Abstract: This study was conducted to determine the effect of different levels of local concentrated protein extracted from slaughterhouse wastes on some carcasses traits of broiler. A total of 225 female broiler Ross 308 chicks, one day, were used, randomized distributed into five treatments, with three replicates per treatment (15 chicks each replicate). The treatments were as follows: T1; basal diet contains 4% imported protein. T2; basal diet contains 2% imported protein+2% local manufactured protein. T3; basal diet contains 4% local manufactured protein. T4; basal diet contains 6% local manufactured protein. T5; basal diet contains 8% local manufactured protein. The results showed that there were no significant differences between the treatments on the carcass weight, dressing percentage, relative weights of the thigh and breast, as well as the relative weight of the abdominal fat. There were no significant differences among all treatments for the sensory traits of the thigh and breast. In conclusion, the locally manufactured animal protein extraction had no negative significant effect on the characteristics of carcasses and could be used as an efficient alternative to imported protein concentration used in broiler diets.

Keywords: Local protein, Slaughterhouse wastes, Carcasses traits, Broiler.

Introduction

Nutrition constitutes 70% or more of the total cost of poultry production and has a direct impact on the production process. Therefore, special attention must be paid to nutrition (Abdelmageed, 2012). The feed components significantly affect the growth of meat and the productivity of laying hens, so the diet should contain all nutrients in a balanced way according to the needs of the bird (Puvadolpirod & Thaxton, 2000). The poultry industry is dependent on imported protein concentrates in Iraq, it is the main source of animal protein, vitamins, minerals and some feed additives in poultry diets, however, the high prices increase the production cost (Al-Athary, 2002). Thousands of tons of poultry waste are dumped annually,
like heads, legs, feathers and intestines, disposed of as waste or used as animal fertilizers, due to the availability of the waste in large quantities, it has become an environmental problem (Al-Tai, 2005). Therefore, some studies have tended to be used in the production of protein concentrates, involves the composition of animal diets, especially poultry and fish, modern technologies were used to convert these animal wastes into beneficial materials for animal feeding, and preserving the environment from the accumulation of these substances, and impact on public health (Ibrahim, 2000).

The researchers resorted to the use of chemical methods using acid, alkaline and salt, these methods were characterized by the short time of decomposition, cheapness and easy, in addition to enzymatic methods. There are a lot of studies that try to make a protein that competes with the imported protein, good progress has been made in this field, but there was no perpetuation of these actions (Ahmed et al., 2018; Frempong et al., 2019).

The aim of this study to manufacture a protein concentrate from the carcass waste (heads and legs), and add it into diets as an alternative to the imported protein concentrate, study the effect on some carcasses traits of broiler.

**Materials & Methods**

The study was conducted at poultry farm, Agriculture College, University of Basrah, from 11/11/2019 to 16/12/2019. A total of 225 female broiler Ross 308 chicks, one day old, 40 g weight were randomly distributed into five treatments, with three replicates per treatment (15 chicks each replicate). Chickens are bred in three-story cages with an area of 1 m² per cage. Provides appropriate conditions for rearing such as heat and ventilation, within the necessary limits, the chicks were fed on two types of diets, the first Starter diet (1-21 days) and the second the grower diet (22-35 days), as shown in table (1).

**Protein concentrate preparing**

Broiler heads and legs were collected from the poultry field slaughter house, Agriculture College, University of Basrah, and washed with water, chopped with an electric mincer, then was exposed to steam at 140°C for 50 minutes (Wiradimadja et al., 2014), the product was dried at 45°C and the resulting material was ground. After analyzing a sample of a protein content, to ensure chemical composition and amino acid content by using a device Amino acid Analyzer, according to the results of the laboratory examination reached, the protein composition was modified by mixing with the amino acid, vitamins and minerals (Wafi), according to the ratio 3 protein products + 1 Wafi mixture.

**Study traits**

Six birds per treatment were slaughtered randomly at 35 days of age to calculate the carcass weight and dressing percentage, and relative weight of carcass cuts were calculated according to the method mentioned by Zangana & Al-Mashhadani (2018). The relative weight of abdominal fat to body weight was estimate according to Al-Hummod (2016). Sensory tests for thigh and breast cuts were conducted according to the method described by Yang et al. (2007). The degree of the sensory evaluation were determined according to table (2).
Table (1): The composition of the diets used and chemical analysis during the starter and grower periods.

| Items                   | Treatments | Starter diet (1-21 days) | Grower diet (22-35 days) | Chemical Analysis |
|-------------------------|------------|--------------------------|--------------------------|-------------------|
|                         |            | T1          | T2          | T3          | T4          | T5          | Crude protein (%) | Metabolizable energy (kcal.kg⁻¹) |
| Maize                   |            | 42.5        | 42.7        | 42.7        | 42.7        | 42.2        |                |                                |
| Wheat                   |            | 18          | 18          | 18          | 18          | 18          |                |                                |
| Soybean meal            |            | 32          | 32          | 32          | 30          | 28.5        |                |                                |
| Imported protein conc.* |            | 4           | 2           | 0           | 0           | 0           |                |                                |
| Local protein conc. Manufactured** | | 0           | 2           | 4           | 6           | 8           |                |                                |
| PREMIXES***             |            | 1           | 1           | 1           | 1           | 1           |              |                                |
| Limestone               |            | 2           | 2           | 2           | 2           | 2           |                |                                |
| Plant oil               |            | 0.5         | 0.5         | 0.5         | 0.5         | 0.5         |                |                                |
| Total                   |            | 100         | 100         | 100         | 100         | 100         |                |                                |

Chemical Analysis

- Crude protein (%): 23.1, 23.1, 23.1, 22.9, 22.9
- Metabolizable energy (kcal.kg⁻¹): 2954, 2950, 2957, 2959, 2955

| Items                   | Treatments | Grower diet (22-35 days) | Chemical Analysis |
|-------------------------|------------|--------------------------|-------------------|
| Maize                   |            | 46.5                     |                  |
| Wheat                   |            | 18                       |                  |
| Soybean meal            |            | 27.5                     |                  |
| Imported protein conc.* |            | 4                        |                  |
| Local protein conc. manufactured | | 0                        |                  |
| PREMIXES***             |            | 1                        |                  |
| Limestone               |            | 1.5                      |                  |
| Plant oil               |            | 1.5                      |                  |
| Total                   |            | 100                      |                  |

Chemical Analysis

- Crude protein (%): 21.3, 21.3, 21.4, 21.1, 21.1
- Metabolizable energy (kcal.kg⁻¹): 3072, 3070, 3072, 3066, 3047

* The protein concentrate for broiler feeding (Brocorn-5 special W) produced by the company (Wafi B.V. Alblasserdam-Holland), chemical composition: 40% crude protein, 5% crude fat, 2.20% crude fiber, 7.10% Moisture, 28.30% crude ash, 4.20% Calcium, 4.65% Phosphorus, 2107 Met. energy (kcal/g).
** Local protein conc. manufactured, chemical composition: 42.79% crude protein, 8.69% crude fat, 2.7% crude fiber, 7.32% Moisture, 21.72% crude ash, 4.2% Calcium and 3% Phosphorus.
*** Premixes, chemical composition: 10% crude protein, 2.1% crude fat, 0.34% crude fiber, 2.66% Moisture, 51.02% crude ash, 20.08% Calcium, 10.83% Phosphorus, 753.82 kcal kg Met. energy (kcal.g⁻¹).

Statistical analysis

A Complete Randomized Design (CRD) were used, the significant differences between the means were compared with Least Significant Difference (LSD) test with a significant level (P <0.05), the SPSS program (SPSS, 2017) was used in statistical analysis and use the following mathematical model (yij = µ + ti + eij).
Table (2): Sensory evaluation of cooked breast and thigh meat traits (Hajem, 2018).

| Sensory evaluation menu |
|-------------------------|
| Degree | Evaluation | Degree | Evaluation |
| 9      | Excellent  | 5-6    | Moderate   |
| 8      | Very good  | 3-4    | Acceptable |
| 7      | Good       | 2-1    | Unacceptable |

| N. Sample | Colour | Flavor | Tenderness | Juiciness | General acceptance |
|-----------|--------|--------|------------|-----------|--------------------|
| 1         |        |        |            |           |                    |
| 2         |        |        |            |           |                    |
| 3         |        |        |            |           |                    |
| 4         |        |        |            |           |                    |
| 5         |        |        |            |           |                    |

**Results & Discussions**

Table (3) shows that no significant differences of the use of local manufactured protein concentrate on the carcasses traits (carcass weight, dressing percentage, relative weight of main cuts and abdominal fat).

The results agreed with Sahraei *et al.* (2012), indicated that there were no significant differences on the carcasses weights and the relative weight of the main cuts (breast and thigh) when used the poultry slaughterhouse waste powder as a source of protein into broiler diets in ratios (30, 60 and 90 g.kg⁻¹ feed⁻¹). While the results were not agreed with those of Ahmed *et al.* (2018), indicated improve in the carcass weight, dressing percentage and main cuts weight, when they use slaughterhouse wastes as a protein concentrate in broiler diets, T4 (15% slaughterhouse wastes) was a significant increase (P<0.05) in carcass weight, while the dressing percentage and weights for breast and thigh were better at T3 (10% slaughterhouse wastes).

The result agreed with that of Abiola *et al.* (2012), they concluded that there were no significant differences in the relative weight of abdominal fat, when they replaced fish meal with poultry hatching powder in broiler diets. However, Sahraei *et al.* (2012), observed a significant differences (P<0.05) in the relative weight of abdominal fat between a control and
Table (3): The effect of different level of the local protein concentrate manufactured on some carcasses traits of broiler (Mean± SE).

| Treatments | Traits     | Body weight (g) | Carcass weight (g) | Dressing percentage (%) | Relative weight of thigh (%) | Relative weight of breast (%) | Relative weight of abdominal fat (%) |
|------------|------------|-----------------|--------------------|-------------------------|-----------------------------|-------------------------------|-------------------------------------|
| T1         |            | 1782.30±1.85 a  | 1261.00±2.1 a      | 70.74±0.04 a            | 20.90±0.87 a                | 37.74±1.30 a                 | 0.51±0.04 a                        |
| T2         |            | 1780±1.73 a     | 1255.00±1.51 a     | 70.50±0.20 a            | 20.57±1.42 a                | 37.68±1.41 a                 | 0.50±0.05 a                        |
| T3         |            | 1778±2.08 a     | 1264.00±2.08 a     | 71.08±0.19 a            | 21.22±1.10 a                | 39.32±0.76 a                 | 0.49±0.02 a                        |
| T4         |            | 1779±2.06 a     | 1256.70±3.33 a     | 70.69±0.19 a            | 21.34±1.29 a                | 39.91±0.48 a                 | 0.50±0.03 a                        |
| T5         |            | 1790±0.57 a     | 1261.00±5.68 a     | 70.88±0.30 a            | 22.41±0.92 a                | 38.91±0.85 a                 | 0.51±0.02 a                        |

T1: basal diet contains 4% imported protein. T2: basal diet contains 2% imported protein+2% local manufactured protein. T3: basal diet contains 4% local manufactured protein. T4: basal diet contains 6% local manufactured protein. T5: basal diet contains 8% local manufactured protein.

Treatment of the slaughterhouse wastes broiler diets. Tables (4 and 5) were showed that the effect of using different level of the local protein concentrated manufactured on the sensory traits of the breast and thigh cuts of broilers. There is no significant differences between the local protein concentrated manufactured and imported protein concentrate on colour, flavor, tenderness, juiciness and general acceptance of the cuts of breast and thigh. We can conclude it has no significant differences of the use of local protein. The present results are similar to those of Eyng et al. (2013), when they used tilapia powder (fish meal) as a source of protein of different levels in broiler diets as their results showed that adding tilapia powder to diets in ratios 2, 4, 6 and 8% had no effect on the sensory characteristics (aroma, flavor, colour, texture and whole quality) of the thigh and breast meat, while the results were not agreed with results of Al-Hummod & Mohsen (2019).

Table (4): The effect of different level of the local protein concentrate manufactured on sensory traits of breast cut (Mean± SE).

| Treatments | Colour   | Flavor   | Tenderness | Juiciness | General acceptance |
|------------|----------|----------|------------|-----------|--------------------|
| T1         | 7.33±0.33a | 7.50±0.29a | 6.86±0.67a | 7.13±0.13a | 6.90±0.29a         |
| T2         | 7.33±0.37a | 7.50±0.29a | 6.83±0.33a | 6.95±0.58a | 7.00±0.58a         |
| T3         | 7.67±0.33a | 7.33±0.88a | 6.77±0.33a | 7.67±0.67a | 7.17±0.17a         |
| T4         | 7.66±0.67a | 8.00±0.29a | 6.73±0.67a | 6.98±0.52a | 6.92±0.00a         |
| T5         | 8.00±0.57a | 7.67±0.67a | 7.00±0.25a | 7.33±0.33a | 7.07±0.23a         |
Table (5): The effect of different level of the local protein concentrate manufactured on sensory traits of thigh cut (Mean± SE).

| Treatments | Colour  | Flavor  | Tenderness | Juiciness | General acceptance |
|------------|---------|---------|------------|-----------|-------------------|
| T1         | 7.33±0.33a | 8.00±0.00a | 7.67±0.33a | 7.67±0.33a | 8.00±0.30a         |
| T2         | 8.00±0.58a | 8.33±0.33a | 6.94±0.29a | 8.00±0.58a | 8.00±0.38a         |
| T3         | 8.16±0.60a | 7.83±0.44a | 6.96±0.33a | 7.67±0.16a | 8.17±0.44a         |
| T4         | 7.33±0.33a | 7.67±0.33a | 7.50±0.29a | 7.67±0.33a | 7.67±0.17a         |
| T5         | 7.33±0.33a | 8.33±0.14a | 7.67±0.33a | 7.50±0.28a | 7.50±0.28a         |

which showed a significant differences (P≤0.05) in the flavor of quail meat fed on a diet containing protein concentrate made from feathers compared to quail meat fed on a diet containing commercial protein concentration.

The local manufactured protein were similar to the results of the imported protein. Also, the absence of significant differences between control and other experimental treatments for the mentioned characteristics, indicates that the processed protein is not less efficient than the imported, to complete the birds' requirements from essential amino acids, in proportion to the different supplies of the body, whether in growth, production, or formation of hormones and enzymes that have important vital functions in the body.

Conclusions

In conclusion, the locally manufactured animal protein extraction had no negative significant effect on the characteristics of carcasses and could be used as an efficient alternative to imported protein concentration used in broiler diets.

Acknowledgments

We thank the team of laboratory of Poultry Technology, College of Agriculture, University of Basrah and all who helped us in this work.

Z. Al-Mhsenawi: https://orcid.org/0000-0003-4706-0951
M. Alasadi: https://orcid.org/0000-0001-5875-7485
Q. Al-khfaji: https://orcid.org/0000-0001-8347-230X

References

Abdelmageed, M. A. A. (2012). Effect of dietary humic substance supplementation on performance and immunity of Japanese Quail. *Egyptian Poultry Science Journal*, 12, 615-660.
Al-Mhsenawi et al. / Basrah J. Agric. Sci., 34(1): 60-66, 2021

https://www.semanticscholar.org/paper/EFFECT-OF-DIETARY-HUMIC-SUBSTANCES-SUPPLEMENTATION-Abdelmageed/11d06702f3404acb1b4de8fc4085ec7773df9baf

Al-Athary, A. K. (2002). Prepare mixtures of vitamins and rare minerals precooked locally (premix) and protein concentrates locally and use them in broiler rations. Journal Abaa of Agricultural Research, 12, 42–48. (In Arabic).

Abiola, S. S., Radebe, N. E., Westhuizen, C. V. D., & Umesiobi, D. O. (2012). Whole hatchery waste meal as alternative protein and calcium sources in broiler diets. Archivos de Zootecnia, 61, 229-234. http://scielo.isciii.es/pdf/azoo/v61n234/art7.pdf

Ahmed, S., Uddin, M. J., Islam, M. A., & Haque, M. E. (2018). Effect of graded levels of slaughter house residues on growth performance and hematological parameters in Broiler Chicken’s Ration. Asian Research Journal of Agriculture, 9, 1-8. http://doi.org/10.9734/ARJA/2018/41409

Al-Hummod, S. K. M. (2016). The effect of lighting systems and temporal feed restriction on some productive, physiological and reproductive traits of Japanese quail. Ph. D. Thesis, College of Agriculture, University of Basrah, 225pp. (In Arabic).

Al-Hummod, K. M., & Mohsen, S. B. (2019). Comparison of different types of protein concentrate in female Japanese quail diets and study their effect on production and sensory characteristics. Basrah Journal of Veterinary Research, 18, 56-66. https://www.iasj.net/iasj/download/16f91db9f7bf1bc6

Al-Tai, M. A. J. (2005). Food and drug products from fish and shrimp and their offal. Marina Mesopotamica, 20, 157-170. (In Arabic). https://www.iasj.net/iasj?func=fulltext&aId=51444

Eyng, C., Nunes, R. V., Pozza, P. C., Murakami, A. E., Scherer, C., & Schone, R. A. (2013). Carcass yield and sensorial analysis of meat from broiler chicken fed with tilapia byproducts meal. Ciência e Agrotecnologia. 37, 451-456. https://doi.org/10.1590/S1413-70542013000500009

Frempong, N. S., Nortey, T.H. N. N., Paulk, C., & Stark, C. R. (2019). Evaluating the effect of replacing fish meal in broiler diets with either soybean meal or poultry by-product Meal on broiler performance and total feed cost per kilogram of gain. Journal of Applied Poultry Research, 28, 912–918. http://dx.doi.org/10.3382/japr/pfz049

Hajem, M. H. A. (2019). Effect of the use of dried yoghurt as a (locally manufactured) and compared with imported probiotics in the some characteristics of productive, physiological, immunological and digestive of broiler. Submitted to the Council of the College of Agriculture University of Basrah, In Fulfillment of the Requirements for the Degree of Doctor Philosophy in Animal Production. Ph. D Thesis, College of Agriculture, University of Basrah, 171pp. (In Arabic).

Ibrahim, I. K. (2000). Poultry Feeding. Book House for Printing and Publishing, University of Mosul. 311pp. (In Arabic).

Sahraei, M., Lootfollahian, H., & Ghanbari, A. (2012). Effect of poultry by product meal on performance parameters, serum Uric acid concentration and carcass characteristics. Iranian Journal of Applied Animal Science, 2, 73-77. http://ijas.iaurasht.ac.ir/article_514336_1c11af8dad674fb46f0c6ae08fa87a5c.pdf

SPSS, Statistical Package for the Social Sciences (2017). Quantitative Data Analysis with IBM SPSS version 25: A Guide for Social Scientists.

Puvadolpirod, S., & Thaxton, T. P. (2000). Model of physiostiocal stress in chickens: 1-Response parameters. Poultry Science, 79, 363-369. https://doi.org/10.1093/ps/79.3.363

Wiradimadja, R., Rusmana, D., Widjastuti1, T., & Mushawwir, A. (2014). Chicken slaughterhouse waste utilization (chicken feather meal treated) as source of protein animal feed ingredients in broiler chickens. Intitifice-Seria Zootechnie, 62, 120-124. https://pdfs.semanticscholar.org/3234/141df2e570a5a b65871a4e974d89f3af172.pdf

Yang, H.-S., Choi, S.-G., Jeon, J.-T., Park, G.-B., & Joo, S. T. (2007). Textural and sensory properties of low fat sausages with added hydrated oatmeal and tofu as texture-modifying agents. Meat Science, 75, 283-289. https://doi.org/10.1016/j.meatsci.2006.07.013
تأثير استخدام نسب مختلفة من المركز البروتيني المصنع محليا من مخلفات المجازر في بعض صفات ذبائح فروج اللحم

محمود فهيد فهيد ومجدي حسن عبد الراشد الاسدي و قتيبة جاسم غني الخفاجي
قسم علوم الحياة، كلية التربية للعلوم الصرفة، جامعة المثنى، العراق
قسم الانتاج الحيواني، كلية الزراعة، جامعة البصرة، العراق

المستخلص: اجريت هذه الدراسة بهدف معرفة تأثير استخدام المركز البروتيني المصنع محليا في بعض صفات ذبائح فروج اللحم. استخدم في التجربة 252 فرخ فرخ (اناث) بعمر يوم (سلالة 308-1) وزعت الافراخ عشوائيا على خمس معاملات و بواعق ثلاثة مكررات (15 فرخ/ مكرر). وكانت معاملات التجربة كالاتي: المعاملة الأولى (السيطرة T1): الافراخ فيها علبة تحتوي 4% بروتين مستورد، المعاملة الثانية (T2): الافراخ فيها علبة تحتوي 2% بروتين مستورد + 2% بروتين مصنع، المعاملة الثالثة (T3): الافراخ فيها علبة تحتوي 4% بروتين مصنع، المعاملة الرابعة (T4): الافراخ فيها علبة تحتوي 6% بروتين مصنع، والمعاملة الخامسة (T5): استخدام علبة تحتوي 8% بروتين مصنع. أظهرت النتائج انعدام الفروق المعنوية بين معاملات التجربة في وزن الذبيحة، نسبة التصافي، الاوزان النسبية لقطعيات الفخذ والصدر فضلا عن الوزن النسبي لدهن البطن. أما فيما يخص الصفات الحسية لقطعيات الفخذ والصدر لم تكن هناك أي فروق معنوية بين جميع المعاملات. نستنتج من هذه الدراسة أن المركز البروتيني الحيوي المصنع محليا لا يمكن له تأثير معنوي على صفات الذبائح وبالإمكان استخدامه كبديل كفوء للمركبات البروتينية المستوردة والمستخدمة في علاطى الفروج.

الكلمات المفتاحية: البروتين المحلي، مخلفات المجازر، صفات الذبائح، فروج اللحم.