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# Muscle type and meat quality of local chickens according to preslaughter transport conditions and sex in Benin

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**ABSTRACT**

It's important for poultry sector's stakeholders to master the effect of intrinsic and extrinsic conditions on meat quality. The objective of this study was to evaluate the influence of muscle type on meat quality of local chickens from Benin according to preslaughter transport conditions and sex. It involved thirty-six chickens of 6 to 7 months from the two sexes comprising a control group, a slaughtered after 4 hours of rest following 2 hours of transport group, and an immediately slaughtered after 2 hours of transport group. Data on meat acidity and color were collected and an analysis of variance was performed using R software. In the three groups, the thigh pH was higher than that of the breast at several measure times ($p < 0.001$), namely 5.76 vs 5.35 in non-transported chickens, 5.76 vs 5.38 in 4-hour of rest chickens, and 5.86 vs 5.47 in immediately slaughtered chickens at 48 hours *post-mortem*. This same trend was observed for the red index (a*) at both measure times in 4 hours of rest chickens (8.15 vs. 6.12 and 8.15 vs. 7.04) and on the slaughter day in the immediately slaughtered after transport chickens (7.78 vs. 6.45) ($p < 0.001$). Meanwhile, the yellow index (b*) and, to a lesser extent, lightness (L*) and chroma of the two muscles showed an opposite trend to that of the red index ($p < 0.001$). These trends of pH and color indices between thigh and breast were also observed in both sexes for the three transport conditions. Then, whatever the sex or the preslaughter transport condition, breast meat is more acidic, more yellowish, and relatively brighter, but less red than thigh meat.

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## INTRODUCTION

The contribution of the traditional poultry farming to the national poultry meat production is substantial in Benin and according to DSA (2024) its production reached 8,100 tons of meat, compared to 1,575 tons for modern poultry farming in 2022. Nevertheless, the contribution of traditional poultry to table egg production is low (Mensah *et al.*, 2019) and studies are being carried out to improve it (Edenakpo *et al.*, 2021). The family poultry farming mainly comes from the *Gallus gallus* species that has a diversity of ecotypes, namely the Northern, Southern, Fulani, Sahouè, and Holli ecotypes (Tougan *et al.*, 2013a) among which the Northern ecotype in the northern region and the Southern ecotype in Southern Benin, are the most represented.

In terms of production and meat quality, local chickens come from a traditional breeding system where free-range farming is common, and habitats are precarious or almost nonexistent. They are often slaughtered under varying conditions that affect carcass and meat characteristics. Several studies aimed at controlling the meat quality of these chickens were carried out. Bonou *et al.* (2017a) characterized the preslaughter conditions and highlighted varying conditions of capture, transport, and waiting, with repercussions on the chicken, its carcass, and meat. The effect of feed withdrawal duration on carcass characteristics and technological quality of meat from local chickens has been studied (Tougan *et al.*, 2016).

Studies successively addressed the influence of transport stress and that of capture chase (Bonou *et al.*, 2017b), the influence of capture chase duration (Bonou *et al.*, 2017c) and then that of *ante-mortem* transport duration (Bonou *et al.*, 2018). The effect of rest on improving meat quality in chickens that had undergone capture chase or transport before slaughter was studied (Bonou *et al.*, 2025a and b).

Or, beyond *ante-mortem* conditions, muscle type can also affect meat quality characteristics. Baéza *et al.* (2018) reported in exotic chicken breeds that growth rate improvement and breast yields increasing led to the production of muscles of which characteristics cause meat quality defects. In Benin, Tougan *et al.* (2013b) and Tougan *et al.* (2024) also reported variations in meat quality depending on muscle type.

Recently, studies examining the interaction between slaughter conditions and muscle type on meat quality have started. Thus, Bonou *et al.* (2025c) investigated the role of *ante-mortem* chase conditions and sex in meat quality variations in local chickens. It is also important to clarify the role of preslaughter transport conditions and sex in the muscle type influence on meat quality of these chickens through the present study.

## MATERIALS AND METHODS

### Area of study

Meat quality was evaluated at the Laboratory of Animal Biotechnology and Meat Technology of the Polytechnic School of Abomey-Calavi of the University of Abomey-Calavi (UAC) and the chickens were produced at a farm in Abomey-Calavi. This township of southern Benin, Department of Atlantic, is limited to the North by the township of Zè, to the South by Atlantic Ocean, to the East by the township of Sô-Ava and Cotonou, and to the West by the township of Tori-Bossito and Ouidah. The climate is of subequatorial type characterized by two rainy seasons of which, the major is from April to July and the minor from September to November. The rainy seasons are separated by two dry seasons. The yearly rainfall is close to 1200 mm and the monthly average temperatures vary between 27°C and 31°C. The relative air humidity is between 65% from January to March and 97% from June to July.

### Animal breeding, sampling, pre-slaughter conditions and slaughter process

Thirty-six (36) local chickens of six to seven months produced under traditional breeding system from two (2) roosters and ten (10) hens all of South ecotype of Benin were used.

These chickens had a henhouse for night housing or for their protection and a front yard of 400 $m^2$. For healthcare, they were vaccinated against fowl pox using Diftosec® vaccine and against Newcastle disease using Itanew® vaccine. They fed around and also received grains, agricultural by-products and kitchen rests. The day before slaughter, chickens were divided into three homogeneous groups of 6 males and 6 females each and labelled. Chickens in group 1 were not transported before slaughter, those in group 2 were immediately slaughtered after a 2-hour motorcycle transport with head in outside down position, and chickens in group 3 underwent 4 hours of rest before slaughter following the 2-hour of transport. The transports were organized so that all the chickens were slaughtered simultaneously. Slaughter was performed by cutting the jugular vein with a sharp knife. The birds in all groups underwent a 6-hour of feed withdrawal before slaughter.

**Data collecting**

The pH was measured at 1 h, 4 h, 8 h, 12 h, 16 h, 20 h, 24 h and 48 h after slaughter in the right slice of the breast muscle (*Pectoralis major*) and in the right thigh muscle (*Iliotibialis superficialis*) at 2 cm depth with a portable pH-meter (HANNA Instrument R, Italy) having a specialized probe and a temperature control system. Five repetitions were performed for every measure and the pH-meter has been daily calibrated with two buffers pH-meter (pH 4 and pH 7) as prescribed by the manufacturer.

The meat color was measured on the slaughter day and at 24 hours *post mortem* using a calibrated Minolta Chromameter CR-400 (Japan) in the trichromatic system (CIE L*a*b *) based on three-dimensional space with one for lightness (L*) and two for redness (a*) and yellowness (b*) (Zhang and Barbut 2005). Chroma (C) and hue angle (h) were determined as followed: $C= (a^{*2}+ b^{*2})^{1/2}$ and $h = \tan^{-1} b^*/a^*$. Five repetitions were performed by measure and they were taken on the ventral face, at the third superior on the thickest part of the left slice of the breast and on the middle of the ventral face of the left thigh muscle.

**Statistical analysis**

R software version 4.3.2 was used and an analysis of variance (ANOVA) was performed to assess the effect of the interactions between muscle type, transport conditions, and sex. Means were compared using the Student-Newman-Keuls (SNK) and Dunnett tests at the 5% significance level.

**RESULTS**

**Variations in pH and meat color of local chickens according to muscle type and preslaughter transport conditions**

The pH results according to muscle type and transport conditions of local chickens are presented in Table 1. Overall, the interaction between muscle type and transport conditions was highly significant ($p < 0.001$), and the thigh pH tended to be higher than the breast pH in chickens from all three groups. This difference was significant, with thigh pH significantly higher than breast pH ($p < 0.001$) at 24 and 48 hours in non-transported chickens, at 48 hours in chickens that had undergone 4 hours of rest, and at all times except 1 hour and 24 hours after slaughter in immediately slaughtered after transport chickens. From 1 hour to 48 hours after slaughter, the breast pH fell from 5.96 to 5.35 in the non-transported chickens (control group) (0.61 points), from 6.16 to 5.38 (0.78 points) in 4 hours of rest after transport's chickens and from 6.16 to 5.47 (0.69 points) in the immediately slaughtered after transport chickens. For the thigh, the pH decreased from 5.93 to 5.76 in non-transported chickens (0.17 points), from 6.12 to 5.76 (0.36 points) in the 4 hours of rest chickens, and from 6.32 to 5.86 (0.46 points) in the immediately slaughtered after transport chickens.

Regarding color, the results of index variation according to muscle type and the preslaughter transport conditions of local chickens are presented in Table 2. For all three transport conditions, the lightness (L*) of the breast tended to be higher than that of the thigh, but this difference was not statistically significant. The yellow index (b*) of the breast was higher than that of the thigh on the slaughter and the following days in non-transported chickens and those immediately slaughtered after transport ($p < 0.001$), while this difference was not significant for the third group's chickens. Chroma varied significantly only in the control group where the breast also had higher values than the thigh on the day after slaughter ($p < 0.01$).

Conversely, the highest red index values were recorded in the thigh, with a significant difference ($p < 0.001$) at both measure times in 4 hours of rest chickens, and on the slaughter day in immediately slaughtered after transport chickens. The hue did not significantly vary.

**Table 1.** Interaction of muscle and *ante-mortem* transport conditions on meat pH of local chickens

| Time (hours) | Control | | Rest | | Transport | | Standard Error | Significativity |
|---|---|---|---|---|---|---|---|---|
| | Breast | Thigh | Breast | Thigh | Breast | Thigh | | |
| 1 | 5.96ab | 5.93a | 6.16cd | 6.12bc | 6.16cd | 6.32d | 0.04 | *** |
| 4 | 5.78a | 5.96ab | 6.02b | 6.1b | 6.03b | 6.32c | 0.05 | *** |
| 8 | 5.62a | 5.7ab | 5.85b | 5.91bc | 5.87b | 6.15c | 0.06 | *** |
| 12 | 5.53a | 5.72ab | 5.8b | 5.85b | 5.82b | 6.13c | 0.06 | *** |
| 16 | 5.63a | 5.67a | 5.81a | 5.83a | 5.79a | 6.1b | 0.06 | ** |
| 20 | 5.7a | 5.77ab | 5.9abc | 5.97bc | 5.88ab | 6.12c | 0.05 | *** |
| 24 | 5.38a | 5.65b | 5.64b | 5.82bc | 5.76bc | 5.93c | 0.05 | *** |
| 48 | 5.35a | 5.76b | 5.38a | 5.76b | 5.47a | 5.86b | 0.06 | *** |

*** : $p < 0.001$ ; The averages of the same row followed by different letters differ at the threshold of 5%.

**Table 2.** Interaction of muscle and *ante-mortem* transport conditions on meat color of local chickens

| Variable | Time (Day) | Control | | Rest | | Transport | | Standard Error | Significativity |
|---|---|---|---|---|---|---|---|---|---|
| | | Breast | Thigh | Breast | Thigh | Breast | Thigh | | |
| L* | 0 | 83.05b | 82.15ab | 81.45ab | 80.6a | 80.95ab | 80.28a | 0.58 | *** |
| | 1 | 81.93c | 79.75bc | 80.21bc | 79.2ab | 79.19ab | 77.24a | 0.56 | *** |
| a* | 0 | 6.11a | 7.11ab | 6.12a | 8.15b | 6.45a | 7.78b | 0.28 | *** |
| | 1 | 6.79a | 7.45ab | 7.04a | 8.15b | 7.48ab | 8.46b | 0.26 | *** |
| b* | 0 | 7.47c | 5.52ab | 6.02bc | 4.35ab | 5.09ab | 4.04a | 0.42 | *** |
| | 1 | 8.34c | 5.56b | 5.25b | 4.87ab | 4.86ab | 3.59a | 0.39 | *** |
| Hue angle | 0 | 0.43a | -0.61a | 0.97a | 3.32a | 1.43a | 2.91a | 1.12 | ns |
| | 1 | 1.41a | 1.95a | 1.63a | 2.61a | 1.61a | -7.1a | 3.18 | ns |
| Chroma | 0 | 9.88a | 9.43a | 8.96a | 9.45a | 8.65a | 9.2a | 0.34 | ns |
| | 1 | 11.19b | 9.68a | 8.99a | 10.02ab | 9.2a | 9.43a | 0.30 | *** |

*** : $p < 0.001$, ns : $p>0.05$, L*: Lightness; a*: Red index; b*: Yellow index; The averages of the same row followed by different letters differ at the threshold of 5%.

**Variations in pH and meat color of local male and female chickens according to muscle type and preslaughter transport conditions**

The results of the interaction between muscle type and sex on variations in meat pH according to different *ante-mortem* transport conditions of local chickens are presented in Table 3. In chickens not transported before slaughter, the thigh pH was higher than the breast pH at 48 h in females and at 24 h and 48 h in males ($p < 0.001$). In immediately slaughtered after transport chickens, the thigh pH was also higher than the breast pH at 48 h in females and at all measurement times in males ($p < 0.001$). For 4 hours of rest after transport chickens, the same trend of significantly higher thigh pH compared to breast pH was observed in both sexes at 48 hours post-mortem. In other cases, the trend of high thigh pH was not statistically significant ($p>0.05$).

Regarding the variations in meat color according to muscle and sex in local chickens from different transport conditions, the results are presented in Table 4. For all three transport conditions and for both sexes, lightness did not significantly vary between the two muscles on the slaughter and the following days. In the non-transported chickens, the yellow index of the breast was higher than that of the thigh at both times in males and only the day after slaughter in females ($p < 0.001$). The same was true for chroma in males the day after slaughter.

**Table 3.** Interaction of muscle and sex on meat pH according to *ante-mortem* transport conditions of local chicken

| Condition | Time (hours) | Female | | Male | | Standard Error | Significativity |
|---|---|---|---|---|---|---|---|
| | | Breast | Thigh | Breast | Thigh | | |
| Control | 1 | 5.81a | 5.88a | 6.11b | 5.99b | 0.06 | *** |
| | 4 | 5.84ab | 6.00b | 5.72a | 5.92ab | 0.06 | *** |
| | 8 | 5.53a | 5.64a | 5.71a | 5.77a | 0.08 | ns |
| | 12 | 5.51a | 5.68a | 5.55a | 5.75a | 0.08 | ns |
| | 16 | 5.76a | 5.61a | 5.58a | 5.64a | 0.08 | ns |
| | 20 | 5.6a | 5.61a | 5.79ab | 5.94b | 0.07 | *** |
| | 24 | 5.42a | 5.59ab | 5.34a | 5.71b | 0.07 | *** |
| | 48 | 5.27a | 5.78b | 5.42a | 5.73b | 0.08 | *** |
| Transport | 1 | 6.3b | 6.31b | 6.03a | 6.32b | 0.06 | *** |
| | 4 | 6.2b | 6.35b | 5.87a | 6.29b | 0.06 | *** |
| | 8 | 5.97ab | 6.2b | 5.78a | 6.09b | 0.08 | *** |
| | 12 | 5.97ab | 6.1b | 5.66a | 6.16b | 0.08 | *** |
| | 16 | 6.05b | 6.11b | 5.54a | 6.09b | 0.09 | *** |
| | 20 | 5.97ab | 6.05ab | 5.8a | 6.17b | 0.07 | *** |
| | 24 | 5.89ab | 5.93b | 5.63a | 5.94b | 0.07 | *** |
| | 48 | 5.62b | 5.96c | 5.31a | 5.76bc | 0.08 | *** |
| Rest | 1 | 6.16a | 6.07a | 6.15a | 6.17a | 0.06 | ns |
| | 4 | 6.14b | 6.09ab | 5.89a | 6.11ab | 0.06 | *** |
| | 8 | 5.90a | 5.84a | 5.79a | 5.99a | 0.08 | ns |
| | 12 | 5.95b | 5.82ab | 5.65a | 5.89ab | 0.08 | *** |
| | 16 | 6.00b | 5.81ab | 5.61a | 5.85ab | 0.08 | *** |
| | 20 | 5.9a | 5.84a | 5.9a | 6.10a | 0.07 | ns |
| | 24 | 5.75ab | 5.77ab | 5.54a | 5.86b | 0.07 | *** |
| | 48 | 5.40a | 5.78b | 5.37a | 5.73b | 0.08 | *** |

***: $p < 0.001$; ns : $p>0.05$; The averages of the same row followed by different letters differ at the threshold of 5%.

**Table 4.** Interaction of muscle and sex on meat color according to ante-mortem transport conditions of local chickens

| Condition | Variables | Time (Day) | Female | | Male | | Standard Error | Anova |
|---|---|---|---|---|---|---|---|---|
| | | | Breast | Thigh | Breast | Thigh | | |
| Control | L* | 0 | 83.47a | 82.27a | 82.64a | 82.02a | 0.81 | ns |
| | | 1 | 82.43a | 79.91a | 81.43a | 79.59a | 0.79 | ns |
| | a* | 0 | 5.89a | 7.37b | 6.33ab | 6.84ab | 0.39 | *** |
| | | 1 | 5.9a | 7.59b | 7.68b | 7.32b | 0.36 | *** |
| | b* | 0 | 8.74b | 6.39b | 6.2b | 4.65a | 0.58 | *** |
| | | 1 | 9.53c | 6.31ab | 7.15b | 4.81a | 0.54 | *** |
| | Hue angle | 0 | 1.14a | 1.72a | 0.73a | -2.92a | 1.57 | ns |
| | | 1 | 1.67a | 1.39a | 1.16a | 2.52a | 4.44 | ns |
| | Chroma | 0 | 10.79b | 10.13ab | 8.97ab | 8.72a | 0.50 | *** |
| | | 1 | 11.52b | 10.2ab | 10.85b | 9.15a | 0.45 | *** |
| Transport | L* | 0 | 79.99a | 80.86a | 81.9a | 79.70a | 0.79 | ns |
| | | 1 | 78.69ab | 76.58a | 79.68b | 77.92ab | 0.77 | *** |
| | a* | 0 | 7.07ab | 7.21ab | 5.82a | 8.36b | 0.39 | *** |
| | | 1 | 7.8a | 7.82a | 7.16a | 9.10b | 0.36 | *** |
| | b* | 0 | 5.12a | 4.72a | 5.06a | 3.36a | 0.58 | ns |
| | | 1 | 5.28b | 3.18a | 4.33ab | 4.00ab | 0.54 | *** |
| | Hue angle | 0 | 1.68a | 1.71a | 1.18a | 4.10a | 1.57 | ns |
| | | 1 | 1.71b | 2.9b | 1.52b | -17.1a | 4.44 | *** |
| | Chroma | 0 | 9.03a | 9.1a | 8.27a | 9.30a | 0.46 | ns |
| | | 1 | 9.73ab | 8.65a | 10.21b | 8.67a | 0.40 | *** |
| Rest | L* | 0 | 79.30a | 79.77a | 83.6b | 81.43ab | 0.80 | *** |
| | | 1 | 79.26ab | 77.62a | 81.16b | 80.77b | 0.78 | *** |
| | a* | 0 | 6.69ab | 7.8bc | 5.55a | 8.49c | 0.39 | *** |
| | | 1 | 6.88a | 8ab | 7.21ab | 8.29b | 0.36 | *** |
| | b* | 0 | 6.44b | 4.52ab | 5.59ab | 4.18a | 0.58 | *** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 5.56a | 5.08a | 4.93a | 4.65a | 0.54 | ns |
| Hue angle | 0 | 1.17a | 2.11a | 0.76a | 4.54a | 1.57 | ns |
| | 1 | 1.23a | 2.4a | 2.03a | 2.82a | 4.44 | ns |
| Chroma | 0 | 9.59a | 9.25a | 8.33a | 9.65a | 0.47 | ns |
| | 1 | 9.06a | 9.98a | 8.93a | 10.06a | 0.41 | ns |

***: $p < 0.001$, ns: $p > 0.05$, L*: Lightness; a*: Red index; b*: Yellow index; ANOVA: Analysis of Variance; The averages of the same row followed by different letters differ at the threshold of 5%.

Meanwhile, the red index showed the opposite trend in females ($p < 0.001$). The hue was similar for both muscles in both sexes. In immediately slaughtered after transport chickens, the yellow index of the breast was higher than that of the thigh in females the day after slaughter. At that time, the breast chroma and hue were also higher than those of the thigh in males. For 4 hours of rest chickens, the yellow indexes of both muscles were statistically similar for both sexes, but with a tendency of higher values in the breast. Conversely, the red index was more abundant in the thigh than in the breast in males on the slaughter day.

## DISCUSSION

### Variations in pH and meat color of local chickens according to muscle type and interaction between muscle and preslaughter transport conditions

Globally, the thigh pH is higher than the breast pH in local chickens, and this difference is significant at 24 and 48 hours in chickens that were not transported. However, it is significant at 48 hours in the 4 hours of rest chickens, and at all times except 1 hour and 24 hours after slaughter in the immediately slaughtered after transport chickens. The lower pH values of the breast indicate a higher acidification in this muscle compared to the thigh of local chickens.

Indeed, pH depends on the muscle's glycogen content at the slaughter time because, after death, being anoxic, the muscle progressively acidifies by its glycogen conversion into lactic acid. So, the pH drops and this will slow down bacteria development and will promote meat preservation.

Thus, when glycogen stock is low at slaughter, the meat pH hardly falls and its acidity is low (Berri, 2015; Bonou *et al.*, 2017b et c; Bonou *et al.*, 2018) resulting in high pH values as in the thigh muscle in our study. The varied movements of both muscles during the chickens' lives require the use of glycogen, reducing the reserves availability and explaining the lower acidity of the thigh compared to the breast in our study. The glucose combustion reactions occur more in the most used muscles to produce energy in the form of ATP and so, these muscles have less glucose to store as glycogen, needed for anaerobic energy production after slaughter or death for pH drop during meat maturation. The local chickens, raised in the traditional farming systems, are constantly moving, using their thigh muscle. This explains the low glycogen potential of the thigh muscle. During the transport, the upside-down position of chickens with attached legs and hooked, puts the thigh muscle in intense activity that affects its acidity (Bonou *et al.*, 2017b; Bonou *et al.*, 2018).

Furthermore, the pH trend of the thigh compared to that of the breast in chickens under different *ante-mortem* transport conditions recorded in our study is consistent with the findings of Tougan *et al.* (2013b), who reported that the thigh-drumstick pH at 1, 4, 8, 12, and 24 hours was significantly higher than that of the breast in local chickens. In a study comparing carcass composition and meat quality in five-week-old broiler chickens from various origins, Biegniewska *et al.* (2017) observed that the breast pH at 15 minutes was lower than that of the thigh. Tougan *et al.* (2024) also observed differences between breast and thigh pH. In addition, studying the effect of muscle on meat quality according to preslaughter capture chase conditions, Bonou *et al.* (2025c) found that in control chickens, immediately slaughtered after capture chase chickens, and chickens that underwent a 4-hour of rest after capture chase, the thigh pH was higher than that of the breast at all measurement times ($p < 0.001$).

Bourin *et al.* (2019) suggested that the pH variations between thigh and breast must also have a genetic origin, with key regions controlling the ultimate pH of the breast and genes of interest.

For the three transport conditions, unlike the red index (a*), the lightness (L*), the yellow index (b*), and the chroma of the breast are relatively higher than those of the thigh, or show this trend, but not statistically significant, depending on the case. Since these observations are not group-specific, the transport conditions of the chickens do not appear to affect variations in meat color according to muscle type, as reported by Bonou *et al.* (2025c) for preslaughter capture chase conditions. Tougan *et al.* (2013b) and Biegniewska *et al.* (2017) also recorded higher red index values in the thigh than in the breast. The redder color of the thigh meat is linked to muscle type and an increase in blood hemoglobin levels during pre-slaughter muscle activity, as the thigh muscle is much more stressed in local chickens due to their farming system. Indeed, according to Dib (2021), red muscles contain more myoglobin, are more vascularized, and have more mitochondria, while white muscles have less developed vascularization and contain fewer mitochondria. Baéza *et al.* (2022) reported that the clarity and red color of meat are primarily influenced by the concentration of heme proteins (myoglobin, hemoglobin, and cytochromes). They also specified that for white meat, color is strongly dependent on muscle glycogen reserves at slaughter and on the evolution of *post-mortem* pH.

Thus, possible correlations between pH and meat color parameters should also explain the values of the other color indices. In our study, the leg, with its high pH values, also has high red index values, while the breast, with its low pH values, has the highest values or trends for yellow index, lightness, and chroma. According to Dib (2021), white muscles have a higher glycolytic capacity. Similar links between pH, lightness, yellow index, and red index were recorded by Harford *et al.* (2014), Xing *et al.* (2015), Tougan *et al.* (2016), and Bonou *et al.* (2017b and c), Bonou *et al.* (2018) and Bonou *et al.* (2025a, b and c) in different conditions.

Riaz *et al.* (2024) also explained color variations by the effect of pH and, furthermore, by myoglobin content and hemoglobin status. However, according to Elkhazen *et al.* (2016), the ultimate pH has no effect on meat red index and lightness. Confirmation of these relationships through a specific study will shed more light on the correlations between acidity and meat color parameters in local chickens from Benin.

Moreover, color variations between muscles can also be explained by their varying fat content. According to Baéza *et al.* (2022), meat color, particularly that of yellow-skinned poultry, depends on its total fat content. The higher is this content, the lighter and yellower is the meat.

**Interaction of muscle and sex on pH and meat color in local chickens according to preslaughter transport conditions**

For the three preslaughter transport conditions, the thigh pH is higher than the breast pH in both males and females, or in one sex non-specifically. Even in cases of non-significant difference, this trend is observed between the pH of the two muscles in both sexes. This result of high thigh pH regardless of sex indicates a low acidification and a low glycogen potential due to muscle activity (Berri, 2015; Bonou *et al.*, 2017b et c; Bonou *et al.*, 2018). It also likely has a genetic origin (Bourin *et al.*, 2019), as confirmed in both male and female in this study.

Concerning color, apart from lightness (L*) of which the variations between thigh and breast are not significant regardless of sex, the yellow index (b*) and chroma are higher in the breast or tend to be so, while the red index (a*) is higher in the thigh, and this is not sex-specific. The redder color of the thigh in local chickens, which can be explained by muscle type, myoglobin content, hemoglobin status, and blood flow in the active muscle or related to its activity level, is valid for both sexes in chickens regardless of preslaughter transport conditions. Furthermore, the relationships between pH and meat color reported in many studies and under different conditions, including the studies by Bonou *et al.* (2025a, b, and c), are valid for local chickens of both sexes under the transport conditions of the present study.

## CONCLUSION

The study of the influence of muscle on the meat quality of Benin's local chickens, according to *ante-mortem* transport conditions and sex, showed that meat acidity and color differ by muscle. In fact, breast meat is more acidic, yellowish, and relatively brighter and less red than thigh meat, regardless of transport conditions. These quality differences between thigh and breast meat almost don't vary from one sex to the other for the preslaughter transport conditions. Understanding these variations in meat acidity and color according to the muscle type, sex, and transport conditions is an asset for the sector's stakeholders, enabling them to anticipate the shelf life of different chicken meat cuts, which is closely linked to their acidity.

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