

## **The Effect of Heavy Metals in Tigris River and Well Water on the Meat and Eggs of Quail Birds**

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### **Abstract**

The current study was conducted on the waters of the Tigris River and the waters of some wells in Salah al-Din Governorate. The research began in October 2020 Until March 2021 To study six sites (four wells, two sites on the Tigris River), within Salah al-Din Governorate, through which the heavy elements of water were studied, in addition to measuring the heavy elements in the flesh and eggs of quail birds that drink from the water of the Tigris River and the water of wells, which included heavy elements (Cadmium, Zinc, Lead) The results showed that the heavy elements (cadmium, lead) exceeded the permissible limits of the Iraqi and international standards in both well sites and the waters of the Tigris River, while the zinc values were within the permissible limits.

In meat, the results of the heavy elements (cadmium, zinc, and lead) were less than the international standards for both birds that drink from well water and that drink from the Tigris River.

As for eggs, the results of the heavy elements (zinc, lead) were less than the global standard determinants for each of the birds that drink from well water and that drink from the Tigris River. As for cadmium, the values matched with the international standard determinants for each of the birds that drink from well water and that we drink water from the Tigris River.

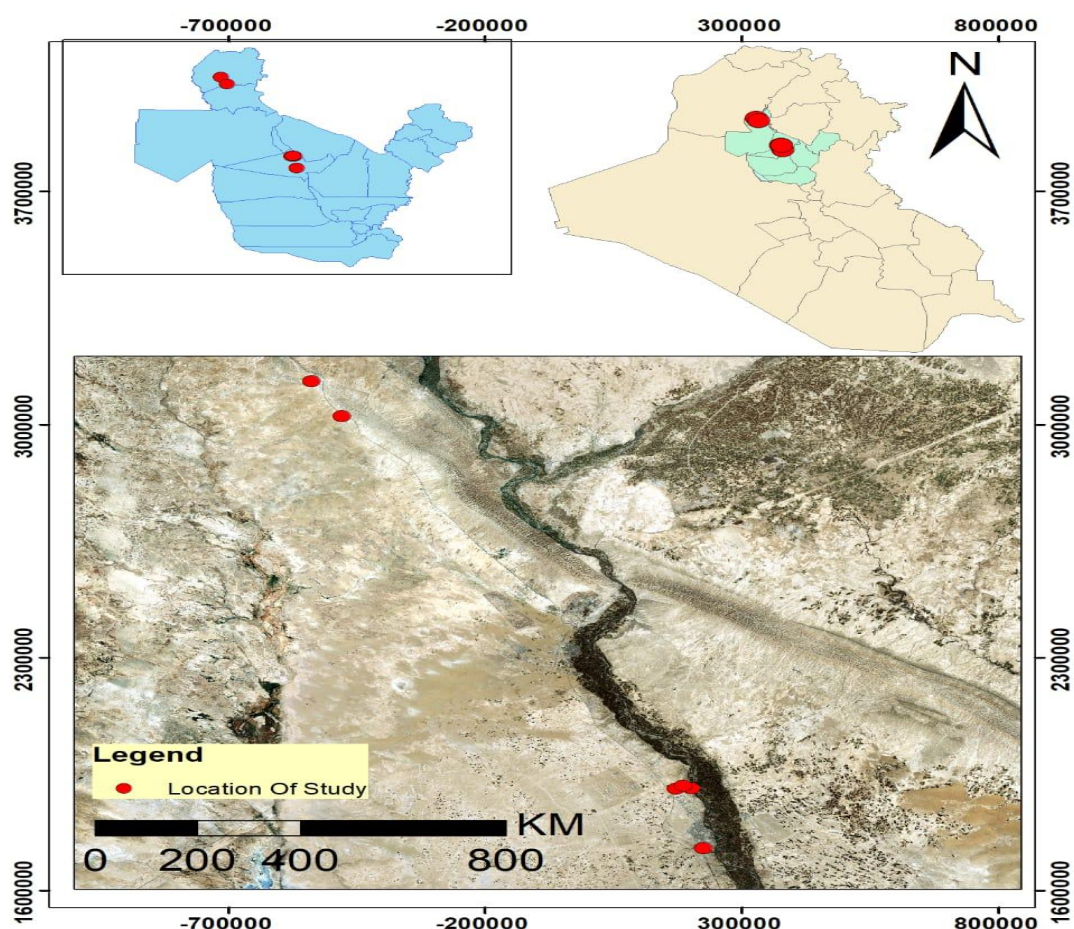
### **Introduction**

Water is polluted with heavy elements through mining activities as well as various industries, and chemicals present in wastewater, which are a source of concern when re-using (Wajahat *et al.*, 2006). The presence of heavy elements in low concentrations is part of the natural ecosystem of water and the problem arises when their concentrations increase as a result of the unregulated addition of urban and industrial wastewater. (Berkowitz *et al.*, 2008). The amount of heavy elements in water depends on product processes, whether they are natural or due to various human activities (Singh *et al.*, 2016). The environmental impact of heavy elements in the aqueous system is related to their distribution between the solid phase and the liquid phase in the aqueous body (AL\_Rawi, 2019). Therefore, the quality of the surface and groundwater source must be well managed and monitored, and the sources of pollution should be reduced and the qualitative studies of different water sources should be continued. (Ismail *et al.*, 2020) The quality of water has an important effect on the performance and production of birds, and that high concentrations of heavy

elements and other pollutants may affect the physiological functions of the body. (Jafari *et al.*, 2006).

### Materials and methods of work

Water samples were collected over a period of six months, beginning in October (2020), And until the month of March (2021) Of the six study sites, river water sites are from the upper surface layer of water with a depth of 20-30 cm. As for the groundwater, the well water was pumped for a period of five to ten minutes to get rid of the polluted and stagnant water. Conducted vital experience in the field of bird population Lowe's to the Faculty of Agriculture - the University of Tikrit, for a period of 4/10/2020 for 20 21/1/2, used the 56 chicks aged 45 days of the Japanese quail birds with a brown color obtained from the Department of Animal Production field at the Faculty of Agriculture, the University of Tikrit by six transactions with three replicates per treatment. The cadmium, zinc, and lead concentrations were estimated in water, meat, and egg samples using an atomic absorption spectrometer. Atomic absorption spectrophotometer in the laboratory of the Faculty of Chemical Engineering, Tikrit University, two sites represent the Tigris River in Tikrit (the first site is a sewage landfill and the second site is raw water). As for the sites of the four wells, the first and second sites are two wells in Tikrit University and the third site is a well in the north of Talul al-Baj and the site The fourth is a well in the east Talul Al-Baj), As shown in the picture(1).



the picture(1) : Site sampling image of the researcher's work using GIS 10.3

## Results and discussion

### 4-1 Heavy elements in water

Note in the table(1) The values of each of the studied elements ( cadmium, zinc, and lead ) in the water of the Tigris River and wells water throughout the study period did not exceed 0.05 ppm, Cadmium values were higher than the permissible limits according to the Iraqi and international standards for drinking water, while the zinc values were within the permissible limits according to the international standards, and the lead values were higher than the permissible limits according to the international standards.

Table (1) Heavy elements in water

March	February	January	December	November	October	Transactions
0.05	0.05	0.05	0.05	0.05	0.05	R1
0.05	0.05	0.05	0.05	0.05	0.05	R2
0.05	0.05	0.05	0.05	0.05	0.05	W1
0.05	0.05	0.05	0.05	0.05	0.05	W2
0.05	0.05	0.05	0.05	0.05	0.05	W3
0.05	0.05	0.05	0.05	0.05	0.05	W4

### 4-2 heavy elements in meat

The results of the current study showed in Table (2) that the values of each of the studied elements (cadmium, lead) in both the meat of birds that drink from the Tigris River water and the meat of birds that drink from well water did not exceed 0.05 ppm. As for zinc, it was the highest value (5.15 ppm) And the lowest value (3.55 ppm) In the meat of birds that drank from the Tigris River, while birds that drank from wells water had the highest value of zinc (5.06 ppm) And the lowest value (4.05 ppm). The cadmium and lead values in the current study were less than the permissible limits for heavy elements in the meat (JECFA, 2005). Zinc was also less than the permissible limits for heavy elements in the meat. (WHO, 1998)

schedule (2) Heavy elements in meat

Pb	cd	Zn	Transactions
0.05	0.05	5.15	R1
0.05	0.05	3.55	R2
0.05	0.05	5.06	W2
0.05	0.05	4.05	W2
0.05	0.05	4.79	W4
0.05	0.05	4.91	W4

### 3-4 Heavy elements in eggs

The results of the current study showed in Table (3) that the values of each of the studied elements (cadmium, lead) in the eggs of birds that drink from the Tigris River water and the eggs of birds that drink from well water did not exceed 0.05 ppm. As for zinc, it was the highest value (1.72 ppm) and the lowest value (1.41 ppm) in the meat of birds that drank from the Tigris River, while birds that drank from wells water had the highest value of zinc (1.53 ppm) and the lowest value (1.41 ppm). The cadmium values in the current study matched the internationally permitted limits, while the lead and zinc values were less than the internationally permitted limits. (Zmudzki and Szkoda, 1996)

Table (3) Heavy elements in eggs

cd	pb	Zn	Transactions
0.05	0.05	1.72	R1
0.05	0.05	1.65	R2
0.05	0.05	1.49	W2
0.05	0.05	1.58	W2
0.05	0.05	1.53	W4
0.05	0.05	1.41	W4

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