of zinc in Tikrit during Winter and Summer compared of Samarra and Baiji through two seasons . we could not found a convincing reason for the high level of Zinc in Tikrit than Samarra and Baiji

Table (1) The effect of region , season and their interaction on levels of lead, cadmium, copper and zinc in liver (ppm)

Traits		Pb ppm	Cd ppm	Cu ppm	Zn ppm
Region	Tikrit	0.50±0.00a	0.37±0.04b	4.42±0.10b	56.15±0.55a
	Samarra	0.50±0.00a	0.50±0.00a	5.00±0.23b	34.87±0.90b
	Beiji	0.50±0.00a	0.37±0.04b	5.92±0.33a	34.01±0.91b
Season	Winter	0.50±0.00a	0.33±0.03b	5.24±0.30a	41.45±3.19a
	Summer	0.50±0.00a	0.50±0.00a	4.99±0.21a	41.90±3.11a
R×S	T×W	0.50±0.00a	0.25±0.00b	4.32±0.13c	56.03±0.85a
	T×S	0.50±0.00a	0.50±0.00a	4.52±0.15bc	56.27±0.82a
	S×W	0.50±0.00a	0.50±0.00a	5.02±0.41bc	33.66±1.43b
	S×S	0.50±0.00a	0.50±0.00a	4.99±0.30bc	36.07±0.89b
	B×W	0.50±0.00a	0.25±0.00b	6.38±0.37a	34.65±1.73b
	B×S	0.50±0.00a	0.50±0.00a	5.46±0.50ab	33.37±0.80b

Means with different letters within each column differ significantly (P<0.05) according to Duncan's test.
T=Tikrit , S=Samarra , B=Beiji , W= Winter, S=Summer

Heavy metals in kidney :

Table (2) showed the levels of lead, cadmium, copper and zinc in kidney there were no significant differences in the level of lead between the three regions Tikrit , Samarra and Baiji the results was:0.86 , 1.01 , 0.90ppm respectively.

the significant differences appeared between the seasons where the higher level of lead was in winter 1.35ppm but in Summer 0.50ppm may be the reason is the difference in air currents between Winter and Summer because lead is movable in the air, the interaction showed low level of lead in kidneys in the three regions during Summer than Winter.

Cadmium showed significant differences presence in a low level of cadmium in Samarra 0.25ppm , than Tikrit and Baiji (0.37 and 0.40 ppm respectively). Cadmium concentration were high in Summer 0.41ppm than winter 0.27ppm .may be it is the same reason above that belongs to the difference of air current between winter and summer.

The interaction demonstrated the high level of cadmium in Summer than Winter in each of Tikrit and Baiji, unlike Samarra, which did not showed significant differences in two seasons.

Copper showed significant differences between reagions where the highest concentration of copper was in Baiji 7.00ppm, but in tikrit and samarra the residue were 4.56 , 4.34ppm , it is because the presence of Baiji refinary. while the copper did not showed significant differences between the two seasons.

The interaction has showed the highest concentration of copper is in Baiji through Winter and Summer and that is due to the high level of copper originally in Baiji than Tikrit and Samarra.

Zinc was the highest level is in Tikrit 55.32, but in Samarra and Baiji the residue was 46.64 , 46.33 respectively. There were no significant differences in zinc concentration between the two seasons.

The interaction demonstrated the highest level of zinc is in Tikrit during two seasons that is because the zinc ratio is already high in Tikrit.but we did not found a clear reason about the high level of Zinc in Tikrit than Samarra and Baiji.

Table (2) the effect of region, season and their interaction on levels of heavy metals in kidney (ppm)

Traits		Pb	Cd	Cu	Zn
Region	Tikrit	0.86±0.15a	0.37±0.04a	4.56±0.35b	55.32±0.50a
	Samarra	1.01±0.23a	0.25±0.00b	4.34±0.34b	46.64±0.65b
	Beiji	0.90±0.16a	0.40±0.04a	7.00±0.21a	46.33±0.76b
Season	Winter	1.35±0.10a	0.27±0.02b	5.29±0.50a	49.10±1.35a
	Summer	0.50±0.00b	0.41±0.03a	5.31±0.36a	49.76±1.35a
R×S	T×W	1.22±0.15a	0.25±0.00b	4.10±0.55b	54.81±0.45a
	T×S	0.50±0.00b	0.50±0.00a	5.03±0.34b	55.83±0.88a
	S×W	1.53±0.27a	0.25±0.00b	4.52±0.66b	46.33±1.33b
	S×S	0.50±0.00b	0.25±0.00b	4.16±0.29b	46.95±0.34b
	B×W	1.30±0.11a	0.31±0.06b	7.25±0.25a	46.16±1.40b
	B×S	0.50±0.00b	0.50±0.00a	6.75±0.32a	46.50±0.84b

Means with different letters within each column differ significantly (P<0.05) according to Duncan's test.
T=Tikrit , S=Samarra , B=Beiji , W= Winter, S=Summer

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