STUDY ON THE CHEMICAL COMPOSITION OF MEAT FROM TURKEY BROILERS REARED UNDER AN EXTENSIVE PRODUCTION SYSTEM

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Abstract

This paper evaluates the chemical composition and energetic value of muscle tissue (boneless, skinless thigh and boneless, skinless breast) obtained from females and males of the Converter hybrid, reared under an extensive production system. At the thigh level, the fat content was higher in females (14.90%) compared with males (8.10%), while the protein content was 18.25% in females and 19.25% in males. In the case of breast meat, the fat content showed low values, of 2.70% in females and 2.60% in males. The highest protein content was recorded in breast meat from females (23.75%), compared with 20.88% in males. Moisture content ranged from 65.71% to 74.77%, with the highest values recorded in breast meat. The ash content ranged from 0.92% to 1.40%, while carbohydrate content ranged from 0.11% to 0.35%. The energetic value of the meat ranged from 108 to 208 kcal/100 g, with the highest value recorded in boneless thigh meat from females (208 kcal/100 g), and the lowest in boneless, skinless breast meat from males (108 kcal/100 g). The results obtained highlight the fact that anatomical part and sex influenced the chemical composition and energetic value of meat from the Converter turkey hybrid reared under an extensive production system.

Keywords*: turkey meat, Converter hybrid, extensive production system, chemical composition, energetic value.*

INTRODUCTION

In recent decades, turkey meat has gained increasing importance in the poultry industry due to its high nutritional value. It is appreciated for its rich content of proteins, vitamins, and minerals, as well as its relatively low lipid content [1, 2, 10]. At the same time, growing interest in animal welfare has encouraged the development of alternative rearing systems, including extensive production systems, which allow birds access to outdoor areas [3, 4, 8].

The Converter hybrid (Hybrid Converter) is used in turkey meat production due to its high productive potential. The chemical composition of meat is influenced by several factors, such as genotype, sex, anatomical region, and rearing system. In this regard, studies conducted by Safronov et al. (2020) and Wegner et al. (2025) have highlighted variations in the chemical composition and nutritional characteristics of meat depending on the genetic category and sex of the birds [5, 6].

From a nutritional perspective, breast muscle generally exhibits a higher protein content and a lower lipid content compared to thigh muscle. Differences between these two anatomical regions have been highlighted in studies conducted by Gálvez et al. (2018), García Solaesa et al. (2024), and Apetroaei et al., who investigated the compositional characteristics of different muscle regions [3, 7, 11]. Furthermore, the sex of the birds may influence the

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proportions of the main chemical constituents of meat, an aspect also demonstrated by research investigating the nutritional composition and muscle characteristics of turkey meat [6, 7, 12].

The rearing system represents another important factor in assessing meat quality, as access to outdoor areas and the level of physical activity may influence muscle development and certain physicochemical characteristics. These aspects were investigated by Castellini et al. (2008), Sarica et al. (2011), and Mudalal (2019), who highlighted the importance of rearing conditions and muscle characteristics in the assessment of poultry meat quality [4, 8, 9].

Therefore, the aim of the present study is to evaluate the chemical composition and energy value of meat obtained from female and male Converter turkeys reared under an extensive production system. The research focuses on comparing two anatomical regions, namely the breast and thigh, deboned and skinless, by determining their moisture, protein, lipid, ash, and carbohydrate contents, as well as calculating their energy value, in order to identify nutritional differences associated with anatomical region and bird sex.

MATERIAL AND METHOD

The study was conducted on Converter hybrid turkey broilers reared under an extensive production system and aimed to comparatively assess the chemical composition and energy value of meat obtained from females and males by analysing two anatomical regions: the breast and thigh muscles.

For the analyses, meat samples were collected from both female and male birds, comprising two types of muscle tissue, namely breast and thigh, both deboned and skinless. The samples were classified according to the sex of the birds and the anatomical region of origin.

The analyses focused on determining the moisture, protein, lipid, ash, and carbohydrate contents, as well as the energy value of the meat, expressed in kcal/100 g.

The results were expressed as percentages for the chemical constituents and in kcal/100 g for energy value. They were subsequently compared according to bird sex and the anatomical region analysed, in order to identify potential differences in the chemical composition and nutritional value of the meat.

RESULTS

The chemical composition of the leg muscles obtained from female and male Converter turkeys reared under an extensive production system is presented in Figure 1.

The moisture content of the leg muscles was 65.71% in females, compared to 71.55% in males. These results indicate a higher water content in the muscle tissue of males, with a difference of 5.84 percentage points between the two categories.

Regarding the protein fraction, males exhibited a crude protein content of 19.25%, slightly higher than that determined in females (18.25%). Consistent with these results, the total nitrogen content was also higher in males, reaching 3.08%, compared to 2.92% in females.

Intramuscular fat content showed the most pronounced differences between the two sexes. Thus, leg muscles obtained from females exhibited a value of 14.90%, considerably higher than that determined in males (8.10%). This difference indicates greater lipid accumulation in the muscle tissue of females.

Finally, the ash content (mineral substances) showed relatively similar values, reaching 0.92% in females and 0.99% in males. Regarding carbohydrate content, low values were recorded in both categories, namely 0.22% in females and 0.11% in males.

The chemical composition of the breast muscles obtained from female and male Converter turkeys reared under an extensive production system is presented in detail in

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Figure 2. The analysis focused on the main nutritional parameters: moisture, crude protein, total lipids, nitrogen, carbohydrates, and ash content.

The moisture content of the breast muscle was 72.03% in females and 74.77% in males. These results indicate a higher moisture content in males compared to females, suggesting a greater degree of muscle tissue hydration.

Regarding the protein fraction, females recorded the highest crude protein content, namely 23.75%, compared to 20.88% in males. Similarly, the total nitrogen content was higher in females (3.80%) than in males (3.34%). These results indicate a higher proportion of the protein fraction in the breast muscles obtained from females.

Intramuscular fat levels were low and relatively similar between the two categories. Thus, females exhibited a fat content of 2.70%, whereas the value determined in males was 2.60%. This small difference indicates a relatively similar distribution of lipids in breast muscle tissue, regardless of sex.

Regarding mineral content, as reflected by the ash percentage, males exhibited the highest value (1.40%), compared to females (1.20%). Carbohydrate content also showed similar values, reaching 0.32% in females and 0.35% in males. These results indicate only minor variations in the carbohydrate fraction between the two categories analysed.

The energy value of the leg and breast muscles obtained from female and male Converter turkeys reared under an extensive production system is presented in Figure 3. The analysis revealed differences in energy value depending on sex and the anatomical region examined.

The energy value of the leg muscles was higher compared to that of the breast muscles. Thus, the thigh meat obtained from females exhibited an energy value of 208 kcal/100 g (865 kJ/100 g), whereas in males, this value was 150 kcal/100 g (629 kJ/100 g). The difference between the two categories indicates a higher energy value for thigh meat obtained from females.

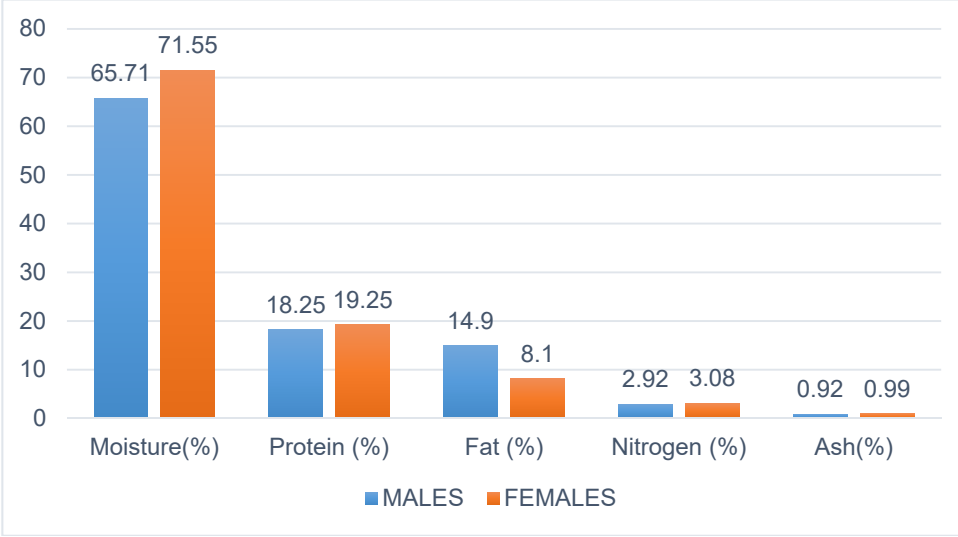


Fig. 1 Chemical composition of thigh muscle in males and female

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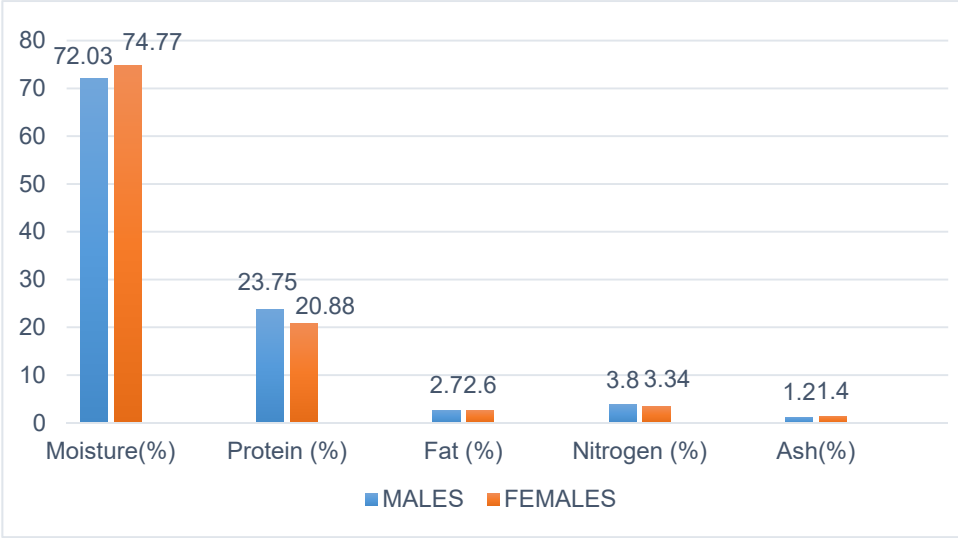


Fig. 2 Chemical composition of breast muscle in males and female

In the case of breast muscles, the energy value was considerably lower, reaching 121 kcal/100 g (509 kJ/100 g) in females and 108 kcal/100 g (457 kJ/100 g) in males. These results indicate relatively similar energy values between the two sexes, with a slightly higher level in females.

The differences observed between the two anatomical regions may be associated with the specific characteristics of the chemical composition of the meat, particularly the intramuscular fat content. Thus, female thigh meat, which exhibited the highest lipid content (14.90%), also recorded the highest energy value (208 kcal/100 g). In contrast, breast muscles, characterized by a low fat content (2.70% in females and 2.60% in males), exhibited lower energy values.

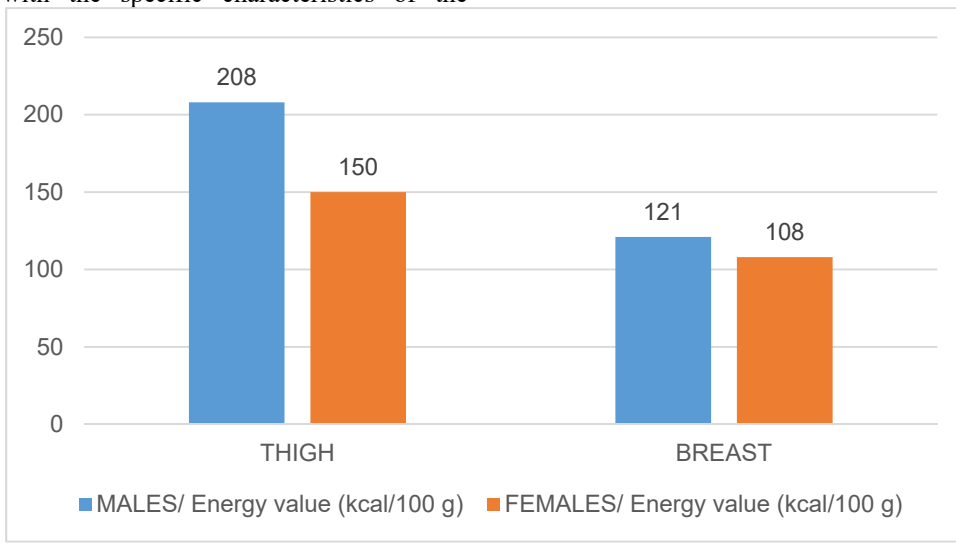


Fig. 3 Energy value of thigh and breast muscles in females and males

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The chemical composition of the leg and breast muscles obtained from female Converter turkeys reared under an extensive production system is presented in Figure 4. The analysis focused on the main nutritional parameters: moisture, crude protein, total lipids, nitrogen, ash, and carbohydrates.

The moisture content was higher in the breast muscles, reaching 72.03%, compared to 65.71% recorded in the leg muscles. This difference indicates a higher degree of hydration in breast muscle tissue compared to leg muscle tissue.

Regarding the protein fraction, breast muscles exhibited the highest crude protein content, namely 23.75%, whereas leg muscles recorded a value of 18.25%. Similarly, the total nitrogen content was higher in breast muscle tissue (3.80%) compared to leg muscle tissue (2.92%). These results indicate a higher proportion of the protein fraction in breast muscles.

Intramuscular fat levels showed considerable differences between the two anatomical regions. Thus, leg muscles exhibited a fat content of 14.90%, whereas the value recorded in breast muscles was only 2.70%. This difference indicates substantially greater lipid accumulation in leg muscles compared to breast muscles.

Finally, the mineral content, reflected by the ash percentage, recorded values of 0.92% in leg muscles and 1.20% in breast muscles. Regarding carbohydrate content, low values were recorded in both anatomical regions, namely 0.22% in leg muscle tissue and 0.32% in breast muscle tissue. These results highlight differences in the chemical composition of the two muscle regions analysed in females.

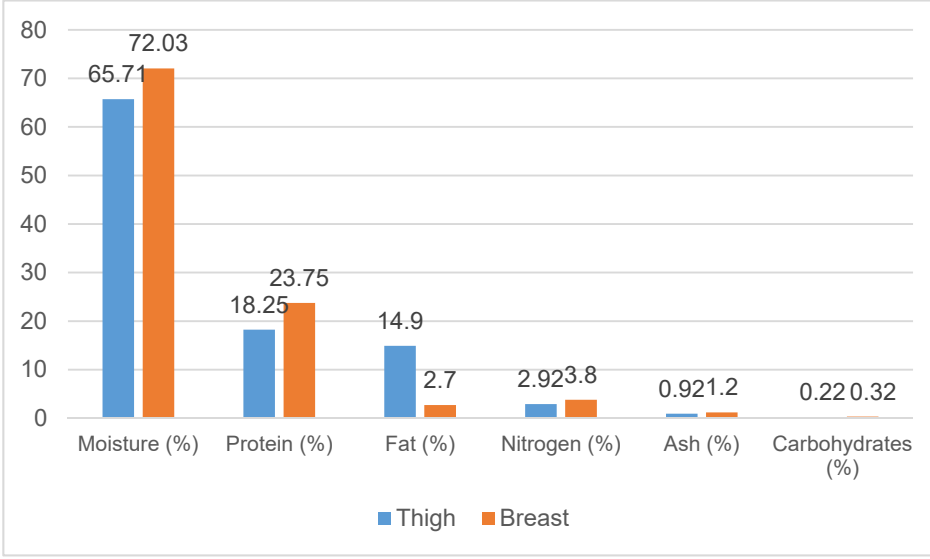


Fig. 4 Chemical composition of thigh and breast muscles in females

The chemical composition of the leg and breast muscles obtained from male Converter turkeys reared under an extensive production system is presented in Figure 5. The analysis focused on the main nutritional parameters: moisture, crude protein, total lipids, nitrogen, ash, and carbohydrates.

The moisture content was higher in the breast muscles, reaching 74.77%, compared to 71.55% recorded in the leg muscles. These results indicate a higher degree of hydration in breast muscle tissue compared to leg muscle tissue.

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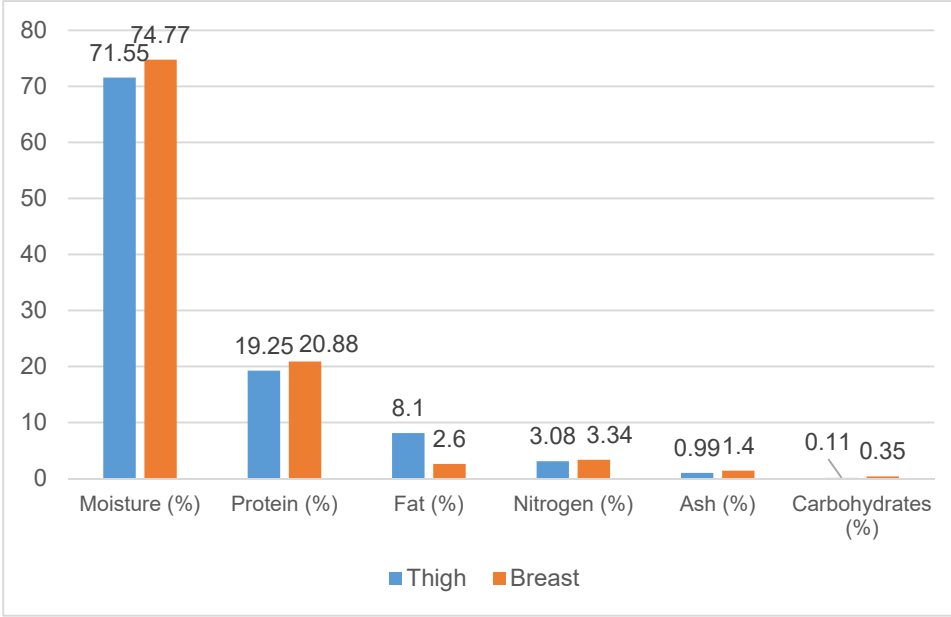


Fig. 5 Chemical composition of thigh and breast muscles in males

Regarding the protein fraction, breast muscles exhibited a crude protein content of 20.88%, slightly higher than that determined in leg muscles (19.25%). Similarly, the total nitrogen content was higher in breast muscle tissue (3.34%) compared to leg muscle tissue (3.08%). These results indicate a higher proportion of the protein fraction in breast muscles.

Intramuscular fat levels showed differences between the two anatomical regions. Thus, leg muscles exhibited a fat content of 8.10%, whereas the value recorded in breast muscles was considerably lower, namely 2.60%. This difference indicates greater lipid accumulation in leg muscles compared to breast muscles.

Finally, the mineral content, reflected by the ash percentage, recorded values of 0.99% in leg muscles and 1.40% in breast muscles. Regarding carbohydrate content, low values were recorded in both anatomical regions, namely 0.11% in leg muscle tissue and 0.35% in breast muscle tissue. These results highlight differences in the chemical composition of the two muscle regions analysed in males.

CONCLUSIONS

The results of the study highlight that sex and anatomical region are important factors influencing the chemical composition and energy value of turkey meat obtained from the Converter hybrid reared under an extensive production system.

The most pronounced differences were observed in the distribution of lipids between the two anatomical regions. Leg muscles showed a greater tendency towards intramuscular fat accumulation, particularly in females, whereas breast muscle tissue was characterized by a low lipid content, regardless of sex.

From a protein perspective, breast muscle tissue stood out for its superior nutritional value, particularly in females. Furthermore, it exhibited a higher degree of hydration compared to leg muscle tissue. Differences in mineral and carbohydrate contents were less pronounced, indicating a relatively similar composition of these

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fractions between the anatomical regions analysed.

The energy value of the meat generally followed the distribution of intramuscular fat content, with leg muscles exhibiting a higher energy contribution than breast muscles. This characteristic highlights the relationship between lipid composition and the energy value of different anatomical regions.

In conclusion, turkey meat obtained from the Converter hybrid reared under an extensive production system exhibits distinct nutritional characteristics depending on sex and anatomical region.

Breast muscles are distinguished by a profile characterized by a higher protein content and a low lipid level, whereas leg muscles stand out for their higher energy value. These characteristics emphasize the importance of separately assessing different anatomical regions when evaluating the nutritional quality of turkey meat.

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