

Morphometrics of One-Month-Old Tukong Chickens: Indonesia's Indigenous Rumpless Breed

Nisa'us Sholikhah¹, Yuli Arif Tribudi², Aprilianna Putri Zahara Nafsina Luvita Sari³ and Danung Nur Adli⁴

¹ Center for Livestock Biotech Studies, Department of Animal Science, Faculty of Animal Science, Universitas Islam Malang, Malang 65155, Indonesia

² Department of Animal Science, Faculty of Agriculture, Universitas Tanjungpura, Pontianak 78121, Indonesia

³ Department of Animal Production, Faculty of Animal Husbandry, Universitas Padjadjaran, Sumedang 45363, West Java, Indonesia.

⁴ Smart Livestock Industry Study Programme, Faculty of Animal Science, Universitas Brawijaya, Malang 65145, Indonesia

Abstract. Indonesia is rich in local breeds of chickens that are valuable genetic resources for growth performance and productivity improvement. Among the most notable of these is the Tukong chicken, which is characterized by a rumpless phenotype. The present study was conducted to investigate morphometric characteristics of one-month-old Tukong chickens. A total of 25 birds (both males and females) were evaluated. The measure traits included shank length and diameter, tibia and femur length, breast circumference and length, back length, wing length, beak length, and body weight. Descriptive statistics showed that males consistently displayed higher mean values across all traits, with notable differences observed in shank length (5.58 vs. 4.59 cm) and body weight (259.97 vs. 234.20 g). Coefficients of variation (CV) indicated moderate variability, with body weight showing the highest relative dispersion (males: 20.27%; females 16.14%), and tibia length (males: 5.43% females: 8.01%). In summary, the findings suggest that Tukong chickens have relatively uniform body proportions, with breast circumference as the most predictive body weight.

Keywords: Breast traits, indigenous chickens, Tukong chickens, prediction

1 Introduction

Indonesia has identified 31 distinct local chicken populations, several of which are categorized as rare due to their limited populations and insufficient biological characterization, including the Tukong chicken [1, 2]. The Tukong chicken is an indigenous

¹ Corresponding author: nisaus.sholikhah@unisma.ac.id

germplasm from West Kalimantan that is uniquely characterized by the absence of a tailbone (rumpless) and relatively small body size (Figure 1). These distinctive traits represent an important component of livestock genetic diversity and may provide valuable insights into the processes of adaptation and domestication of poultry in the region [3]. Variation in body size and conformation among local chickens is a critical parameter for evaluating growth patterns and skeletal development. Body measurements are widely recognized as reliable indicators of body weight [4] and serve as a basis for understanding feed efficiency and the conversion of nutrients into meat and muscle tissue [5].

Morphometric data characterized as femur length and tibia length, chest followed by wing length, back length, and then followed by shank, provide an objective measure of growth, body structure and productivity potential [6]. This information is essential in defining the boundaries of phenotypic variability and will contribute crucial information to guide breeding or selection work. A significant transformation in morphometric evaluation occurs at one month of age which is important time frame of a chicken's life in terms of morphometric evaluation. One month of age marks a shift from early growth to the initiation of skeletal development and formation of body frame. At this time in growth patterns are detected among populations of chickens before the influence of environmental or management factors become more predominant in determining body conformation. Early body measurements also provide a reliable basis for predicting mature body size, estimating growth trajectories, and identifying traits of economic and breeding interest [7]. Given the scarcity of data on Tukong chickens, obtaining morphometric information at this early age is essential to establish baseline characteristics, support conservation efforts, and inform the sustainable utilization of Indonesia's indigenous poultry genetic resources.



Fig. 1. Tukong chicken

2 Materials and Methods

2.1 Research Animals and Experimental Design

The research material consisted of Tukong chickens reared from day-old chicks (DOC) to the age of one month. In total, 50 individuals were utilized for the study: 25 males and 25 females. The chickens were kept in a colony-rearing condition in a cage measuring $2 \times 1 \times 0.5$ m, with feeders, drinkers, and lighting facilities. Feed and water were provided *ad libitum*, using commercial feed and fresh drinking water. Routine vaccination and medication programs were applied to maintain flock health.

2.2 Equipment

Morphometric assessments were performed according to procedures of [8] and [9], as shown in Figure 2. We measured thirteen distinct morphological traits and carefully ensured measurement accuracy and consistency across individuals. The measurements encompassed both skeletal and soft-tissue dimensions to provide a comprehensive overview of the birds' body conformation. Head circumference was determined by wrapping a flexible measuring tape around the widest part of the head. The length of the neck was measured from the proximal cervical vertebrae to the caudal vertebrae using calipers. Wing length was assessed from the humerus, extending through the radius and ulna to the metacarpus, with the aid of a measuring tape. A back length measurement was taken from the intersection of the neck and spine to the end of the pygostyle bone, and a breast circumference measurement was taken by wrapping around the thoracic area on the sternum plane.

Femur and tibia lengths were recorded with calipers, with the femur measured from the pelvic bone to its junction with the tibia, and the tibia from the patella down to the end of the bone. Shank length was measured along the tarsometatarsus bone with a digital caliper, and shank circumference was measured at the middle of this bone using a flexible tape measure. The length of the third toe was measured from its base to the tip using calipers, and breast width was recorded as the distance between the left and right sternum bones. Beak length was taken from the base to the tip, and breast length was measured along the sternum using a digital caliper. In this study, the morphometric traits examined included body weight (g), breast length (cm), breast circumference (cm), back length (cm), wing length (cm), tibia length (cm), femur length (cm), shank length (cm), shank circumference (cm), and beak length (mm).

2.3 Data Analysis

All data were expressed as mean ($\bar{x}$), standard deviation (SD), and coefficient of variation (CV). Descriptive statistics were used to summarize morphometric characteristics. Pearson's correlation analysis was conducted to determine the relationship between body weight and morphometric traits associated with skeletal growth and development.

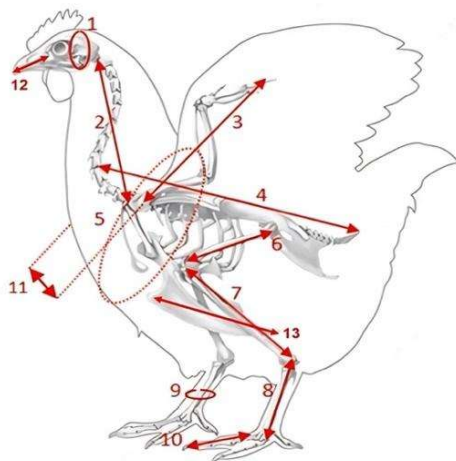


Fig. 2. Morphometric measurement schemes in chickens include head circumference (1), neck length (2), wing length (3), back length (4), breast circumference (5), femur length (6), tibia length (7), shank length (8), shank circumference (9), third toe length (10), breast width (11), beak length (12) and breast length (13)

3 RESULTS AND DISCUSSION

The average morphometric traits and body weight of one-month-old Tukong chickens are presented in Table 1. The results showed significant differences in morphometric size between males and females in this age group, with male Tukong chickens consistently higher than the females' on almost all parameters evaluated, including shank length (SL), shank diameter (SD), tibia length (TL), femur length (FL), breast circumference (BrC), breast length (BrL), and wing length (WL). These results are consistent with the assessment of the biological tendency of roosters to have a more rapid growth rate than hens in the early stage of development. Morphometry, the measurement of body size, can serve as an effective method of assessing growth, health, and performance of poultry. As noted by [10], sexual dimorphism in chickens can be recognized in the juvenile stage, with males exhibiting greater or larger body sizes than females. The present study supports this pattern, as male Tukong chickens at one month of age exhibited consistently greater morphometric measurements than females, including differences in shank, tibia, and femur lengths, as well as breast circumference and body weight.

The coefficient of variation (CV) further illustrates the degree of diversity among individuals for each morphometric parameter. Low CV values, such as in male tibia length (5.43%), suggest relatively uniform size within the group, whereas high CV values, such as in male body weight (20.27%), indicate substantial variability within the population. Such variation may result from both genetic and environmental influences, including management practices and feed quality [11]. Consequently, body weight during the early growth phase may serve as a sensitive indicator of maintenance quality.

Table 1. Average and coefficient variation (CV) of the morphometric size of 1-month-old Tukong chickens

Traits	Male		Female	
	Mean	CV	Mean	CV
Shank length (SL) (cm)	5.58±0.68	12.22	4.59±0.55	11.91
Shank diameter (SD) (cm)	2.21±0.25	11.25	2.09±0.13	6.11
Tibia length (TL) (cm)	6.95±0.38	5.43	6.19±0.50	8.01
Femur length (FL) (cm)	6.57±0.88	13.42	5.34±0.78	14.62
Breast circumference (BrC) (cm)	14.62±1.14	7.82	13.67±1.02	7.28
Breast length (BrL) (cm)	6.08±0.76	12.43	5.70±0.36	6.39
Back length (BcL) (cm)	9.58±0.86	8.96	9.25±1.12	12.13
Wing length (WL) (cm)	12.17±0.84	6.88	11.36±1.14	10.06
Beak length (BeL) (mm)	2.03±0.13	6.63	1.99±0.13	6.69
Body weight (BW) (g)	259.96±52.70	20.27	234.20±37.81	16.14

CV – coefficient variation

The correlations between morphometric traits and body weight of one-month-old Tukong chickens are presented in Table 2. Correlation values ranged from moderate to strong, with the highest relationships observed for breast circumference ($r = 0.92$), breast length ($r = 0.80$), and back length ($r = 0.84$). Among these, breast circumference showed the strongest association with body weight, indicating its suitability as a predictor of growth performance in Tukong chickens. These results are consistent with previous studies on local chickens, which also reported that chest circumference is strongly correlated with body weight and overall growth performance [12, 13]. Thus, breast circumference measurement

offers a practical and non-invasive selection parameter for breeding programs aimed at improving early growth [14].

Table 2. Correlation value of morphometric size with the weight of 1-month-old Tukong chickens

Traits	Correlation
Shank length (SL) > Body weight (BW)	0.48
Shank diameter (SD) > Body weight (BW)	0.60
Tibia length (TL) > Body weight (BW)	0.38
Femur length (FL) > Body weight (BW)	0.66
Breast circumference (BrC) > Body weight (BW)	0.92
Breast length (BrL) > Body weight (BW)	0.80
Back length (BcL) > Body weight (BW)	0.84
Wing length (WL) > Body weight (BW)	0.54
Beak length (BeL) > Body weight (BW)	0.62

The emergence of morphometric differences between males and females as early as one month of age suggests that biological factors such as growth hormones and testosterone are already influencing sexual dimorphism at this stage [15]. Meanwhile, the relatively high variability in body weight underscores the importance of optimizing environmental conditions to minimize unwanted heterogeneity in growth performance. Overall, the findings of this study emphasize the utility of simple morphometric traits, particularly breast circumference, as reliable predictors of body weight. Such traits provide a practical tool for selection and performance monitoring, especially in field conditions where frequent weighing of chickens is less feasible.

4 Conclusion

To sum up, the findings of this study showed evidence of clear sexual dimorphism early in life, with males having larger body dimensions than females. Furthermore, across morphometric traits, breast circumference displayed the strongest correlation with body weight, making it a promising predictor of growth performance. Overall, these outcomes provide important information that will be useful in breeding and genetic improvement programs designed to increase productivity in Tukong chickens.

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