

Sex-Based Growth Performance of Three Varieties of Kedu Chicken Aged 0–10 Weeks

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ABSTRACT

This study aimed to evaluate the growth performance of Red-Combed Kedu (RCK), Black-Combed Kedu (BCK), and White Kedu (WK) chickens based on sex during the early growth phase (0 to 10 weeks of age). A total of 136 Kedu chickens were raised under uniform management conditions, consisting of 99 RCK (65 roosters and 34 hens), 29 BCK (5 roosters and 24 hens), and 8 WK (6 roosters and two hens). Body weight was recorded weekly and analysed using a two-way General Linear Model (GLM) in SAS to assess the effects of chicken variety, sex, and their interaction. The Shapiro–Wilk test confirmed that the data were normally distributed ($p > 0.05$). The results showed that sex had a significant effect on body weight from weeks 3 to 10 ($p < 0.05$), with roosters consistently exhibiting higher weights than hens. Significant differences among chicken varieties were observed only in the hen group at weeks 9 and 10, where BCK hens had higher body weights ($p < 0.05$) than WK hens, while RCK hens showed intermediate values. In contrast, no significant differences were found among rooster groups at any age. These findings suggest that genetic factors play an essential role in influencing growth performance in Kedu chickens, particularly in hens. This information provides a valuable foundation for breeding selection and the conservation of local chicken genetic resources.

Keywords: Body weight, breeding selection, growth performance, Kedu chickens,

INTRODUCTION

The Kedu chicken is one of Indonesia's indigenous poultry genetic resources, officially recognised through the Decree of the Minister of Agriculture No. 2481/Kpts/LB.430/8/2012. This breed holds significant historical, cultural, and economic value, and has long been familiar to communities, particularly in Central Java and surrounding regions. Kedu chickens are known for their resilience, distinctive meat flavour, and unique morphological characteristics (Mahfudz et al., 2024). They comprise several varieties such as Red Combed Kedu (RCK), Black Combed Kedu (BCK), and White Kedu (WK), which are visually distinguished by plumage colour and comb morphology (Mustaqiem et al., 2024). These phenotypic traits reflect underlying genetic diversity that can be utilised in breeding programs to improve production traits and ensure the conservation of local poultry genetic resources (Azmizam & Teguh, 2025; Muhsinin et al., 2025). Classified as a dual-purpose breed, the Kedu chicken is valued for both meat and egg production, making it a promising candidate for

sustainable poultry farming systems, particularly at the smallholder level (Mahfudz et al., 2024).

Phenotypic traits such as plumage colour, comb shape, and body size not only contribute to the birds' aesthetic appeal but are also closely associated with physiological performance and productivity. Previous studies have demonstrated that variations in comb and plumage colour affect chickens' adaptability to the environment and metabolic efficiency (Qi et al., 2025). Therefore, evaluating the growth of these three Kedu chicken varieties is essential to understand better the contribution of genetic factors to their production performance. One of the primary parameters for evaluating poultry performance is body weight, as it is directly linked to feed efficiency, market age, and economic value (Ekinici et al., 2021). In addition to genetic factors, sex also plays an important role in determining growth performance. Roosters generally have higher body weight and faster growth rates than hens, due to the influence of androgens and differing physiological needs (Avrilliani et al., 2024). These differences are already evident during the grower phase and become more pronounced as the crop approaches market age. Therefore, studying



growth differences based on sex are highly relevant, especially in the context of superior breeding selection and local poultry management strategies.

Based on the above background, this study aimed to evaluate the growth differences in body weight of Red-Combed, Black-Combed, and White Kedu chickens by sex during the 0-10-week age range. The results of this study are expected to provide scientific information that is useful as a basis for conservation and genetic selection of Indonesian local chickens.

MATERIALS AND METHODS

Study Location and Period

This study was conducted at the Poultry House, Faculty of Animal and Agricultural Sciences, Universitas Diponegoro. The rearing period began on March 14, 2025, and lasted for 10 weeks, from day-old chicks (DOC) to 10 weeks of age. During this period, body weight was recorded weekly as part of the evaluation of Kedu chicken growth performance.

Research Materials

The experimental animals consisted of 136-day-old chicks (DOC) representing three varieties of Kedu chickens: Red-Combed Kedu (RCK), Black-Combed Kedu (BCK), and White Kedu (WK). The RCK group comprised 99 individuals (65 roosters and 34 hens), the BCK group included 29 individuals (5 roosters and 24 hens), and the WK group consisted of 8 individuals (6 roosters and 2 hens). Sex determination was initially performed through visual inspection at the start of the rearing period and was reconfirmed during the growth phase based on the development of secondary phenotypic characteristics.

From weeks 1 to 3, the chicks were housed in group brooder cages. Beginning at week 4 and continuing through week 10, each bird was

transferred to an individual cage and assigned a unique identification number. All chickens were provided ad libitum access to commercial feed (Bravo 511, PT Charoen Pokphand Indonesia) and clean drinking water. Artificial lighting was supplied daily from 5:00 PM to 7:00 AM (WIB) to ensure adequate exposure to light. Routine health monitoring was performed throughout the rearing period.

Data Collection

Body weight was measured weekly from week 0 (day 1) to week 10 using a digital scale. The data were recorded as mean \pm standard deviation for each chicken variety and sex.

Data Analysis

The data were analysed using a two-way General Linear Model (GLM) to assess the effects of chicken variety (RCK, BCK, WK), sex (rooster and hen), and their interaction on body weight from 0 to 10 weeks of age. Data normality was assessed using the Shapiro–Wilk test, which confirmed a normal distribution ($p > 0.05$). When significant effects ($p < 0.05$) were detected, post-hoc comparisons were performed using the Bonferroni test to identify groups that were significantly different from one another. All analyses were carried out using SAS software.

RESULTS AND DISCUSSION

The results of the study (Table 1) showed that the body weight of Kedu chickens increased steadily each week during the 0–10-week period. In the early phase of life (weeks 0 to 2), the average body weight remained relatively uniform across Kedu chicken varieties and sexes. This lack of significant difference at the early stage is likely due to the dominant influence of maternal genetic factors and uniform environmental adaptation immediately after hatching (Dunislawska et al., 2022; Avrilliani et al., 2024).

Table 1. Mean body weight (g) of Red Combed, Black Combed, and White Kedu chickens (roosters and hens) at 0–10 weeks of age

Age (weeks)	Chicken Variety	Roosters (Mean \pm SD)	Hens (Mean \pm SD)
0	Red Combed Kedu	30.94 \pm 2.95	31.50 \pm 3.21
	Black Combed Kedu	32.60 \pm 2.07	32.17 \pm 3.12
	White Kedu	31.00 \pm 1.67	30.50 \pm 0.71
	Total	31.05\pm2.83	31.73\pm3.12
1	Red Combed Kedu	62.62 \pm 6.58	60.65 \pm 7.06
	Black Combed Kedu	65.80 \pm 8.32	64.63 \pm 7.45
	White Kedu	66.50 \pm 10.77	59.50 \pm 2.12

Age (weeks)	Chicken Variety	Roosters (Mean \pm SD)	Hens (Mean \pm SD)
	Total	63.13\pm7.07	62.20\pm7.41
2	Red Combed Kedu	120.42 \pm 12.82	114.06 \pm 12.80
	Black Combed Kedu	124.00 \pm 13.15	120.71 \pm 12.21
	White Kedu	123.67 \pm 20.66	111.50 \pm 7.78
	Total	120.91 \pm 13.39	116.63 \pm 12.64
3	Red Combed Kedu	191.80 \pm 21.92	176.21 \pm 15.63
	Black Combed Kedu	205.80 \pm 26.57	182.25 \pm 20.40
	White Kedu	200.17 \pm 15.16	178.00 \pm 15.56
	Total	193.38\pm21.89^a	178.68\pm18.20^b
4	Red Combed Kedu	295.20 \pm 41.61	261.59 \pm 30.25
	Black Combed Kedu	324.80 \pm 65.82	270.88 \pm 34.79
	White Kedu	299.67 \pm 56.93	268.50 \pm 31.82
	Total	297.50\pm44.49^a	265.53\pm33.77^b
5	Red Combed Kedu	426.38 \pm 49.31	378.24 \pm 34.83
	Black Combed Kedu	434.00 \pm 47.36	389.79 \pm 36.34
	White Kedu	438.33 \pm 41.79	352.50 \pm 45.96
	Total	427.83\pm48.21^a	382.00\pm38.93^b
6	Red Combed Kedu	567.69 \pm 55.70	486.18 \pm 39.06
	Black Combed Kedu	588.00 \pm 69.34	504.38 \pm 39.93
	White Kedu	580.00 \pm 40.12	437.50 \pm 45.96
	Total	570.00\pm55.18^a	491.83\pm45.69^b
7	Red Combed Kedu	711.46 \pm 77.55	597.65 \pm 57.63
	Black Combed Kedu	741.00 \pm 88.42	624.79 \pm 50.40
	White Kedu	707.50 \pm 51.45	535.00 \pm 56.57
	Total	713.09\pm76.04^a	606.42\pm59.23^b
8	Red Combed Kedu	846.15 \pm 83.39	708.68 \pm 72.22
	Black Combed Kedu	857.00 \pm 117.24	744.58 \pm 61.98
	White Kedu	851.67 \pm 34.74	625.00 \pm 77.78
	Total	847.30\pm82.20^a	720.25\pm71.08^b
9	Red Combed Kedu	1027.69 \pm 101.06	841.18 \pm 71.94 ^b
	Black Combed Kedu	1073.00 \pm 130.99	887.92 \pm 71.32 ^a
	White Kedu	1008.33 \pm 69.98	747.50 \pm 102.53 ^b
	Total	1029.14\pm100.61^a	856.75\pm79.31^b
10	Red Combed Kedu	1165.54 \pm 106.60	954.56 \pm 75.93 ^{ab}
	Black Combed Kedu	1207.00 \pm 119.93	1011.88 \pm 77.71 ^a
	White Kedu	1140.83 \pm 69.53	847.50 \pm 116.67 ^b
	Total	1166.32\pm104.64^a	973.92\pm87.33^b

Different superscript letters [a, b, ab] indicate significant differences at the 5% level based on GLM followed by Bonferroni post-hoc test.

From week 3 to week 10, growth differences became more pronounced, particularly between roosters and hens (Figure 1). Roosters consistently showed higher body weights than hens, as evidenced by the GLM results and significantly different superscripts ($p < 0.05$). This finding is consistent with reports by Cui et al. (2021) and Yuan et al. (2024), which state that roosters exhibit faster growth performance than hens due to the role of androgens, such as testosterone, in stimulating muscle and bone tissue development.

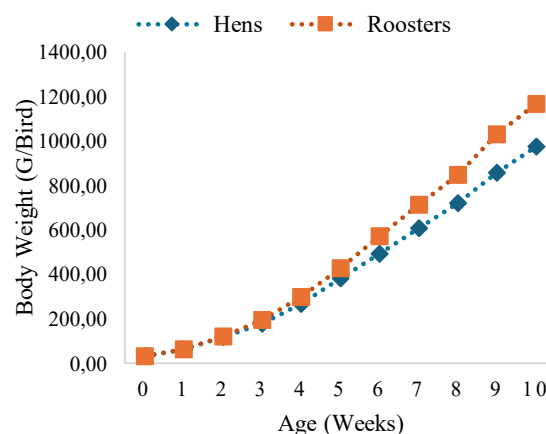


Figure 1. Growth of roosters and hens of Kedu chickens from 0 to 10 weeks of age

All three Kedu chicken varieties demonstrated that roosters exhibited a more stable and faster growth pattern than hens. After six weeks of age, the body weight differences between sexes became increasingly pronounced. This phenomenon is consistent with the theory that sex-based growth divergence generally becomes significant during the grower-finisher phase (Cui et al., 2021). In contrast, hens exhibited a relatively slower growth rate, which may be attributed to differences in metabolic demands and physiological strategies associated with earlier sexual maturation (Müsse et al., 2022; Yuan et al., 2024).

An interesting observation emerged at 9 and 10 weeks of age, where significant differences among the Kedu varieties were observed, but only within the hen group. Hens of the Black-Combed Kedu (BCK) variety had higher body weights compared to those of the Red-Combed Kedu (RCK) and, in particular, the White Kedu (WK). This variation reflects the influence of genetic

factors associated with Kedu chicken varieties on growth performance, particularly in hens. Previous studies by Ismoyowati and Susanto (2012) and Ashifudin et al. (2017) have shown that comb and plumage colour in Kedu chickens are closely associated with genetic variation affecting growth hormone regulation and metabolic pathways, which can ultimately influence body development.

White Kedu hens showed the lowest body weights, especially at weeks 9 and 10 (Table 1, Figure 2). This may be due to specific genetic characteristics of the WK variety, which has not undergone intensive selection for meat production traits. Additionally, the limited sample size within the WK hen group (only two individuals) may have increased variability and led to less stable growth estimates. A similar issue was highlighted by Gumpili and Das (2022), who reported that small population sizes can increase statistical error and complicate the interpretation of actual performance outcomes.

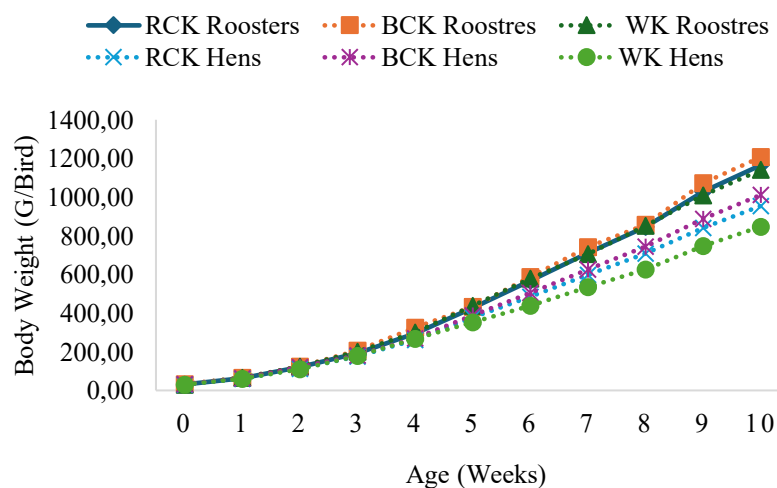


Figure 2. Body weight development of roosters and hens of RCK, BCK, and WK chickens from 0 to 10 weeks of age

In contrast to the hen group, no significant differences among the chicken varieties were observed within the rooster group. This may be attributed to the dominant hormonal influence in roosters, particularly testosterone, which may override or mask phenotypic variations among the three Kedu chicken varieties. In addition, the unequal sample sizes among the varieties, especially the limited number of roosters in the BCK and WK groups, likely reduced the statistical power to detect significant differences (Gumpili and Das, 2022).

Overall, the results of this study confirm that sex is the primary factor influencing body weight growth in Kedu chickens. In contrast, the effect of chicken variety became more pronounced ($p < 0.05$) among hens at 9 to 10 weeks of age. The interaction between variety and sex plays a crucial role in determining the final performance of chickens and should be considered in genetic selection and breeding programs for local poultry. Based on these findings, Black-Combed Kedu (BCK) hens may be regarded as a promising candidate for improving the productivity of local chickens.

In contrast, White Kedu (WK) chickens may require further selection efforts to enhance their growth performance.

CONCLUSION

Differences in body weight among Kedu chicken varieties were observed only in the hen group at 9 to 10 weeks of age, while no significant differences were detected among roosters.

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