Original Research Paper

Body Weight and Morphometric Characteristics of KUB Chicken at 60 Days of Age

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Abstract: Kampung Unggul Balitnak Chicken (KUB) is a highly favored Indonesian native chicken breed among breeders because of its rapid development rate and ability to thrive in many situations. This study aimed to investigate KUB chickens' growth performance and morphometric parameters at 60 days of age, a crucial phase for determining their suitability as commercial broilers. Using an intensive rearing system, 100 KUB chickens were reared for 60 days in group cages. Body weight measurements were recorded weekly, and morphometric traits were measured after the study period. The study's findings indicated that the mean body weight of KUB chickens at 60 days of age was 710.53±16.76 grams, suggesting a favorable growth rate. In addition, the morphometric analysis revealed favorable physical characteristics, including an average chest length of 100.55±3.70 mm, chest width of 47.47±3.12 mm, wing length of 165.93±4.34 mm, back length of 164.9±4.26 mm, back height of 205.51±3.99 mm, shank length of 63.23±3.69 mm, and shank circumference of 35.76±1.48 mm. The results indicate that KUB chickens exhibit desirable body weight and morphometric traits at 60 days old, proving their suitability in commercial broiler farming. To summarize, this study offers significant information regarding the growth performance and physical characteristics of KUB chickens during a critical phase of their development. The findings highlight the breed's capacity to serve as a practical choice for commercial broiler production, enhancing the variety and long-term viability of the poultry sector in Indonesia.

Keywords: chicken breeding; growth performance; local chicken breeds; poultry science.

Introduction

The chicken livestock industry is essential for meeting Indonesia's need for animal protein, particularly due to the expanding population, increasing incomes, and greater recognition of the significance of protein in diets. Chicken's price renders it a crucial protein source accessible to individuals of all socioeconomic statuses. The Kampung Unggul Balitnak (KUB) chicken, a local breed created by the Indonesian Research Institute for Animal Husbandry (Balitnak), offers a promising alternative to conventional kampung chickens due to its exceptional growth rate, egg production, and ability to resist diseases (Komarudin et al., 2021; Sartika & Iskandar, 2019).

Comprehending the body weight and morphometric parameters of KUB chickens at 60 days of age is essential for various reasons: 1) Assessment of Growth Potential: This understanding allows for the creation of optimized breeding programs and assists in predicting body weight in later phases, helping farmers in making well-informed choices. 2) Performance Comparison: By comparing the performance of KUB chicken with other strains, farmers can choose the most appropriate breed for their unique

requirements, guaranteeing maximum production and profitability. 3) Environmental Impact Analysis: By comprehending the influence of environmental elements on KUB chicken growth and development, we can improve the rearing conditions, resulting in healthier and more productive flocks.

Previous studies have shown that KUB chickens typically weigh between 800-1000 grams at 60 days of age (Fitriani et al., 2023; Harnanik & Wiraswati, 2021). These chickens also exhibit significant variation in morphometric traits such as body length, chest width, and leg length (Depison et al., 2020; Putri et al., 2020). This study aims to investigate male and female KUB chickens' body weight and morphometric features at 60 days of age, particularly those raised intensively. This study builds upon prior knowledge and experience in this field. This study aims to provide crucial insights into KUB chickens' growth and progress and offer valuable advice on maximizing their potential in commercial production environments.

Material and Method

Experimental Animals

The study utilized a sample of 100 KUB chickens, consisting of both male and female hens aged 60 days. These chicks were kept at the Lendang Lestari Group Cage in Bagek Polak Village, Labuapi District, West Lombok Regency, West Nusa Tenggara Province. The investigation utilized a digital scale with a 3 kg capacity and a precision of 0.01 grams, as well as vernier calipers and a measuring tape. The research sampling was carried out utilizing a purposive sample technique.

Data Collection
Parameters Observed in the Study:

1. **Body Weight (BW):** Measured by weighing the KUB chicken using a digital scale (g).
2. **Chest Length (CL):** Determined by measuring the sternum bone (mm). The length of the front sternum is measured from the upper base to the tip of the chest using a measuring tape and then converted to a vernier caliper.
3. **Chest Width (CW):** Obtained by measuring the distance from the left side of the sternum to the widest part on the right side using a digital vernier caliper (mm).
4. **Wing Length (WL):** Measured from the humerus bone to the tip of the phalanges using a measuring tape (cm converted to mm) (Permadi et al., 2020).
5. **Back Length (BL):** Measured from the neck's base to the tail's base using a measuring tape (cm converted to mm).
6. **Back Height (BH):** Measured from the bottom of the chicken's foot to the back using a measuring tape (cm converted to mm).
7. **Shank Length (SL):** Measured along the tarsometatarsus bone (shank) using a digital vernier caliper (mm) (Permadi et al., 2020).
8. **Shank Circumference (SC):** Measured by wrapping a measuring tape around the middle of the tarsometatarsus bone (shank) (cm converted to mm) (Suhardi, 2012).

Data Analysis

The morphometric data were then recorded and calculated for their mean, standard deviation, and coefficient of variation using Microsoft Excel 2019. The results were then discussed descriptively. The formulas for calculating the mean, standard deviation, and coefficient of variation are as follows:

Average Formula

$$\bar{x} = \frac{\sum x}{n}$$

Information:
$\bar{x}$ = Average
$\sum x$ = Number of data values
n = Lots of data

Standard deviation formula

$$Sd = \sqrt{\frac{1}{n-1} \sum (x_i - \bar{x})^2}$$

Information:
Sd = Standard deviation
x_i = i-th x value
n = Lots of data

Coefficient of Variation

$$CV = \frac{Sd}{\bar{x}} \times 100\%$$

Information:
CV   = Coefficient of variation
Sd   = Standard deviation
$\bar{x}$ = Average

Result and Discussion

KUB chicken body weight and weight gain 60 Days

The body weight of KUB chickens exhibited a progressive increase as they advanced in age, from week 1 to week 8. The maximum body weight was recorded in week eight at 710.53 ± 16.76 grams, while the minimum weight was detected in week one at 57.08 ± 5.06 grams. The greatest weight increase occurred from week 4 to week 5, with a gain of 100.32 grams, while the smallest increase was observed between week one and week 2, with a gain of 59.08 grams. According to the findings of this research, the mean body weight of KUB chickens was 710.53 ± 44.66 g. The findings of the study on relative body weight measurement are consistent with the results reported by Putri et al. (2020), which were 713.15 ± 66.75 g, and surpass the results reported by Harnanik & Wiraswati (2021), which were 635.21 ± 72.67 g. Genetic variables, environmental factors, and the interplay between genetic factors and the environment influence the study's outcomes (Stallings & Neppl, 2021; von Stumm et al., 2023).

Table 1. Body weight and weight gain of KUB chicken

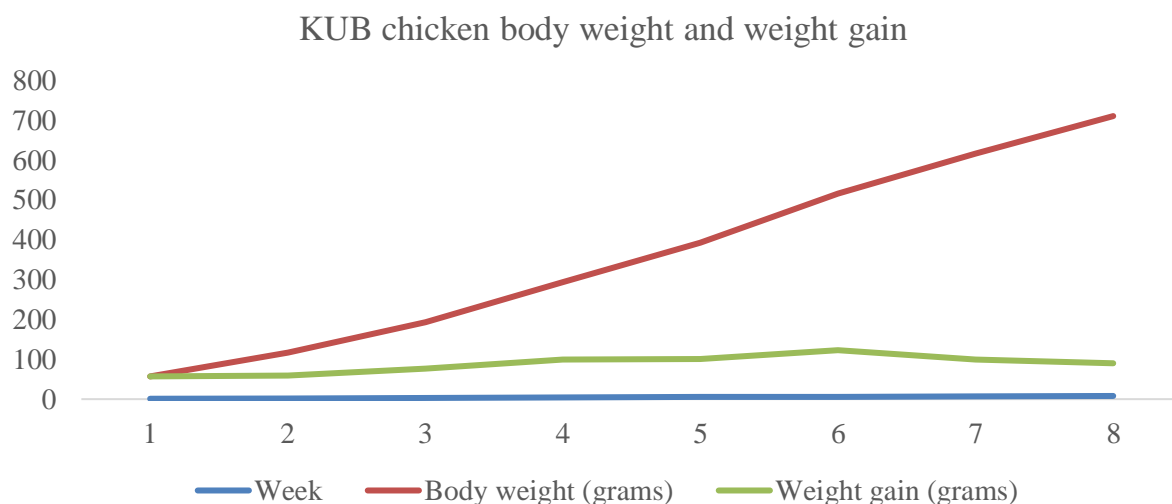| Week	Body weight (grams)	Weight gain (grams)
1	57.08 ± 5.06	57.08
2	116.16 ± 5.06	59.08
3	193.26 ± 3.42	77.10
4	292.94 ± 4.11	99.68
5	393.26 ± 3.42	100.32
6	516.16 ± 5.06	122.90
7	616.16 ± 5.06	100.00
8	710.53 ± 16.76	90.32

Figure 1. Body weight and weight gain of KUB chicken

The findings of this study suggest that KUB chickens demonstrate a uniform growth trajectory, with their body weight and weight gain progressively increasing as they mature. This aligns with the anticipated growth pattern of broiler chickens, which are commonly bred for meat production and undergo rapid growth in the initial phases of their life. The progressive rise in

weight gain, accompanied by a minor decrease towards the conclusion of the study period, can be attributed to the chickens nearing their fully developed weight.

Multiple variables may have impacted the outcomes of this investigation. The factors encompassed in this list are heredity, nutrition, environmental variables, and health state (Gržinić et al., 2023; Hartcher & Lum, 2020). The KUB chicken breed may possess distinct genetic characteristics influencing its growth rate and overall body weight. The growth of the chickens would have been significantly influenced by both the nutritional composition and amount of feed offered to them. Environmental elements such as temperature, humidity, and lighting may affect the hens' metabolism and growth (Gržinić et al., 2023; Hartcher & Lum, 2020). Furthermore, the hens' growth could have been influenced by their health condition, which encompasses any potential infections or parasites.

Additional research could explore the precise genetic, dietary, and environmental elements that contribute to the growth and development of KUB chickens. This may entail comparing the growth performance of KUB chickens with other broiler breeds, analyzing the impacts of different feed formulations on their growth, and evaluating the influence of various environmental variables on their development. Furthermore, further research could investigate the potential of KUB chickens for meat production, considering their growth rate, body weight, and meat quality.

KUB Chicken Morphometrics

The parameters utilized in this study are specifically associated with features linked to meat production, including body weight (BW), chest length (CL), chest width (CW), wing length (WL), shank length (SL), and shank circumference (SC). In addition, Irmaya et al. (2021) asserted that the physical dimensions of chicken, such as shank length, shank circumference, tibia length, tibia circumference, chest circumference, chest width, and chest length, serve as distinguishing characteristics for categorizing poultry of the same breed. The findings of this morphometric analysis of KUB chicken are displayed in Table 2.

Table 2. Average body measurements of KUB chicken at the age of 8 weeks

No	Body Measurements	Average
1	Chest Length (mm)	100.55 ± 3.70
2	Chest Width (mm)	47.47 ± 3.12
3	Wing Length (mm)	165.93 ± 4.34
4	Back Length (mm)	164.9 ± 4.26
5	Back Height (mm)	205.51 ± 3.99
6	Shank Length (mm)	63.23 ± 3.69
7	Shank Circumference (mm)	35.76 ± 1.48

Chest Length and Width

The investigation yielded measurements of 100.55 ± 3.70 mm for the chest length and 47.47 ± 3.12 mm for the chest breadth of KUB chickens. The values presented here resemble the measurements Putri et al. (2020) reported, which were 100.54 ± 5.23 mm and 47.47 ± 4.37 mm for chest length and width, respectively. The observed consistency is most likely attributable to shared environmental characteristics at the sampling sites, including age, raising system, and feeding system.

Quantitative features such as chest length and width have economic significance and can serve as data points for estimating the body weight of cattle. A study by Pratama et al. (2024) shows a significant and positive link between KUB chickens' body weight and chest breadth. Moreover, Hastuti et al. (2021) found a strong association between body weight and chest circumference, chest width, and chest length, as indicated by the correlation coefficient.

Wing Length

The mean wing length of KUB chickens at 8 weeks of age was 165.93 ± 4.34 mm. The wing

length of chickens is a significant economic characteristic since it is directly correlated with the overall muscle mass of the animal. The findings of this study indicate that KUB chickens exhibit a comparatively elongated wing length compared to other chicken breeds. As an illustration, Sadick et al. (2020) conducted a survey revealing that the mean wing length of Broiler chickens at eight weeks of age was 155.2 $\pm$ 3.8 mm. These findings indicate that KUB chickens likely possess a greater muscle mass than Broiler chickens.

Several factors, such as genetics, nutrition, and environment, can influence the wing length of chickens (Jones et al., 2005; Zaghari et al., 2011). All chickens in this study were reared under identical environmental conditions and provided with a uniform diet. These findings indicate that the variations in wing length seen among the hens in this study are most likely attributable to genetic causes. Additional investigation is required to ascertain the precise genes accountable for the elongated wing span of KUB chickens. This data could be utilized to formulate breeding initiatives to generate hens with even greater muscularity.

Shank Length and Circumference

The assessment yielded the shank length and circumference of the KUB chicken, which measured 63.23 $\pm$ 3.69 mm and 35.76 $\pm$ 1.48 mm, respectively. The research findings are consistent with those previously published for the average shank length and circumference of KUB chicken, which were 62.76 $\pm$ 6.25 mm and 36.44 $\pm$ 2.38 mm, respectively.

The length and circumference of the shank are crucial factors in supporting the chicken's body and can, therefore, enhance chicken productivity. According to Nosike et al. (2021), shank length is the most precise indicator of body weight.

Moreover, Pratama et al. (2024) asserted a robust positive link between body weight shank length and chest breadth in male and female KUB chickens, as indicated by the correlation coefficient (r).

Back Height and Length

The mean back height of KUB chickens at 8 weeks of age was 205.51 $\pm$ 3.99 mm. The mean back length of KUB chickens at eight weeks of age was 164.9 $\pm$ 4.26 mm. When selecting chickens for breeding, breeders must carefully assess the height and length of their backs. A chicken's back height indicates its total size and impacts the quantity of meat that can be obtained from the bird (Hafid, 2023). The back length of a chicken is an important factor in determining its size and can impact the quantity of meat that can be obtained from it. The study found that KUB chickens' average back height and length at eight weeks old was within the expected range for this particular breed. These findings indicate that the chickens involved in this research were healthy and received adequate nutrition.

Several factors, such as genetics, nutrition, and environment, can influence the height and length of hens' backs (Jones et al., 2005; Zaghari et al., 2011). All the chickens in this study were reared under identical environmental conditions and received similar feed. These findings indicate that the variations in the height and length of hens' backs were attributable to genetic causes. Breeders can utilize this study's findings to choose hens with favorable back height and length. Breeders can enhance the overall quality of their flocks by choosing hens with these characteristics.

Coefficient of Variation

The coefficient of variation of KUB chickens' observed body size characteristics is presented in Table 3, reflecting their performance.

Table 3. Coefficient of Variation of Body Measurements of KUB chicken at the age of 8 week

Body Measurements	Average	Coefficient of Variation (%)
Chest Length (mm)	100.55 $\pm$ 3.70	3.68
Chest Width (mm)	47.47 $\pm$ 3.12	6.57
Wing Length (mm)	165.93 $\pm$ 4.34	2.62
Back Length (mm)	164.9 $\pm$ 4.26	2.58
Back Height (mm)	205.51 $\pm$ 3.99	1.94
Shank Length (mm)	63.23 $\pm$ 3.69	5.83
Shank Circumference (mm)	35.76 $\pm$ 1.48	4.13
Body Weight (gr)	710.53 $\pm$ 16.76	2.36

The coefficient of variation was employed to assess the degree of variation in body size compared to body weight in chickens. The coefficient of variation for chest width and body weight of KUB chickens was moderate, with values of 6.57% and 2.36%, respectively. On the other hand, the variation was low for shank circumference (4.13%), shank length (5.83%), back height (1.94%), back length (2.58%), wing length (2.62%), and chest length (3.68%). Kurnianto (2009) classified variance into three categories: low variation for values less than 5%, moderate variation between 6% and 14%, and high variation for values equal to or greater than 15%.

According to the collected data, the coefficient of morphometric diversity of KUB chickens in the Lendang Lestari group cage ranges from moderate to low. This suggests that the coefficient of morphometric variety of the observed KUB hens has a low coefficient of variation. The low coefficient of variation in KUB chickens is due to their genetic selection. The test samples are also kept under identical environmental conditions, including cultivation, cages, and administering the same meals. According to Nematbakhsh et al. (2021), the size of livestock might range due to variations in genetic potential, origin, and the applied breeding and mating technique. According to Urfa et al. (2017), KUB chickens are produced by choosing indigenous Indonesian kampung chickens (the female line) for six consecutive generations. These chickens possess various benefits, such as increased disease resistance, enhanced feed efficiency resulting from reduced consumption, low mortality rates, and higher egg production than other kampung chickens.

Conclusion

This study assessed KUB chickens' growth performance and physical parameters when they reached 60 days of age. The findings suggest that KUB chickens demonstrate favorable growth rates, achieving an average body weight of 710.53 grams at this stage of development. In addition, the morphometric properties of these birds, such as their chest dimensions, wing and back lengths, back height, and shank measurements, correspond to ideal attributes for broiler chickens. The findings emphasize the potential of KUB chickens as a suitable breed for commercial broiler production in Indonesia, contributing to the industry's diversity and sustainability.

Acknowledgments

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