



Calculating residue of heavy metals in chest and thigh in the local hens and two types of frozen hens in markets

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الخلاصة

تناولت هذه الدراسة معرفة متبقيات بعض المعادن الثقيلة (الرصاص، الكاديوم، النحاس، الزنك) في قطعتي الصدر والفخذ المأخوذة من ثلاث انواع من الدجاج النوع الاول : الدجاج العراقي المحلي ، النوع الثاني : الدجاج البرازيلي نوع (Sadia) ، النوع الثالث : الدجاج التركي نوع (Garip) تم تسجيل مستويات عالية للرصاص والكاديوم والنحاس بالنسبة لقطعتي الصدر والفخذ في الدجاج المحلي مقارنة مع نوعين الدجاج المستوردة البرازيلي والتركي وعزي السبب الى احتمال تعرض الدجاج المحلي الى بيئة ملوثة كالهواء الملوث بدخان السيارات ودخان المعامل والمصانع وكذلك المياه والاعذية الملوثة بالمعادن الثقيلة ، بينما اظهر الدجاج المحلي انخفاض واضح في مستوى الزنك في قطعتي الصدر والفخذ حيث بلغت (25.87 ± 0.27 و 23.63 ± 1.11) % على التوالي .

كذلك تم اجراء اختبارات التحليل الكيميائي لقطعتي الصدر والفخذ ، لوحظ ارتفاع نسبة الرطوبة في قطعة الصدر في الدجاج المحلي (72.98 ± 0.99) % ، اما بالنسبة للبروتين فقد انخفضت هذه النسبة في قطعة الصدر للدجاج المحلي حيث بلغت (20.13 ± 0.45) % مقارنة بالمستورد . اما نسبة الدهن فقد انخفضت في قطعة الصدر في الجاج المستورد الثاني (الدجاج التركي) حيث بلغت (5.15 ± 0.48) % . بالنسبة لقطعة الفخذ فلم تظهر نسبة الرطوبة اختلافات معنوية بين الانواع الثلاثة بينما انخفضت نسبة البروتين في الدجاج المحلي حيث بلغت (20.12 ± 0.54) اما نسبة الدهن فقد انخفضت في الدجاج المستورد النوع الاول (البرازيلي) حيث بلغت (5.15 ± 0.29) مقارنة بالنوعين الاخرين ، اما نسبة الرماد فلم تظهر اي فروقات معنوية بين الانواع الثلاثة من الدجاج لقطعة الفخذ.

Introduction

Meat plays important role in the human nutrition, by contributing a high quality of proteins, essential minerals and trace elements, and a some important vitamins in bio available forms (Ponnampalam et al., 2001). Consumers of today are health conscious and demand high quality food products. Ultimately, the success of any food product is determined by consumer acceptability, which is largely determined by the perception of quality (Dransfield, 2001).

Meat and meat product are an important for human diet, but also may carry certain toxic substances which burn to its through multisources for contamination that showed at a higher

concentration of toxic substance than most other food. (Fathy et al., 2011)

In this paper, we discuss the important part of the pollutants that are exposed prior to slaughter, it is heavy metals pollution.

Heavy metals it is more substances that contaminate the meat being being considered naturally present in the ecosystem. These metals consumption by birds necessary and important to maintain the metabolism but the consumption of large quantities (high concentrations) be harmful and toxic, where it is difficult for the body to get rid of it, resulting was called heavy metals poisoning. (Lenntech, 2004, Duruibe et al., 2007).

This difference in the level of exposure to heavy metals due to industrial sources and industrial effluents that contaminate the water ,soil, and thus up to the bird, leading contamination the consumer meat by human with heavy metals.(Cholewa et al., 2012) . also, sewage water gradually increase the toxic concentration of heavy metals in soil and these are increasingly up taken by the plants and vegetables and afterwards relocate into the food chain causing severe damage to both animals and human health (Haiyan and Stuanes, 2003).

Materials and methods

This research was conducted at the agricultural college university of tikrit . meat sample were taken from the local market in tikrit it was (local hens) and Brazilian hens producer name(sadia) and Turkish hens producer name (Garip) .

We took chest and thigh piece of each bird and conducted the following measuring :

Moisture content determination

Moisture content was determined in hens meat samples according to AOAC (1980) by drying about 15 gm of the sample at 120°C until constant weight was recorded. Then calculate the weight difference , the moisture was determined by the difference weight before and after drying.

Protein determination

Total nitrogen was measured according to AOAC(2000) procedures by using (micro-kjeldhal) procedures and conversion factor of 6.25 extract protein percent in meat sample was used.

Fat determination

The percentage of fat in hens meat was measured by using soxhlet extraction units according to AOAC(2000) procedures.

Ash determination

Ash is determined according to AOAC(2000) procedures , 2 gm. Of hens meat was weighted , put in a silica platinum dish , transferred to muffle furnace maintained at (500-600°C)for 6 hours untill grey ash was obtained . it is left to be cooled , then was weighted and the ash percent was calculated.

Heavy metals estimate

Heavy metals estimated by way (ROPME,1983):

1- Taking weight 2g of 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 chest and thigh.

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

$$\text{Heavy metals (ppm)} = R_x V / D$$

R = Reading in atomic absorption spectrophotometer

V = The final sample volume

1. D = Dry weight of the sample

Results were analyzed statistically using the (SPSS) program ((Completely Randomized design C.R.D) (Steel and Torrie 1960) according to mathematical model:

$$Y_{ij} = \mu + T_i + e_{ij}$$

Y_{ij}: the observation j to treatment i

μ: the overall mean

T_i: treatment effect I

E_{ij}: The random error which independent normally distributed with zero mean and variance σ^2_e

The differences compared between the averages using Duncan's Multiple Range)Duncan (1955 , test

Results and discussions

Chemicals analysis of chest:

The results of statistical analysis showed significant differences in moisture content between three species it was (72.98%) in local hens compared with imported 1 and 2 it was (71.54% , 71.93%) respectively , the reason may be due to differences between the three genotypes species. We also noted the low percentage of protein in the local hens (20.13%) compared with the first and second imported hens it was (21.99% , 21.98%) respectively , the reason may be due to high moisture in local hens .

The fat content, we note low percentage in the second imported hens (5.15%) compared with local and first imported hens it was (6.63% , 6.01%) , the reason may be due to the differences of nutrition between three types.

Ash ratio showed significant differences between three types, it was low percentage in local hens (0.2%) compared with first and second imported hens (0.4% , 0.4%) the reason may be due to the high moisture in local hens.

Table (1) chemical analysis of chest in three types of hens

traits	Moisture	Protein	Fat	Ash
local	72.98±0.99a	20.13±0.45b	6.63±0.73a	0.2±0.02b
Sadia	71.54±0.58b	21.99±0.38a	6.01±0.15a	0.4±0.04a
Turkish	71.93±0.83b	21.98±0.79a	5.15±0.48b	0.4±0.10a

Means with different letters within each column differ significantly (p<0.05) according to Duncan's test.

Chemical analysis of thigh:

There were no significant differences in moisture between the three types of thigh hens , the differences were calculation but not significant .

Protein ratio in thigh hens was low in local hens (20.12%) compared with the first and second imported thigh hens it was (21.96% , 21.01%) respectively .

Also, fat percentage showed significant differences it was low in first imported thigh hens (5.15%) compared with local and second imported thigh hens (6.65% , 6.97%) respectively, the reason may be due to the difference in the quality of nutrition among the three species.

Ash did not show significant differences among three species.

Table (2) chemical analysis of thigh in three types of hens

Traits	Moisture	Protein	Fat	Ash
local	71.97±0.76a	20.12±0.54b	6.65±0.73a	1.2±0.04a
Sadia	71.02±0.97a	21.96±0.28a	5.15±0.29b	1.8±0.08a
Turkish	70.86±0.29a	21.01±0.69a	6.97±0.11a	1.1±0.03a

Means with different letters within each column differ significantly (p<0.05) according to Duncan's test.

Heavy metals in chest:

The results showed significant differences in lead levels between three types of hens it was increase the in local hens (3.00ppm) compared with the first and second imported hens (0.50 , 0.50ppm) respectively the reason may be due to polluting the environment resulting from smoke car exhaust.

Cadmium was also high in local hens (2.53ppm) compared with the first and second imported hens (0.50 , 0.50ppm) respectively the reason may be due to unhealthy conditions of hens in Iraq

compared with the typical farms in the world.

As well as, copper showed high significant differences where the percentage was high in local hens (5.53ppm) compared with the first and second imported hens (3.78 , 3.01ppm) respectively. The reason may be due to use drinking water from copper water pipes.

Finally, zinc was low in local hens (25.87ppm) compared with the first and second imported hens (40.74 , 45.98ppm) respectively. the reason may be due to low percentage of zinc local hens meat that beneficial to humans , especially children.

Table (3) heavy metals in chest in three types of hens

traits	Pb	Cd	Cu	Zn
local	3.00±0.12a	2.53±0.14a	5.53±0.42a	25.87±0.27a
Imported1	0.50±0.00b	0.50±0.00b	3.78±0.18b	40.74±2.78b
Imported2	0.50±0.00b	0.50±0.00b	3.01±0.58b	45.98±2.99b

Means with different letters within each column differ significantly (p<0.05) according to Duncan's test.

Heavy metals in thigh:

In thigh cut we note high significant differences in lead level in local hens (2.87ppm) compared with the first and second imported hens (0.50 , 0.50ppm) respectively. The reason may be due to a contaminated environment in smoke generators.

Also, cadmium was high in local hens (1.90ppm) compared with the first and second imported hens (0.50 , 0.50ppm) respectively the reason may be due to the presence of cadmium in hens farms like wall paintings of barn.

Copper was high significant differences in local hens (4.87ppm) compared with the first and second imported hens (1.11 , 2.98ppm) respectively . the reason may be due to use tools contaminated with copper as well as the knives used in the process of slaughtering local hens on the contrary , imported hens slaughtered in places of allocated slaughter .

Zinc was low in local hens (23.63ppm) compared with the first and second imported hens (30.43 , 35.22ppm) the reason may be due to low percentage of zinc local hens meat that beneficial to humans , especially children.

Table (4) heavy metals in thigh in three types of hens

traits	pb	cd	cu	zn
local	2.87±0.45a	1.90±0.18a	4.87±0.83a	23.63±1.11b
Imported1	0.50±0.00b	0.50±0.00b	1.11±0.64b	30.43±2.83a
Imported2	0.50±0.00b	0.50±0.00b	2.98±0.09b	35.22±2.99a

Means with different letters within each column differ significantly ($p < 0.05$) according to Duncan's test.

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