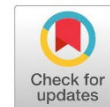


Research Article

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Libyan local pigeon: Preliminary description of meat characteristics

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Abstract: Pigeon is one of the potential alternative poultry species for meat production. Meat characteristics of Libyan local pigeon have not been previously described. The current study aimed to describe the characteristics and chemical composition of Libyan local squab carcasses. The study was conducted on six chicks of Libyan local squab (28 – 40 days old). The birds were deprived of food and water for 12h and weighed (live body weight). The birds were slaughtered and scalded in hot water (85°C) immediately after bleeding and carcasses were eviscerated and weighed. The mean live body weight and eviscerated carcass weight of birds were 283.38 and 207.81g, respectively. The dressing percentage of squabs was 73.36%; the breast and leg (thigh + drumstick) represent the highest cuts: 34.91% and 5.82% of carcass weight, respectively. Meat to bone ratio in breast, thigh, wing and back cuts was 10.55, 5.49, 3.12 and 3.16, respectively. Squab meat content of moisture, crude protein, crude fat and ash were 67.01, 21.72, 8.78 and 1.19 %, respectively. Based on the results obtained from the present study, Libyan local pigeon meat can be considered as one of the potential alternative poultry meat in the local meat market.

Keywords: Component; Formatting; Style; Styling; Insert (3-6 words)

الحمام المحلي الليبي: وصف مبدئي لخصائص اللحم

المستخلص: يعد الحمام أحد أنواع الدواجن البديلة الممكنة لإنتاج اللحوم. خصائص الذبيحة في فراخ الحمام المحلي الليبي لم يتم توصيفها من قبل. تهدف هذه الدراسة إلى وصف مبدئي لخصائص ذبيحة فراخ الحمام المحلي وتركيبها الكيميائي. أجريت الدراسة على ستة فراخ من سلالة الحمام المحلية الليبية تتراوح أعمارها بين (28-40 يوماً). منعت الطيور من الطعام والشرب لمدة 12 ساعة ووزنت (الوزن الحي)، ثم ذبحت ونزع ريشها باستخدام ماء ساخن (85 درجة مئوية) وأزيلت أحشاءها الداخلية وسجل وزن الذبيحة. بلغ متوسط الوزن الحي ووزن الذبيحة المنزوعة الأحشاء 283.38 و 207.81 جرام، على التوالي. كانت نسبة التصافي 73.36%. يمثل الصدر والرجل (الفخذ + عصا الطبال) أعلى القطعيات: 34.91% و 5.82% من وزن الذبيحة، على التوالي. كانت نسبة اللحم إلى العظم في قطعيات الصدر والفخذ والجناح والظهر 10.55 و 5.49 و 3.12 و 3.16 على التوالي. كان محتوى لحم الفراخ من الرطوبة والبروتين الخام والدهن الخام والرماد 67.01 و 21.72 و 8.78 و 1.19%، على التوالي. بناءً على النتائج المتحصل عليها من الدراسة الحالية، يمكن أن يشكل لحم الحمام أحد أنواع لحوم الدواجن البديلة في سوق لحوم الدواجن المحلي.

الكلمات المفتاحية: حمام، ذبيحة، لحم



INTRODUCTION

Meat consumption in developing countries has been continuously increased (Delgado, 2003). Intake of protein derived from animal origin represents only 27% of protein consumption in Libya (FAO, 2005) versus 62% in the United States of America (Pasiakos, 2015). This leads to a growing interest in meat from alternative animal species like ostriches, ducks, rabbits and pigeons to fulfil this gap. World production of poultry meat has been rising because of relatively low price compared to other meat types (Scanen, 2007). Squab meat is excellent and is considered, in comparison to poultry meat, what veal is to beef (Parkhurst & Mountney 1988). The main primal cuts of the poultry, particularly pigeon: breast and leg muscles have healthy fatty acid profile, with a high content of polyunsaturated fatty acids (Pomianowski et al., 2009). The purpose of pigeon breeding was according to three categories: sports pigeons, ornamental pigeons, and utility (meat type) pigeons (Fekete et al., 1999; Al-Agouri et al., 2021). In Libya, pigeons are mainly raised in rural areas with an increased number of urban breeders of sports and ornamental pigeon exotic breeds. The limited availability of pigeons, the absence of the tradition of consuming pigeon meat, in addition to the relatively high price of pigeon squabs compared to broiler chickens, has made pigeon meat less popular in Libya in similar to the situation in other countries like Poland (Kokoszyński et al., 2013). China is the largest producer of meat pigeons with 80% of global production and annual production of about 680 million pigeon squabs (Jiang et al., 2019). Pigeon meat is obtained by slaughtering young squabs at 28–30 days of age (Dal Bosco et al., 2005). Pigeon meat contains 66.52-76.23% of water, 21.73-23.61% of protein, 1.54-7.07% of fat and 1.05-1.48% of ash (Dal Bosco et al., 2005; Pomianowski et al., 2009; Abdel-Azeem et al., 2016). Breed (Pomianowski et al., 2009), diet (Liu et al., 2006) and age (Bu et al., 2018) are principal factors of variation in meat chemical composition.

Information about the productive and reproductive performance of Libyan local pigeon was previously described (Akraim & Jadallah 2021; Akraim et al., 2022). However, information about their carcass characteristics is not available. Therefore, the objective of the current study was to provide preliminary information on the proximate components and carcass traits of Libyan local squab meat.

MATERIALS AND METHODS

Birds, slaughtering and preparation of pigeon squab carcass

A total number of six birds of Libyan local pigeon squabs (aged 28-40 days), were obtained from the Animal Production Department's experimental house, a College of Agriculture at Omar Al-Mukhtar University. Their parents received a pelleted ration composed of corn, wheat, and soybean meal (Table 1). Housing and management of birds were previously described (Akraim et al., 2022).

Table:(1). Ingredients and chemical composition of total mixed ration

Ingredients %		Chemical composition %	
Corn	66	DM	88
Wheat	10.50	Crude protein	15.5
Soybean meal	18.60	Crude fiber	2.71
Dicalcium phosphate	1.20	Ether extract	3.88
Limestone	2.40	Ash	1.00
Salt	0.30	Soluble carbohydrate	76.1
Vit-min complex	1.00		

After collection, the birds were fasted for 12 hours, weighted (live weight), and slaughtered according to local practice, where halal necks were cut. Then they were immediately hoisted to permit

thorough bleeding. Scalding was done in hot water (85C°) immediately after bleeding. The carcasses were defeathered, eviscerated and weighed (Hot carcass weight), then cut up into primal cuts (breast, leg muscles: all muscles from both thighs and drumstick muscles, back and both wings) and the weight of each cut was recorded. Dressing percentage was determined as hot carcass weight/live weight x 100.

Meat-to-Bone Ratio

This was carried out on each primal cut. Each of the cuts was boiled for 20 minutes, and the flesh, including the skin, was separated from the bones and weighed. Proximate analysis of moisture content, crude fat, crude protein and total ash was carried out on selected raw meat primal cuts (leg and breast) according to the method described by (AOAC, 2000).

The data was subjected to descriptive statistics in Microsoft Excel® 2016 software, and presented as means \pm standard error.

RESULTS AND DISCUSSION

Meat chemical composition

A proximate analysis of squab meat is presented in Table 2. The moisture content of local squab meat was 67.01%. The closest results were reported by Pomianowski et al. (2009), who found 66.52%, 69.94%, and 70.59% of moisture content in three different pigeon breeds.

Table:(2). Proximate composition of squab meat (%)

Variable	Means \pm SD
Moisture	67.01 \pm 6.74
Crude protein	21.72 \pm 0.62
Crude fat	8.78 \pm 1.27
Ash	1.19 \pm 0.17

The crude protein and fat contents of squab meat in this study were 21.72% and 8.78%, respectively. Protein and fat in muscle tissue are important meat quality parameters and contribute substantially to the nutritional characteristics of meat. Poławska et al. (2013) reported a comparable protein content in squab meat of 21.70%, but a lower fat content of 4.3%. However, Pomianowski et al. (2009) showed that the protein content of squab meat varied from 20.56 to 23.61%, and the fat content from 4.32 to 7.85% in three different pigeon breeds. The variation in nutrient content may be due to different diets consumed by the birds (Abdulla et al., 2019). On the other side, Dal Bosco et al. (2005) revealed that the percentages of moisture, protein, fat and ash in white king pigeons in Italy were 76.23%, 21.18%, 1.54% and 1.05%, respectively. In general, pigeon meats are fatty and contain all essential amino acids in the amounts and proportions required by the human body (Elsayed et al. 1980). Nevertheless, additional researches are needed to create more awareness regarding the fatty acid profile in local pigeon meat, particularly poly unsaturated fatty acids and their relation with lipid oxidation (Abdulla et al., 2019). As mentioned earlier, breed, diet, age and cut type could be sources of variation in meat chemical composition (Liu et al. 2006, Pomianowski et al. 2009, Bu et al. 2018).

Intramuscular fat influences meat taste, consistency and acceptability. Between 2.2% and 3.4% of intramuscular fat is the minimum recommended to ensure a good taste of meat (Font-i-Furnols et al. 2012). Ash content indicates the number of minerals found in food. The ash content in food determines the extent to which dietary minerals can be available in food (Ogunmola et al 2013). The average ash content of squab meat in our study was 1.78%. This result is higher than the results re-

ported by Pomianowski et al. (2009) on Wrocławski, King and Europigeon squab meat breeds: 1.11, 1.48, 1.42%, respectively; or the result reported by Dal Bosco (2005), who found 1.05% ash in white king squab meat. Gašperlin et al. (2006) reported that ash content exhibited significant differences due to genotype, age and sex.

Carcass parameters

In the present study, measurements were made for live body weight, carcass weight, dressing percentage and percentage of carcass cuts.

These cuts were at the breast, the leg, the back, and the neck. The results are shown in Table 3. It was noted from the results presented in Table 2. that the average live body weight of weaned squabs was (283.38 g).

Table:(3). Carcass characteristics of Libyan local pigeon squab meat

Items	Value
Live body weight	283.38 ± 13.75 g
carcass weight	207.81 ± 18.78 g
Dressing percentage	73.30 ± 4.45 %
Breast	34.91 ± 2.10 %
Wing*	9.80 ± 0.53 %
Leg*	5.82 ± 0.12 %
Back	21.77 ± 0.23 %
Neck	6.46 ± 0.54 %

* One leg, one wing

This was in agreement with the range of weights reported previously for this breed by (Akraim and Jadallah 2021; Akraim et al. 2022). The average dressing percentage of squab in this study was 73.30%. This percentage was similar to the dressing percentage reported in domestic pigeons in the Indian province of Assam (71.48%), but higher than that of domestic pigeons in the Sokoto region of Nigeria (66.02%), Giribaz breed (53.88%) or Egyptian domestic pigeon (52.15%) (Khargharia. et al. 2002, Omojola et al. 2012, Hasan et al. 2016, Abdel-Azeem et al. 2016). Dressing percentage is affected by genetic factors such as breed type and sex, or non-genetic factors such as feed and age (Coyne et al. 2019). This is evidenced by the increase in dressing value in Egyptian pigeons from 55.20% to 70.10% with increasing protein and energy in the feed (Omar et al. 2017). The higher the dressing out percent, the better in terms of economic returns (Omojola, 2007).

The percentage of squab carcass parts can be seen in Table 4. These carcass parts have consisted of the breast, leg, back, and wing. The breast represented the highest cut of squab carcass 34.91% followed by back cut 21.77%, wing 9.80%, neck 6.46% and leg 5.82%. Pomianowski et al. (2009) reported that breast and leg cuts represent 28.70-30.60% and 5.50-7.10%, respectively.

Meat to Bone ratio

From Table 3. It can be noted that the breast has the highest percentage of meat 10.55, followed by leg 5.49, neck 4.81, while the lower observed values were for the back and wing: 3.16, 3.12, respectively.

Table:(4). Meat-to-Bone ratio of primal cuts of squabs.

Cuts	Means ± SD
Breast	10.55 ± 2.75
leg	5.49 ± 0.66
Wing	3.12 ± 0.26
Back	3.16 ± 0.56
Ash	1.19 ± 0.17

Apata et al. (2015) found lower meat to bone ratio in breast cut (7.96). Moderate excess of dietary protein above requirements increases carcass and breast meat yields and decreases fattening in broilers (Bartov and Plavnik 1998). Ganabadi et al. (2009) found that the breast meat to bone ratio was higher in broilers compared to jungle fowl and they attribute this difference to habitat and feeding pattern.

CONCLUSION

It can be concluded from the present study that the meat of the Libyan local domestic pigeons may also be utilized to fulfill the protein requirements, and these species should be considered in the existing poultry industry.

Duality of interest: The authors declare that they have no duality of interest associated with this manuscript.

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