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Article

Comparison of chemical and Sensory Characteristics of meat betties produced from three types of ducks: Muscovy, Pekin and Molar

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ABSTRACT

This study was conducted in the Animal Production department of the Agriculture College University of Karbala to compare three types of duck meat bred in the animal fields of the College (*Muscovy - Mollar - Pekini*). The slaughter was carried out in the fields of the college, and only the breasts were taken for each sample of the three species. They were minced in a home mincing machine and kept in polyethylene bags until physical and sensory tests were performed on duck meat and compared between them. The moisture content of *Molar*, Muscovy, and Pekin ducks was 74%, 73% and 56%, respectively. Results showed a higher fat content in Pekin meat, 36%, than the other two kinds of duck meat, Muscovy and molar meat, 23% and 24%, respectively, While *Pekin* meat had a low protein content of 14.8%. Muscovy and mular were 18% and 17% respectively. There was a positive direct correlation between the properties of protein and fat, which indicates that both the content of protein and fat are present at a very close level for Muscovy and molar meat. This indicates the superiority of these two types and the possibility of using them to manufacture meat and meat products. Despite the few differences between the studied samples, the burger manufacturing results of the three models showed the possibility of using these meats in the manufacture of meat and meat products.

Keywords: Sensory and chemical composition; Muscovy duck 1; Molar 2; Pekin duck.

INTRODUCTION

Duck breeding projects spread in different parts of the world, which is a food source. It is one of the best types of meat. It is believed that ducks were domesticated more than 200 years ago And that the production of commercial ducks began a long time ago in China. Given the steady increase in the world's population, it is necessary to provide more animal protein. Therefore, the interest in duck production will form a tributary in this direction: [1.] The main breeds for meat production of ducks are Muscovy, Aylesbury, Pekin and Rouen. Various crosses have taken place between these four pure breeds. Most ducks commercially produced for meat in Australia are Pekin/Aylesbury crosses, often Pekin 2. Molar ducks are produced by mating two types of ducks, the Muscovy and the Pekinese duck. The duration of its cycle is different from the rest of the species. Molar ducks eat (8-10) kilos of feed per cycle[3]. Molar ducks are characterized by their strong immunity and the ability to withstand weather fluctuations. The duration of its cycle is short, ranging from (60-70) days. Muscovy ducks originally

belong to Mexico, Central America, and South America and are called the Great Wood Duck or the Forest Duck.
Females weigh between 3-4 kg, 1- Adult individuals of Muscovy ducks (males and females) are characterized by a fleshy body, a broad chest and a face covered with a rough layer of red skin, and there is a fleshy swelling at the base of the beak. Muscovy ducks are one of the best meat-producing waterfowl, and the period of fattening them ranges between 12-18 weeks, depending on the required weight. The Pekinese duck: An American breed of domesticated duck bred mainly for meat, brought to the United States from China in the nineteenth century and bred in many parts of the world. Chinese type, but has a different breed. Pekin duck features:- 1. Cheapest price for Pekinese chicks, 2. Strong immunity, higher than all types of ducks, 3. Fast conversion efficiency,4. It bears cold temperatures and fluctuating environmental conditions [5]. It is a rich source of protein: The protein content of duck meat is one of its most critical nutritional aspects, as the amount of proteins contained in 100 grams of duck meat may cover approximately 23% of the recommended daily intake of proteins [6] in addition to being high in proteins. Quality contains various essential and non-essential amino acids. It is also a good source of vitamins and minerals: ducks contain a variety of micronutrients, such as Iron and Selenium, essential types of antioxidants that enhance the health of the immune system by helping to reduce cell damage and fight infection. Duck meat also contains small amounts of vitamin C, a group of B vitamins, While it is rich in vitamin B3, which plays a vital role in the metabolism of fats and proteins and the conversion of carbohydrates into glucose, in addition to a high amount of vitamin B12, which is an essential element in the function of nerves, and in the formation of red blood cells and the substance body genetics[7].
This research aims to compare the physical, chemical, qualitative and sensory characteristics of the meat of the three types of Muscovy, Pekinese and Molar ducks and to know the extent to which the consumer accepts cooked burgers from the meat and its production of these species.

MATERIALS AND METHODS

The Materials and Methods should be described with sufficient details to allow others to replicate and build on the published results. Please note that the publication of your manuscript implies that you must make all materials, data, computer code, and protocols associated with the publication available to readers. Please disclose any restrictions on the availability of materials or information at the submission stage. New methods and protocols should be described in detail, while well-established methods can be briefly described and appropriately cited.

1. Preparation of raw duck meat.

Thirty male ducks (10 in each group) were used for comparison. The birds were raised in the animal field of the Department of Animal Production at the College of Agriculture, University of Karbala. The birds were slaughtered by the professors working in the field; meat from bird breasts was taken for study chemical analysis. Samples were stored in airtight polyethylene bags and placed in the refrigerator at -20°C Until it gets tested.

*2. Chemical Analysis of Duck Meat***.**

Moisture, Protein and Fat on minced meat were studied according to the method. The moisture content was determined using the air oven drying method. Protein content was analyzed using the Kjeldahl method, and the Soxhlet method in[9] determined fat content.

3. Preparing and cooking the burger product batties

Burgers were made from 3 different types of fresh meat, Pekin, Molar, and Muscovy, that was slaughtered in the animal production department at the agriculture college, Kerbala University. The frozen minced duck meat was thawed inside the chiller at 4 -7°C for 10 h before burger production. The chilled minced meat formula includes

The cooking method used followed[10]. Each burger was cooked (griddled) on a hot plate (Tefal Plancha, Groupe SEB, Canohès, France) for 10 min at medium heat. Both sides of the burger were cooked and flipped for a few minutes until a well-done cooked burger was obtained and a minimum internal temperature of 75°C was reached[11].

4. Evaluation of cooked burger batties

The sensory evaluation of the burger product was carried out by the Department of Animal Production / College of Agriculture assessors who have experience in this field, according to the sensory evaluation form in Figure 1, for color, flavor, tenderness, and general acceptance[12]. Added a quantity of ground spices to manufacture burgers, at 0.5% for each amount.

Degree	general acceptance	Tenderness	Flavor	Color
1	Unacceptable	Very light	Unacceptable flavor	hard
2	Low acceptable	Light	Low flavor	Semi-soft
3	Middle acceptable	Acceptable	Middle flavor	Middle tender
4	Acceptable	dark	Strong flavor	Soft
5	Very acceptable	Very dark	Very strong flavor	Very soft

Table 1. Form of Sensory evaluation form for burger samples (the Iraqi standard maintenance 1580 (1990).

Statistical analysis: It used the statistical program SAS (2012)[13].

RESULTS

Chemical composition of duck meat

Table 2 shows that the meat of (Muscovy molar) ducks has a little more protein than the (Pekin) ducks, 18% and 17%, respectively, against 14.8%. At the same time, Peking duck meat has a higher fat content of 36% compared with the meat of Muscovy and Molar ducks (23 and 24%). These results agreed with found protein, 15,18.5,17.3 respectively, fat content was 35, 23.4 and 24.3, and moisture was 49.4,56.6 and 55.8 for Pekin, Muscovy and Molar.

It was also found from Table 1 that. The significant decrease in the moisture content of the Pekin duck meat ($P< 0.05$) was 53%, compared to the Muscovy duck and Molar's 60% and 61%, respectively.

Duck breed	Protein%	Fat%	Moisture%
The Pekin	14.8±0.05	36 ± 0.33	53±1.85
The Muscovy	18.0±0.33	23±0.57	60 ±0.88
The Molar	17.0±0.33	24± 0.57	61 ±0.57
LSD	0.9489	1.762	4.2643
Significant level	0.05	0.05	0.05

The data represent the average of duplicate

Table 2. Chemical composition of duck meat.

Sensory evaluation of raw muscles

From Table 3 and Figure 1, we have noticed no significant differences between the three samples regarding flavor, as all types of meat were characterized by a good flavor and an acceptable smell by those who evaluated the meat. The same table indicates a significant decrease in Pekinese duck meat (semi-hard) tenderness compared with Molar duck meat and Muscovy (very soft and soft), respectively.

Duck breed	Tenderness	Flavor	Color	acceptable
The Pekin	Semi-hard	Good	Pink-red	Good
The Muscovy	Soft	Good	Light red	Good
The Molar	very soft	Good	Dark red	Good

Table 3. Sensory evaluation of raw muscle meat.

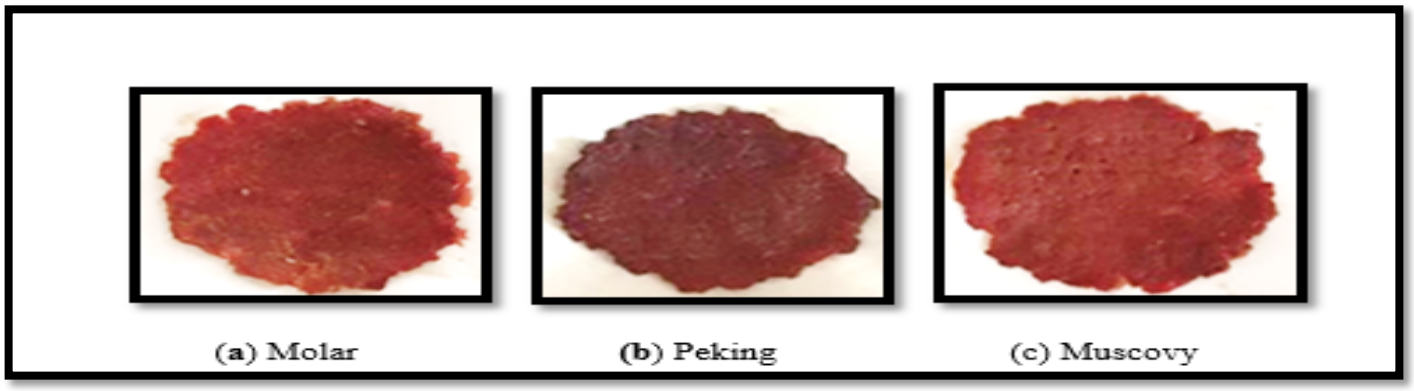

Figure 1. (a) (b) (c) Color of raw duck's meat.

Sensory and qualitative tests of cooked duck meat burgers

Table 4 shows that the texture test of Pekin and Molar cooked burgers was significantly more complex than Muscovy burger meat ($P < 0.05$). The Muscovy burger samples had higher softness and chewiness than other samples.

Duck breed	Flavor and aroma	Texture	Color	Acceptable
The Pekin	Like	higher hardness	Brightness	Like
The Muscovy	Like	higher hardness	Brightness	Like
The Molar	Like	Softness	Brightness	Like

Table 4. Sensory and qualitative tests of cooked duck meat burgers.

Figure 2. The burger is made from duck meat samples.

Statistical correlations between the chemical content of duck meat

From the statistical correlation analysis of the results in Figure 3, it noticed that there is an inverse correlation between the characteristic of fat and protein in the meat of Pekin duck, which means when the % of the protein in the meat increases, it leads to a decrease in the percentage of fat compared to the statistical results in Figure 5 and 6 for Muscovite ducks and Molar ducks. It was found that there is a positive direct correlation between the properties of protein and fat, which indicates that both the content of protein and fat are present at a very close level for Muscovy and Molar meat. This suggests the superiority of these two types and the possibility of using them to manufacture meat and meat products.

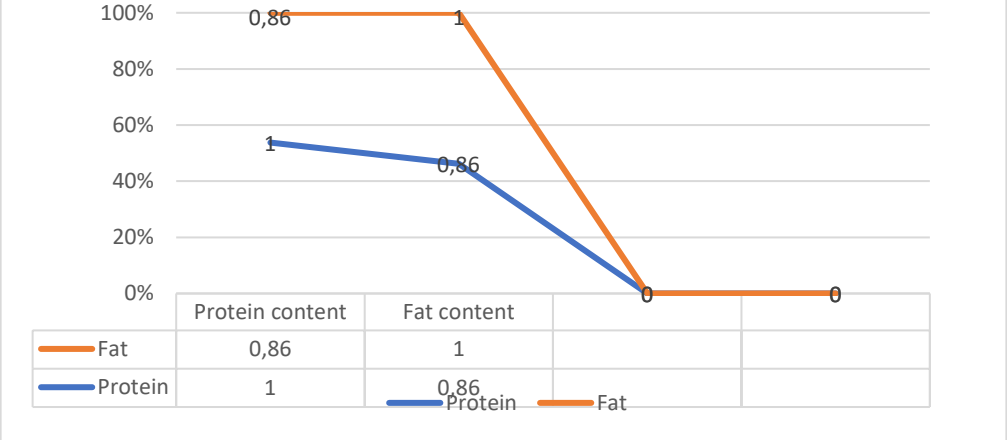

Figure 3. Statistical correlations between the chemical characteristics of Pekin duck meat

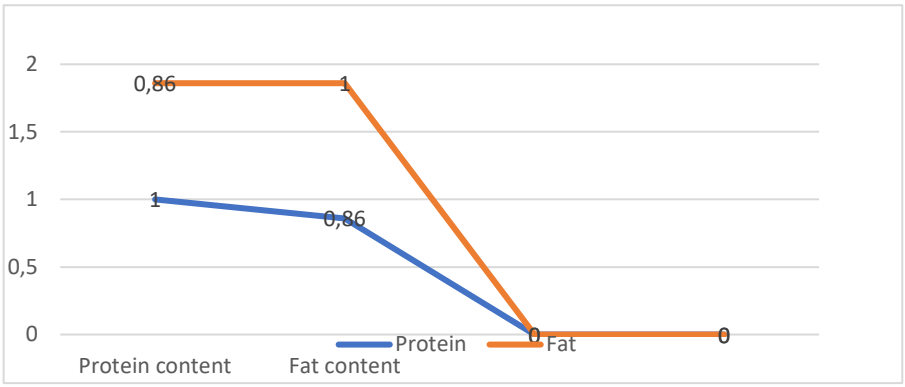

Figure 4. Statistical correlations between the chemical characteristics of The Muscovy duck meat

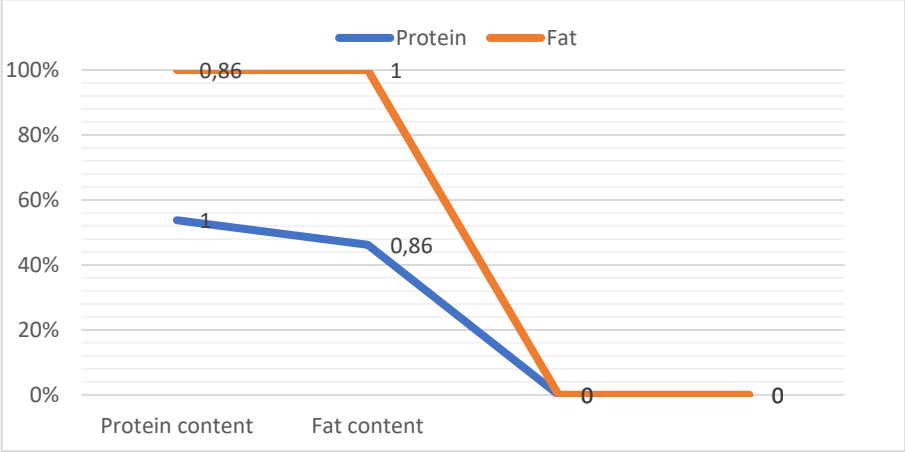

Figure 5. Statistical correlations between the chemical characteristics of The Molar duck meat.

DISCUSSION

As shown in Table 1, the decrease in moisture levels in Pekin samples may be due to genetic factors or the different types of ducks. The results in the same table found that a significant difference in fat content in raw duck meat (P< 0.05) was 36% for the Pekin duck meat compared to Muscovy and Molar, which was 23% and 24%, respectively.

This difference in Table 2: may be attributed to the lower moisture content of Pekinese duck meat. Sensory scores of palatability factors such as visual color, tenderness and acceptance of duck meat were determined by trained taste panelists who scored the duck meat using the sensory evaluation, also known as the affective test method[6] Determination of color parameters. It was found that the Molar duck meat had a redness color and was darker than Pekin, which was pink, and Muscovy duck meat was light red.

However, all samples were distinguished by a red color acceptable to the consumer. These results agreed with [14]. the reason for these differences is due to the different types of ducks. The myosin protein is considered to be in charge of the red color in the meat, as the myoglobin is entered into the blood circulation and the remaining of it enters into the cellular tissue and gives the purple color when the myoglobin is mixed, a compound called oxyglobin is found in the blood. It is possible to have a small amount of it in The tissue after the slaughtering process, the animal's color, its type, gender, and the type of food[15].

These results in Table 3 agree with our previous results for cooked duck's meat burger[16]. It is found in Table 3. Figure 3 (a, b, c), samples of the cooked burger were distinguished by a shiny brown color; it was difficult for the panelists to discern the difference between the colors in this study because the product's color was very similar. As for the flavor of the products, the burger produced from Muscovy duck meat was better in terms of flavor and aroma than other samples. Panelists preferred flavor and overall acceptability. These results are in concordance with [16].

In general, for all samples, burgers made from duck meat had a high-fat content, and the sensory properties of the burger had material approached those of burgers made of chicken. Investing these results in the possibility of using duck meat under study to manufacture meat products by producing meat and meat products from the different ducks raised in Iraq is possible.

CONCLUSIONS

The study investigated the physicochemical and sensory properties of duck meat and duck meat burgers produced from three different duck breeds (Pekin, Muscovy, and Molar) raised in Iraq. The results revealed

significant moisture, fat content, and color differences among the duck breeds. Pekin duck meat had lower moisture and fat content than Muscovy and Molar duck meat. The cooked burger samples from all three duck breeds had a similar shiny brown color, and the panelists preferred the flavor and overall acceptability of the burger produced from Muscovy duck meat. The high-fat content and sensory properties of the duck meat burgers suggest the potential for using duck meat to manufacture meat products.

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Data Availability Statement: All data is available by the first author**.**

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