

Evaluation of KUB Chicken Carcass Dimensions Based on Slaughter Age and Sex

**Budi Indarsih^{1*}, Tapaul Rozi¹, I Nyoman Sukartha Jaya¹, Muhammad Hasil Tamzil¹,
I Gede Nano Septian¹, Ni Ketut Dewi Haryani¹ and Umrah¹**

Faculty of Animal Science, Mataram University, Jalan Majapahit No. 62, Mataram
Email: budiindarsih@unram.ac.id

Diterima: 30 Mei 2025, Disetujui: 27 Juni 2025

ABSTRAK

Penelitian ini bertujuan untuk mengkaji pengaruh umur potong dan jenis kelamin terhadap dimensi karkas ayam KUB. Penelitian menggunakan Rancangan Acak Kelompok dengan pola faktorial 2 x 4, yang melibatkan dua variabel: jenis kelamin (jantan dan betina) serta umur potong (4, 6, 8, dan 10 minggu). Setiap kelompok perlakuan terdiri dari 10 ekor ayam, dengan pembagian merata antara ayam jantan dan betina. Parameter yang diukur meliputi panjang dan lebar paha atas dan bawah, panjang sayap, serta panjang dan lebar dada dan punggung. Hasil penelitian menunjukkan bahwa umur potong berpengaruh nyata ($P < 0,05$) terhadap semua parameter yang diukur, termasuk ukuran paha dan sayap, dimensi dada, serta panjang dan lebar punggung. Jenis kelamin juga memberikan pengaruh yang signifikan terhadap dimensi paha atas, panjang dada, dan ukuran punggung. Selain itu, terdapat interaksi yang signifikan antara jenis kelamin dan umur potong terhadap ukuran paha atas, panjang sayap, dan dimensi dada ($P < 0,05$). Ukuran karkas terbesar ditemukan pada ayam yang dipotong pada umur 10 minggu. Jantan mempunyai dimensi tubuh lebih besar dari betina.

Kata kunci: Ayam KUB, Umur Potong, Dimensi Karkas

ABSTRACT

This study examined the effect of slaughter age and sex on carcass dimensions in KUB chickens. A Randomized Block Design with a 2 x 4 factorial layout was used, involving two factors: sex (male and female) and slaughter age (4, 6, 8, and 10 weeks). Each treatment group consisted of 10 chickens, evenly split between males and females. The parameters measured included the length and width of the upper and lower thighs, wing length, and the length and width of the breast and back. The results indicated that slaughter age significantly affected ($P < 0.05$) all measured traits, including thigh and wing size, breast dimensions, and back length and width. Sex also significantly impacted upper thigh measurements, breast length, and back size. Additionally, there was a significant interaction between sex and slaughter age for upper thigh size, wing length, and breast dimensions ($P < 0.05$). The largest carcass measurements were observed in chickens slaughtered at 10 weeks of age. Male KUB chickens showed greater carcass dimensions than females.

Keywords: KUB Chickens, Slaughter Age, Carcass Dimension

INTRODUCTION

Poultry is one of the primary sources of meat in Indonesia, with free-range chicken being especially popular. One notable variety is the Balitnak Superior Kampung Chicken (KUB), developed by the Agricultural Research and Development Agency in Ciawi-Bogor (Suryana, 2017). Compared to village chickens, KUB chickens offer several benefits such as stronger resistance to disease, lower mortality rates (Urfa et al., 2017; Hidayat et al., 2018), and faster growth (Mayora et al., 2018). These chickens were selectively bred to improve the productivity of free-range poultry. KUB chickens are known for higher egg output, more consistent growth, and better feed efficiency than other native chickens (Amanda et al., 2019). KUB chickens possess distinguishing traits such as varied feather colours, a body weight ranging from 1.200 to 1.600 grams at 20 weeks of age, eggs weighing between 35 to 45 grams, and an earlier onset of egg-laying (around 20–22 weeks). They also produce more eggs annually (160–180), reach 50% egg production more quickly, achieve peak production of 65–70%, and exhibit stronger disease resistance (Amanda et al., 2019). Free-range chicken farming comes with advantages like minimal land requirements, affordable and accessible feed, and a shorter production cycle. Nonetheless, challenges persist, including traditional management methods, low meat and egg yields, genetic variability, high mortality rates, and substandard feeding practices (Sartika et al., 2014). Carcass dimensions are closely associated with carcass weight, which can be a good predictor of overall body mass (Musa et al., 2012). A key factor in maximizing the success of KUB chicken farming is

determining the optimal slaughter age. However, research on the carcass dimensions of KUB chickens remains limited, making it essential to examine how age at slaughter affects their body measurements. This study was designed to explore that specific relationship.

MATERIALS AND METHODS

Time and Location

This study was carried out in July 2024 at the Animal Products Processing Technology Laboratory, Faculty of Animal Science, Mataram University.

Animal and Experimental Design

KUB chickens, both male and female, were obtained from intensive farming operations located around Mataram city. These chickens were raised under an intensive management system using a postal rearing method and were provided with a commercial broiler feed. All husbandry practices adhered to established good management standards. A total of 40 chickens were slaughtered at 4 weeks (28 days), 6 weeks (42 days), 8 weeks (56 days), and 10 weeks (70 days) of age.

Measurements

The following are parts of primal carcass measured

1. Length of the upper thigh bone which was measured the distance between the base and the tip of the thigh bone (thigh) using a caliper. (Figure 1).
2. Width of the upper thigh bone which was measured the distance between the right side and the left side using a caliper.
3. Length of the lower thigh bone which was measured the distance between the base and the tip of the lower thigh bone (tibia) using a caliper.

4. Lower thigh bone width which was measured the distance between the right and left sides using a caliper.

This study employed an experimental approach using a Randomized Block Design with a 2x4 factorial structure (2 sexes and 4 slaughter ages: 4, 6, 8, and 10 weeks). For each slaughter time, 10 KUB chickens were used as replications, with each experimental unit consisting of 5 male and 5 female KUB chickens, totaling 10 chickens per experimental unit.

Data Analysis

Data were processed using analysis of variance (ANOVA) following the General Linear Model (GLM) procedure of SPSS version 15 (SPSS, 2006).

Differences between treatment group means were identified using Duncan's test at a 5% significance level.

RESULTS AND DISCUSSION

Tables 1 to 9 present the carcass dimensions of KUB chickens, which include 9 variables measured across different ages and sexes. These variables are the length and width of the upper thigh bone, lower thigh bone, wing bone, breast, and the length and width of the backbone.

Upper thigh bone length

Age at slaughter (SA) and sex (S) influenced upper thigh bone length, and there was an interaction between SA and S is presented in Table 1.

Table 1. Upper thigh bone length based on sex and slaughter age

Slaughter age (weeks)	Upper thigh (mm)	
	Male	Female
4	6.52±0.07 ^a	6.65±0.18 ^a
6	13.59±2.76 ^b	14.70±1.19 ^b
8	19.08±1.79 ^c	15.64±1.51 ^b
10	22.46±4.14 ^d	18.72±2.21 ^c
p-value:		
Sex (S)	0.035	
Slaughter Age (SA)	0.000	
S x SA	0.032	

Note: ^{a-d} different superscript in all columns and rows indicates a difference of (P<0.05)

There was no effect of sex on the length of the thigh bone at 4 weeks of age. However, the differences were significant for male chickens at ages 6, 8, and 10 weeks, while in female chickens, the difference becomes apparent between 8 and 10 weeks. This suggests that the thigh bone can still grow up until 12 weeks of age, indicating the need for further research to determine the optimal age for slaughtering male KUB chickens to achieve ideal thigh bone dimensions. This

finding aligns with Müsse (2022) who noted that the length of the thigh bone continues to increase with age. It was also emphasized that bone growth rates differ between male and female chickens with males always reaching higher values compared to females. Therefore, male and female chickens grow at different rates and have different body compositions. Males often have faster growth and larger body structures, including bones, especially as they age. As chickens get older, the

difference in bone growth rates between sexes can become more pronounced, leading to the observed interaction.

The upper thigh bone width

Table 2 showed that both sex and slaughter age significantly affect the width of the upper thigh bone ($P < 0.05$). This reveals that the slaughter age notably impacts the width of the upper thigh bone. In males, significant differences in the average width were observed between slaughter ages of 4 and 6 weeks, with a 4.26% difference, while the difference between 8 and 10 weeks was only 0.45%. For females, the difference in width between the 4 and 6-week slaughter ages was 4.18%, while between 8 and 10 weeks, the difference was 1.51%.

Table 2 also showed that the average width of the upper thigh bones of both males and females, based on the differences between treatments for slaughter age and sex, is nearly identical.

Bone development continues with age as animals grow, their bones increase in size, density, and width. Younger animals have narrower, less mineralized bones, while older ones show more developed and broader bones. Also, growth plate activity, meaning that younger animals still have active growth plates (epiphyseal plates), which means bones are still elongating and expanding. With age, these plates close and bones mature.

The rate and pattern of bone growth differ between males and females over time. Male bones may continue to thicken for a longer time, while females might reach skeletal maturity earlier. Therefore, at certain ages, the difference between male and female bone width might be more or less pronounced. At younger ages, both sexes might have similar widths. At older ages, males may show significantly greater bone width due to continued growth (Müsse et al., 2022).

Table 2. Upper thigh bone width based on sex and slaughter age

Slaughtered Age (weeks)	Upper thigh bone width (mm)	
	Male	Female
4	4.47±0.12 ^a	4.56±0.23 ^a
6	8.73±1.26 ^b	8.74±1.27 ^b
8	14.55±3.17 ^c	10.34±2.04 ^{bc}
10	15.00±2.47 ^d	11.85±1.36 ^c
p-value		
Sex (S)	0.003	
Slaughter age (SA)	0.000	
S x SA	0.019	

Note: ^{a-d} different superscript in all columns and rows indicates a difference of $P < 0.05$

Lower Thigh Bone Length

Sex has no a significant effect ($P > 0.05$) on lower thigh bone length. However, the age at slaughter significantly impacts ($P < 0.05$) the length of the lower thigh. Bone length, especially in the lower thigh (e.g., tibia or femur), naturally increases with age as part of normal skeletal development. This age-related

increase in length is expected in both sexes as the chickens grow toward maturity. Unlike upper thigh bones or body mass, lower thigh bone length may not differ significantly between males and females, especially in breeds or lines with minimal sexual dimorphism in skeletal traits.

While males might be heavier or have wider bones, the length of long bones

like the tibia may reach similar endpoints in both sexes at slaughter, especially if the slaughter window is narrow (e.g., 6–10 weeks). For males, the average difference in length between slaughter ages of 4 and 6 weeks was 2.22%, while the difference between 8 and 10 weeks was 1.92%. For females, the difference between 4 and 6 weeks was 5.23%, while between 8 and 10 weeks was 2.33% (Table 3).

The lack of interaction between age and sex means that the effect of age on bone length is consistent across sexes. In other words, both males and females show a similar rate of increase in lower thigh bone length as they age. And the tibia length was used as the size indicator in KUB chickens (Puteri et al., 2020).

Table 3. Lower thigh length based on sex and slaughter age

Slaughter Age (weeks)	Thigh length (mm)	
	Male	Female
4	5.54±0.23 ^a	3.77±1.71 ^a
6	7.76±1.18 ^b	9.00±0.64 ^b
8	14.72±2.45 ^{cd}	12.78±2.15 ^c
10	16.64±1.69 ^d	15.11±2.22 ^d
p-value		
Sex (S)	0.079	
Slaughter Age (SA)	0.000	
S x SA	0.162	

Note: ^{a-d} different superscript in all columns and rows indicates a difference of P(<0.05)

Lower Thigh Bone Width

Sex did not have a significant effect (P>0.05), but age at slaughter significantly influenced (P<0.05) the width of the lower thigh bone. There was no interaction between the two factors for this parameter (Table 4). In males, the difference in average values between the 4 and 6-week slaughter ages was 3.83%, while the difference between the 8 and 10-week ages was 4.33%. For females, the difference between the 4 and 6-week slaughter ages was 2.81%, and the difference between the

8 and 10-week ages was 1.6%. The largest difference in average values was observed in males at 8 and 10 weeks of age. The progression and characteristics of bone growth exhibit sex-based differences over time. Males typically undergo bone thickening for a longer duration, while females generally reach skeletal maturity at an earlier age. Consequently, the disparity in bone width between males and females may vary in prominence depending on the specific age (Charuta et al., 2013). Another reason is that sex has limited effect on bone length in this region.

Table 4. Lower thigh bone width based on sex and slaughter age

Slaughter Age (weeks)	Lower thigh bone width (mm)	
	Male	Female
4	4.47±0.22 ^a	5.24±0.12 ^a
6	8.30±1.70 ^b	8.05±1.55 ^b
8	11.08±1.36 ^c	11.31±1.23 ^c
10	15.41±0.73 ^d	12.91±0.67 ^d
p-value		
Sex (S)	0.615	
Slaughter Age (SA)	0.000	
S x SA	0.213	

Note: ^{a-d} different superscript in all columns and rows indicates a difference of P (<0.05)

Wing Bone Length

As indicated in Table 5, sex does not significantly affect wing bone length ($P > 0.05$), whereas age at slaughter has a significant impact ($P < 0.05$). Additionally, there was no significant interaction between sex and age. Among males, the difference in wing bone length between 4 and 6 weeks of age was 0.46%, increasing to 2.79% between 8 and 10 weeks. For females, these differences were 2.28% and 4.47%, respectively. This suggests that wing bone length in chickens generally follows a predictable growth pattern primarily influenced by age rather than sex. Genetic or hormonal differences between males and females appear to have minimal effect on this trait. In breeds like

KUB and local chickens, wing length may not be significantly influenced by sex-related hormones or genetic factors (Eshimutu and Omoniyi, 2024). The lack of interaction between age and sex further indicates that both sexes experience similar growth rates in wing length over time. In other words, the developmental trajectory of wing length is consistent across males and females. This uniformity could be attributed to the KUB chicken's selective breeding for dual-purpose use, which may favour balanced growth across sexes, particularly for traits like wing length that are less subject to sexual selection. Similar patterns are often observed in traditional or indigenous breeds, where ornamental or flight-related features have not been strongly selected for.

Table 5. Wing bone length based on sex and slaughtered age

Slaughtered age (weeks)	Wing bone length (mm)	
	Male	Female
4	9.39±1.68 ^a	6.50±0.18 ^a
6	9.85±0.98 ^b	8.78±1.37 ^b
8	13.17±1.12 ^c	13.37±1.04 ^c
10	15.96±1.57 ^d	17.84±1.69 ^d
p-value:		
Sex (S)	0.140	
Slaughtered Age (SA)	0.000	
S x SA	0.032	

Note: ^{a-d} different superscript in all columns and rows indicates a difference of P (<0.05)

Breast length

Both factors (sex and slaughter age) and their interaction affected on breast length ($P < 0.05$) (Table 6). In males, the average difference in breast length between 4 and 6 weeks was 3.02%, while the difference between 8 and 10 weeks was 1.78%. In females, the difference in breast length between 4 and 6 weeks was 6.75%, and between 8 and 10 weeks, the difference was 1.9%. Males have longer breast than females. Effect of sex, male chickens (roosters) typically grow larger and develop more muscle mass, especially in areas like the breast, due to hormonal differences (e.g., testosterone). In many chicken breeds, including KUB, males

have more pronounced muscle growth, which directly affects carcass traits like breast length. Effect of slaughter age, as chickens age, muscle and skeletal structures continue to grow. Breast length increases over time, but the rate of increase may slow as the bird matures. Depending on breed, for fast growth chickens, major changes in breast meat traits were observed between 35 and 49 d of age and it was recommended to slough heavy lines at 6 weeks of age (Baéza et al., 2011). In this study. KUB chickens should be slaughtered at the age of 8 and 10 weeks because the growth of the breast length is still ongoing even though there is a decrease. This part of the meat has a high economic value.

Table 6. Breast length based on sex and slaughter age

Slaughtered age (weeks)	Breast length (mm)	
	Male	Female
4	13.64±4.22 ^a	11.64±1.39 ^a
6	16.66±1.55 ^b	18.39±0.86 ^b
8	21.63±2.40 ^{cd}	17.4±1.33 ^b
10	23.41±2.58 ^d	19.24±2.58 ^{bc}
p-value:		
Sex (S)	0.006	
Slaughtered Age (SA)	0.000	
S x SA	0.024	

Note: ^{a-d} different superscript in all columns and rows indicates a difference of $P < 0.05$

Breast width

Breast width in KUB chickens was significantly influenced by age ($P < 0.05$), but not by sex alone ($P > 0.05$). However, there was a significant interaction between sex and age ($P < 0.05$), indicating that the effect of age on breast width differed between males and females. Specifically, while breast width increased with age in both sexes, the rate or extent of increase varied, suggesting that sex modifies the age-related changes in breast development. In males, the average breast width

increased by 4.84% between 4 and 6 weeks, but showed only a 0.13% increase between 8 and 10 weeks. For females, the difference in breast width was 5.52% between 4 and 6 weeks, and 1.44% between 8 and 10 weeks. The data indicates that breast width in both sexes fluctuated with each slaughter age, likely due to minor differences in age between treatments. These findings are generally consistent with those of Puteri et al. (2020), who reported that the breast width in 10-week-old male chickens was 21.23 mm, and 20.39 mm in females.

Table 7. Width of the breast based on sex and slaughter age

Slaughtered age (weeks)	Width of the breast (mm)	
	Male	Female
4	11.22±1.43 ^a	12.04±1.15 ^a
6	16.06±1.47 ^b	17.56±1.33 ^{bc}
8	20.28±2.09 ^c	18.19±1.93 ^c
10	20.41±1.30 ^c	16.75±1.11 ^{bc}
p-value:		
Sex (S)	0.083	
Slaughtered Age (SA)	0.000	
S x SA	0.002	
Note: ^{a-c} different superscript in all columns and rows indicates a difference of P(<0.05)		

Back Length

This study indicates that both slaughter age and sex have a significant effect ($P<0.05$) on back length. There was no interaction between sex and slaughter age regarding back length. The longest back length for both male and female KUB chickens is observed at a slaughter age of 10 weeks (Table 8). Male KUB chickens have longer backs than females. For males, the difference in back length between slaughter ages of 4 and 6 weeks was 3.5%, while the difference between 8 and 10 weeks is 5.77%. In females, the difference between 4 and 6 weeks was 3.55%, and between 8 and 10 weeks, it was 3.72%.

Thus, in KUB chickens, both slaughter age and sex independently influence back length, indicating that older chickens and differences between males and females lead to measurable variations in back development. However, the absence of a significant interaction between these two factors suggests that the effect of age on back length does not differ between sexes, and the effect of sex remains consistent across different slaughter ages. These findings are consistent with the research by Primawati et al. (2021) who studied characteristics of body sizes of local chicken aged 3-10 weeks with different strains and found the back length (regardless of sex) was 22.00 ± 0.93 m

Table 8. Back length based on sex and slaughter age

Slaughtered age (weeks)	Back length (mm)	
	Male	Female
4	13.35±1.20 ^a	12.46±1.84 ^a
6	16.85±2.21 ^b	16.01±0.28 ^b
8	22.7±1.68 ^c	21.58±2.70 ^c
10	28.14±1.01 ^d	25.30±1.16 ^d
p-value:		
Sex (S)		0.016
Slaughtered age (SA)	0.000	
S x SA	0.453	
Note: ^{abcd} different superscripts in columns and rows indicate differences at P (<0.05)		

Back width

The back width of male chickens was greater than that of females at the same age (10 weeks). Additionally, the back width of an 8-week-old male chicken was almost equivalent to that of a 10-week-old female chicken (Table 9). Although the back has a lower economic

value compared to other carcass parts, it still influences the overall weight of the carcass. Therefore, if KUB chickens are sold as whole carcasses, the ideal slaughter age for both sexes is 10 weeks. However, if sold as individual carcasses, females should be slaughtered at 8 weeks of age. Generally, KUB chickens are sold per head, not based on live weight.

Table 9. The width of the backbone based on sex and slaughter age

Slaughtered age (weeks)	Backbone width (mm)	
	Male	Female
4	12.03±1.40 ^a	12.58±0.38 ^a
6	17.36±1.82 ^{bc}	15.62±1.67 ^b
8	18.21±1.17 ^{cd}	16.33±1.24 ^{bc}
10	21.89±1.60 ^d	18.67±2.08 ^d
p-value:		
Sex (S)	0.002	
Slaughtered age (SA)	0.000	
S x SA	0.063	

Note: ^{abcd} different superscripts in columns and rows indicate differences at P (<0.05)

CONCLUSIONS AND SUGGESTION

Conclusion

The age at slaughter affects all carcass dimensions, while sex also has an impact on all of them. An interaction between sex and slaughter age was observed for the length and width of the upper thigh, wing bone length, and the length and width of the breast (P<0.05). The largest carcass dimensions were observed at a slaughter age of 10 weeks and males was higher than females for almost all dimension parameters.

Suggestion

KUB chickens should be slaughtered at 10 weeks of age. Sex at marketing should also be considered.

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