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QUALITATIVE STUDY IN THE DIFFERENCES IN THE PROPORTIONS OF THE WEIGHTS OF MEAT, BONES AND SKIN IN EACH OF THE BROILER CHICKENS AND LOCAL LAYING HENS

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Abstract:
This study was conducted in the Department of Science/College of Basic Education/ Mustansiriyah University for the period from 11/15/2021 to 3/15/2022, for the purpose of studying the effect of type and breed on skin, meat and bone weights in relation to the total weight of a chicken. Three weights of chicken were used in this study. The local meat is Lohman white type and the white Lohman red hens are (1300 gm, 1400 gm, 1500 gm) and each weight was distributed among five replicates and each duplicate was two chickens. 12.7%) and the highest average skin weight in laying hens for the same weight reached (300 gm) and (20%) (and significant differences were found between total weights at a significant level p<o.o1)) in terms of skin rates. The highest weight was also reached In meat at a weight of 1500 g in broiler chickens, which amounted to (994.25 g) and at a rate of (66.28 %), while the weight of meat for the same weight in laying hens reached (709 g) and at a percentage of (47.26%), and significant differences were found between the total weights at a significant level. p<o.o1)) in terms of meat rates. The bone weight of broiler chickens is close to all weights. It was according to the sequence (267.5 gm, 263.5 gm and 247.75 gm) and there were significant differences in bone weight in all weights taken from laying hens, and the highest average was in weight 1500 gm (307 g), and significant differences were found at the level of significance p<o.o1)) Between the total weights in the averages of bone weights. The results obtained from this study showed that the skin weight increased with the increase in the total weight of the chicken with the convergence of the bone weight in all the weights taken and in both types, but it was greater in the laying hens. It was noted that the weight of the skin in laying hens is greater than the weight of local broiler chickens of the same weight. The results indicated that there is a great discrepancy in the results of skin, meat and bones in both broiler and laying hens.

Key words :(broiler chickens, laying hens, weight of meat in broiler chickens, weight of meat in laying hens, bone weight in broiler chickens, weight of bones in laying hens, skin weight in chickens)

Introduction:

Poultry meat is considered a basic food item. God Almighty mentioned it in His Noble Book as the food of the people of Paradise. He said, “And the meat of birds of that which they desire.” He preferred it also to vegetable foods when he said in Surat Al-Baqarah: “Do you exchange for what is lower” i.e., legumes, cucumbers and wheat And lentils “with what is good” i.e. manna and quail (quail), in addition to that, its biological value is higher than that of vegetable foods (Al-Fayyad and Naji, 1989).Chicken meat is one of the food sources rich in protein used in a rapid increase in the rate of people’s consumption of animal protein, and for this purpose it is mainly used for broiler

meat. Other types of poultry meat, especially white chicken meat, whose white and dark meat contain 24.9 and 23.2% protein, respectively, but the problem facing the consumption of laying hen meat is its low tenderness, as it is stiff and dry compared to broiler meat (Al-Ani, (1999) and Al-Kassar, 2010). The properties that characterize the individual units that are important in determining the degree of acceptance of the unit by the consumer, and regardless of the type of bird, the white and dark skeletal muscles have similar structural and chemical properties, all of which contain approximately 75% of their weight in water and 20% protein with quantities of varying amounts of fats, carbohydrates, and small amounts of soluble organic compounds (Ouali, 1999). These components play a role in the development of the different sensory properties of meat. Water plays a key role in the juiciness of meat, which has A role in the tenderness of meat, and the fat represented by the skin and the amount of fat underneath it has an important role in the development of each of the meat tissues, although the mechanism of this is unknown (Ouali, 1999), and the flavor of meat because the fat is the main source of most of the volatile compounds responsible for the flavor of meat (Al-Fayyad and Nagy, 1989 ; .perry, et.al.2015). Muscle proteins are divided into three groups according to their solubility in water and saline solutions (Pospiech et al., 2003). They are sarcoplasmic proteins, myofibrillar proteins, and connective tissue proteins. Tissue Proteins), as the first type constitutes about 30-34 percent of the total muscle proteins. These proteins are easily soluble in water and dilute saline solutions and include many proteins related to the quality of meat. Myoglobin and hemoglobin proteins give the red color to the muscles. ATPase enzymes, kinases and glycolytic enzymes within these proteins, which have a role in the development of the phenomenon of throwaway stiffness Asghar and Pearson, 1980; Jiang, 1998). As for the second type of proteins, they are myofibrils, which constitute 55-50% of the total muscle proteins. These proteins are characterized by being soluble in strong saline solutions and include thin and thick filament proteins, especially myosin and actin, which are responsible as a result of their overlap together. Regarding muscle stiffness, the connective tissue proteins constitute about 2-6% of the total muscle proteins and include collagen, elastin and reticulum proteins. Collagen is the most important in relation to the tenderness of meat of aged birds. Jiang, 1998, and (Xiang et al., 2014). The effect of feeding on freshness can be studied through two directions. The first is the use of Lathyrogen substances in poultry rations, which are also called Collagen dimming agents, and among these substances are Cyst amine and Thiosemicarbazide, which have an inhibitory effect on cross-bridge formation. They were used by Sekoguchi et al. (1978, 1979) in feeding laying hens at the age of 1.5 years. They noticed that the meat of birds fed on these two substances is tenderer than meat of birds that were not fed these substances, but their meat contains total and heat-stable collagen. More and these two substances led to an increase in the amount of collagen dissolved in acid and neutral salts (Sams (1990a).Klandorf et al. (1996) used amino guanidine (AG) in broiler mothers' diets, as they fed broiler mothers at 30 weeks of age on these diets for a period of 34 weeks. They noticed that adding this substance to the diets was 0, 200, 400 or 800. ppm led to a decrease in both the cross-links of collagen and the percentage of insoluble collagen, and the percentage of acid soluble collagen increased with the increase in AG concentration.

Iqbal et al. (1999) concluded that the toughness of the meat of aged birds and laying hens may be due to the accumulation of pentocidin in the meat, and this toughness can be reduced by rationing feeding or adding AG. The level of oxidative stress and glycation, which reduces the concentration of antioxidant enzymes, and AG leads to a decrease in the level of oxidative stress in broiler mothers. Exposing birds to stress factors such as excitement, heat, cold, flight, transportation and other factors (Ngoka et al., 1982) leads to a decrease in muscle pH and an increase in the breakdown of ATP and creating phosphate under anaerobic conditions. These conditions lead to Tissue stiffness (de Fremery and Pool, 1958), thus raising the hardness of meat containing a low concentration of ATP and a high concentration of lactic acid (Ali et al., 1999) and Al-Rubaie (2020). Some studies indicated that acute stress (Struggle)) has an effect on the rate of glycolysis, causing a decrease in the tenderness and quantity of meat (Khan and Nakamura, 1970; Ma et al., 1971), while no effect of stress on the tenderness was observed in other studies (Dodge and Stadelman, 1960; Ma and Addis 1973). Providing good environmental conditions such as temperature, good feed and a wide place for birds leads to an improvement in the tenderness and quality of meat. Landes et al. (1971) noted that stress and an increase in the temperature of the place led to a decrease in pH and a decrease in the level of glycogen and the susceptibility of meat to meat. Water retention and meat tenderness compared to low-GI chicken HD (broiler). Owens and Sams (2000) show that the process of transporting turkeys for 3 hours may cause stress to the birds, accelerating muscle metabolism to the point of depletion of glycogen in them, leading to a lowering of their pH, and this decrease in muscle content of glycogen is related With the increase in the cutting values of these muscles (Mellor et al., 1965) and the decrease in the length of the sarcomere (0Etherington et al., 199). Several studies and researches have been conducted for the purpose of estimating the effect of cold and hot heat stress before slaughter on the tenderness of meat and the glycolysis process in it. Simpson and Goodwin (1975) found that the cut-off values for the muscles of birds bred during autumn are lower compared to birds bred during spring, winter and summer seasons. In general, the effect of high temperature on freshness is greater than low temperature, and this was noted by Babji et al. (1982).) that meat of birds exposed to high temperature (38 ° C) before slaughter has a lower pH (5.99) compared to meat of birds exposed to low temperature. Note Petracci et al. 2001 the muscles of birds bred at 25°C were redder and softer than those raised at 29.5 or 34°C.

Materials and methods:

The chicken used in the experiment:

In this study, adapted red Lohmann and Lohmann laying hens were used, aged 8 months for laying hens and 4 months for broiler hens, with live weight between 1850-2,600 g, purchased from local markets. The birds were slaughtered manually (after five minutes of slaughter), then the carcasses were scalded with water at a temperature of 60 ± 2 H for two minutes and the feathers were removed using the feather removal machine.

Transactions and sampling method:

30 meat chickens were distributed on 3 weights (1300 gm, 1400 gm, 1500 gm) and 10 chickens per weight. After keeping the carcasses in the refrigerator for 24 hours, the cuts of the breast, thigh

and bone were separated from the carcasses, and the skin was separated. The skin, meat and bones of broiler chickens and laying hens were weighed and for each of the weights taken (1300 gm, 1400 gm and 1500 gm).Use an electronic scale arranged after the separator (1 g-5 kg) and a sensitive electronic scale two orders after the separator (0.01 - 400 grams) of Chinese origin to measure the weights of skin, meat, bones and the total weight of the chicken. Knives for normal uses (such as cutting meat, etc.) were also used to separate the skin, meat and bones

Statistical analysis:

The data of the first experiment were statistically analyzed using the ANOVA table and two ways (two way analysis) of the protein level and its source and using the ready-made statistical system SASS, 1986).The averages of the coefficients were compared according to Duncan's polynomial test at the 0.05 level of significance (Duncan, 1955). The independent averages were compared (Orthogonal comparison) according to the narrator and Khalaf Allah (1980).

Results and discussion:

The study showed that the percentage of skin in chickens is the lowest percentage of the weight of meat and bones compared to the total weight of the chicken. The results of the weights rates for skin, meat and bones in both broiler chickens and laying hens were clarified, as well as the percentages of weights taken (1300 g-1400 g-1500 g) in Table No. (1 and 2).The results in chickens indicated an increase in the weight of the skin and meat with an increase in the weight of the chicken, while the weights of the skeleton converged for all weights. The rates of skin weight with the percentage in the meat chicken for the weights taken are as follows (140 g, 148.25 g and 190.5 g) and percentages (12.7%) , 10.75 % 10.7%) and significant differences were found between total weights at a significant level p<o.o1) and the percentages of skin weight and percentage in laying hens for the weights taken were as follows (200 g, 241 g and 300 g) and percentages (20%, 17.21%, 15.38%) (Which confirms that the amount of skin in local laying hens is higher than that of broiler chickens with this feature, as the skin increases as the weight of the chicken increases at the expense of the meat. The results agree with (Al-Mashhadani, 2011). It was also noted that the percentage of meat weight rates In broiler chickens and laying eggs in the three weights (1300 g, 1400 g and 1500 g), where they were in broiler chickens (923 g, 981 g and 994.25 g) and in percentages (66.28%, 70.81%, 71.01%) and significant differences were found between the total weights At a significant level (p<o.o1) and in white (660 g, 680 g and 709 g) and in percentages (47. 26%, 48.57 %, 50.76 %) (and significant differences were found between the total weights at the level of significance p<o.o1)), and here it was found that there is an increase in the amount of meat in broiler chickens compared to laying hens. This may be due to the type of breed, feeding and age of the chicken. The results are consistent with Al-Mashhadani, 2011 and Thamer et al. (2017).The lower values of meat concentration in laying hens in this study than the values obtained from broiler chickens (Murphy et al., 1988; Warriss et al., 1988; Sams and Mills, 1993) may be due mainly to the species difference, as well as to the fact that The birds used in this study are egg-producing, perhaps the egg production process is one of the stressful factors for laying hens, which results in the consumption of a certain portion of glycogen, and the bird's age reduces the concentration of glycogen in the muscles. The difference in glycogen concentration in the

muscles of the chest and thigh may be due the difference between the type of fiber and the function of each muscle and its content of glycolytic enzymes (Ngoka et al., 1982). The collagen and the number of cross-bridges between its fibers, the main factor in the hardness of meat and the lack of water content and thus the lack of its quantity in laying hens, in contrast to broilers. The hardness of its meat is mainly due to the proteins of muscle fibers, as the hardness of its meat resulting from or related to the presence of collagen is of little importance because it is young in age, and the amount of collagen and transverse bridges in its meat is low (Dawso). n et al., 1991. The differences in the amount of collagen in the white and red muscles, where they are redder, may be due to the function of each muscle. It was observed from the autopsy that the quantities of meat in the chest for meat chickens are greater than the amount of meat in the thighs, as the thigh muscles have a lower moisture content than the chest muscles (Al-Baghdadi, 1997). The breast contains more protein that retains moisture (4.08 %) compared to thigh meat cuts that contain less protein and more collagen %), and the same results were observed by Fathi (2000) in his study on aged laying hens. For all weights, they were as follows (247.75 g, 263.5 g, 267.5 g), and the percentages were as follows (17.56%, 18.96%, 19.05%) and were less than laying hens, and the bone weight ratios were close in all laying hens weights and amounted to (300 g and 335). g and 370 g) and the percentages were as follows (24.66%, 23.92%, 23.07%) This may be due to the increase in the amount of lime and calcium in the ration used to feed local laying hens compared to broiler chickens whose protein amount is higher. The results agree with al-Mashhadani, 2011 and perry, et.al. (2015)) .

Table No. (1) shows the weight rates and percentages (gm/%) of skin, meat and bones in each of the weights of broiler chickens in the experiment.

weight rates Body parts totals (chicken weight)	Average skin weight and percentage of total weight	Average meat weight and percentage of total weight	Average bone weight and percentage of total weight
A 1300gm	140 gm 15± a 10.7 %	923.25 gm ± 40a 71.01 %	247.75 gm ± 18a 19.05 %
B140 gm	148.25 gm 20 ± b 10.75 %	981 gm ± 30b 70.81 %	261.25 gm ± 16b 18.96 %
C1500 gm	190.5 gm 28 ± c 12.7 %	994.25 gm ± 50c 66.28 %	263.5 gm ± 20c 17.56 %

There were significant differences between treatments A, B, and C at the level of significance ($p<0.01$), and there were significant differences between a,b,c at the level of significance ($p<0.01$).

Table No. (2) Shows the rates and percentages (g/%) of skin, meat and bones in each of the weights of laying hens in the experiment.

weight rates Body parts totals (chicken weight)	Average skin weight and percentage of total weight	Average meat weight and percentage of total weight	Average bone weight and percentage of total weight
A 1300gm	200 gm 10 ± a 15.38 %	660 gm20 ± a 50.76 %	300 gm40 ± a 23.07 %
B1400 gm	241 gm28 ± b 17.21 %	680 gm50 ± b 48.57 %	335 gm 30 ± b 23.92 %
C1500 gm	300 gm30 ± c 20 %	709 gm30 ± c 47.26 %	370 gm20 ± c 24.66 %

There were significant differences between treatments A, B, and C at the level of significance ($p<0.01$), and there were significant differences between a,b,c at the level of significance ($p<0.01$).

Sensory evaluation:

The high juiciness of thigh meat is attributed to the high percentage of fat that prevents the loss of more moisture and maintains the meat's moisture and juiciness (Al-Fayyad and Naji, 1989), and these results are consistent with the results of Al-Baghdadi (1997), who noted that there were significant differences in the tenderness of thigh and breast meat in chicken compared to In laying hens, while they differed from the results of Al-Alwani (2002), who noted the superiority of the softness of the chest muscles in three types of laying hens.In view of the fact that the general acceptance is the result of the common taste sensation of freshness, juiciness and flavor, which was in thigh meat more than breast meat in broilers, the general acceptance of thigh meat is less than breast meat in laying hens. It was also noted that the difference in the concentration of myoglobin pigment between white and dark muscles It may be due to the function and type of the dominant fibers in it, red muscle fibers are slow to contract and most of the energy pathways in them are aerobic, while white muscle fibers are fast contracting and depend on anaerobic glycolysis pathways to produce energy (Nishida and Nishida, 1985). In laying hens, chest muscles and skin were much greater than seen in broiler chickens, and for all treatments, it is an expected case in comparison. Part of these differences may be due to the difference in type and breeds (Pages and Plana, 1983; Al-Alwani, 2002), and the other part may be due to the different ages The birds used in these studies (Nishida and Nishida, 1985; Naveena and Mendiratta, 2001;Nishida and Nishida, 1985; Naveena and Mendiratta, 2001; Al-Alwani, 2002).

Conclusions:-

The difference in weight affects the proportions and weights of skin, meat and skin, and there are differences for the same weight between broiler chickens and laying hens. The amount of meat was the largest compared to the weight of the skin and bones in both broiler chickens and laying

hens. The largest percentage of bone weight was in laying hens compared to broiler chickens of the same weights.

Recommendations:-

A study of bone weight at the same age for broiler chickens and laying hens. A comparative study of bone lengths in broiler chickens and laying hens.

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