EFFECT OF REGION IN BROILER MEAT POLLUTION BY HEAVY METAL IN KIRKUK GOVERNORATE, IRAQ

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ABSTRACT

This study was carried out to determine the effect of region pollution by heavy metal in concentration of it in poultry meat. The study is done by collecting the poultry carcass from three regions in Kirkuk governorate Laylan, Shawn and Kirkuk city, the carcass was cut to main and second parts, then three parts of carcass (wing, thigh and breast) and three replicate for each were analysis. The main sources of heavy metal in environmental were factory, cars, Industrial waste. Heavy metal concentration was determined by atomic absorption spectrophotometer. The concentration of CU, Cd, Pb, Ni and Zn in samples were measured to determine the effect of region on it. The results showed that significantly (p<0.05) effects to region in heavy metals that were measured in Kirkuk, for copper were (0.986, 0.983, 0.981) for wing, thaw and breast compared to (0.980, 0.986, 0.986)for Laylan and (395, 393, 395) in Shwan city respectively all measurements of heavy metal take the same direction and that gives us in indicator about the meat showed not bring from Kirkuk region to Human consumption but we showed bring it from Laylan or Shawn and better from Shawn region.

KEY WORDS : Heavy metal, Poultry meat, Region pollution.

INTRODUCTION

The most important problems in the present time is Pollution by heavy metals which has caused a very big harm to the public health and lead to a dangerous disease like cancer and respiratory diseases (Wail, 2002) when humans eat a food population with heavy metals (meat or vegetable) the body will poisoned by it and concentration will be enough to cause disease (Al-perkhdri, 2019).

Materials and Methods

The samples of experiment were collected from three regions in Kirkuk governorate (north, south and middle) Laylan, Shawn and Kirkuk city and for three parts of carcass (wing, thigh and breast) and three replicated each.

Heavy metals analysis

Heavy metals including Copper (Cu), cadmium (Cd), lead (Pb), nickel (Ni), zinc (Zn) and iron (Fe) were measured in poultry meatby using atomic absorption spectrophotometer (Perkinelmer, 2380) according to Richard and Rubinshapiro (1986).

Statistical analysis

Heavy metals concentrations recorded as means ± standard errors (SE). Results were analyzed using was one-way analysis of variance (anova). Duncan's test used for statistical analysis. Comparing metals in muscles of the same bird done by T-test. The value of *P*<0.05 was used to indicate statistical significant differences. Correlation analyses among the measured metals calculated based on Spearman's coefficient using JMP program (SAS, 2003).

RESULTS AND DISCUSSION

Copper concentration (ppm)

Table 1 shows concentrations of Copper in ppm. Samples collected from the results Kirkuk region have a highly significantly concentration in Copper

(0.986, 0.983 and 0.983) for wing, thigh and breast compared to (0.980, 0.986 and 0.983) and (0.395,0.392 and 0.395) for Laylan and Shawn respectively.

Lead concentration (ppm)

For this metal we saw that the higher pollution of poultry meat showed in Kirkuk region (0.135, 0.112, 0.95) for wings, thaw and breast compared to (0.119, 0.097, 0.090) for Laylan and (0.098, 0.93, 0.081) for Shwan. The region has a significant effect (p<0.05) on lead concentration.

Nickel concentration (ppm)

From Table 3 results which show the effect of region

in concentration of nickel (ppm) in broiler meat there were no effect for region on it.

Zinc concentration (ppm)

Table 4 shows the average of zinc concentration (ppm) in different carcass parts of the broiler in three region of Kirkuk, it seemed to be like other heavy metal measurements direction, and that Kirkuk city have the higher concentration of zinc in all carcass parts compared to other regions.

Iron concentration (ppm)

The analysis of the results of iron concentration (ppm) in Table 5 for carcass parts we saw that, for wings Kirkuk city recorded the lowest concentration

Table 1. Effects of region and meat broiler parts in Kirkuk governorate on concentration ofCopper (ppm)

| Carcass part | Name of region | | | Effect of |
	Shwan	Laylan	Kirkuk	region
Wings	0.395±0.04c	0.980±0.04b	0.986±0.07a	0.394±0.04b
Thaw	0.392±0.03b	0.986±0.03a	0.983±0.02a	0.980±0.01a
Breast	0.395±0.01b	0.986±0.01a	0.981±0.02a	0.982±0.03a
Effect of part	0.197±0.09a	0.196±0.05a	0.197±0.09a	

The averages with different letters within the same raw differ significantly at (P <0.05).

Table 2. Concentration of lead (ppm) in poultry meat from different region in Kirkuk governorate

| Carcass part | Name of region | | | Effect of |
	Shwan	Laylan	Kirkuk	region
Wings	0.098±0.02c	0.119±0.05b	0.135±0.07a	0.093±0.04b
Thaw	0.093±0.03b	0.097±0.03b	0.112±0.02a	0.096±0.01ab
Breast	0.081±0.07b	0.090±0.09b	0.099±0.01a	0.103±0.05a
Effect of part	0.104±0.03a	0.100±0.07a	0.095±0.09b	

The averages with different letters within the same raw differ significantly at (P <0.05)

Table 3. Concentration of nickel (ppm) in poultry meat from different region in Kirkuk governorate

| Carcass part | Name of region | | | Effect of |
	Shwan	Laylan	Kirkuk	region
Wings	0.105±0.007	0.105±0.005	0.110±0.007	0.104±0.004
Thaw	0.103±0.003	0.099±0.003	0.103±0.002	0.102±0.001
Breast	0.105±0.007	0.102±0.009	0.106±0.003	0.103±0.002
Effect of part	0.103±0.003	0.101±0.001	0.104±0.003	

The averages with different letters within the same raw differ significantly at (P <0.05).

Table 4. Concentration of zinc (ppm) in poultry meat from different region in Kirkuk governorate

| Carcass part | Name of region | | | Effect of part |
	Shwan	Laylan	Kirkuk	
Wings	3.166±0.34b	3.200±0.22ab	3.333±0.14a	3.200±0.11
Thaw	3.133±0.21c	3.300±0.12b	3.436±0.12a	3.188±0.11
Breast	3.066±0.45c	3.300±0.43b	3.633±0.14a	3.100±0.45
Effect of region	3.155±0.34c	3.266±0.12bc	3.466±0.24a	

The averages with different letters within the same raw differ significantly at (P <0.05)

Table 5. Concentration of iron (ppm) in poultry meat from different region in Kirkuk governorate

Carcass part	Name of region			Effect of part
	Shwan	Laylan	Kirkuk	
Wings	0.430±0.04b	0.480±0.07ab	0.500±0.03a	0.520±0.03a
Thaw	0.513±0.03b	0.533±0.08ab	0.566±0.03a	0.526±0.03a
Breast	0.386±0.01b	0.513±0.07a	0.516±0.06a	0.498±0.08a
Effect of region	0.493±0.03b	0.535±0.05a	0.516±0.03a	

The averages with different letters within the same raw differ significantly at (P <0.05).

Table 6. Cadmium concentration (ppm) in poultry meat from different region in Kirkuk governorate

Carcass part	Name of region			Effect of part
	Shwan	Laylan	Kirkuk	
Wings	0.0486±0.004	0.0483±0.007	0.0483±0.004	0.0484±0.003
Thaw	0.0483±0.009	0.0483±0.002	0.0486±0.008	0.0484±0.006
Breast	0.0486±0.005	0.0486±0.003	0.0484±0.002	0.0485±0.007
Effect of region	0.0485±0.003	0.0484±0.003	0.0484±0.009	

The averages with different letters within the same raw differ significantly at (P <0.05)

(ppm) compared to Shwan and Laylan where for thaw and breast they have significantly (P ≤ 0.05) by recording the lowest conc. compared to Kirkuk city.

Cadmium concentration (ppm)

The results of Table 6 showed no significant effect (P≤0.05) for region in concentration of cadmium (ppm) and for all carcass parts.

DISCUSSION

In the present time the contamination of meat by heavy metals are very dangerous subject because of high consumption of it from humans and the amino acids which contents of it become as a part of cell proteins, therefor if the meat pollution by any kind of heavy metals or any thing else will be harmful for human body so that we see the very big interest of analysis of pollution by it in our food sources. In our research we saw that the region has a very big effect on meat pollution by heavy metal and that Kirkuk city record a highest value on metals that measured because of high number of factory, Industrial workshops, cars and other pollution sources when Laylan record a second place and Shwan become it the end by all measurements of pollution because of its far from pollution sources.

CONCLUSION

Contamination by heavy metal is a very important problem because a lot of people consumed meat as a sourness of protein especially poultry meat (WHO, 2018) therefor it may be caused a many disuses for human every when it concentration low because it had a cumulative effectin meat tissue (Al-Perkhdri, 2019).

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