# Body Size Performance of F1 Murung Panggang x KUB Chicken

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**Abstract.** Body size is essential as an indicator of growth in the economic trait. The objective of this study was to evaluate the chicken selection between crossbred chickens and their parental groups using body size variables. This study used 5 Murung Panggang chickens (parental males) and 131 crossbred chickens (BS chickens). The BS chickens were divided into two groups namely BS3 and BS6. BS chicken groups were obtained from the crossing of Murung Panggang (males) x KUB 1 (females) to form BS3 and Murung Panggang x KUB 2 (females) to form BS6. The variables included breast width, shank length, breast circumference, and wing length. Chickens were measured five times at weeks 2, 4, 6, 8, and 10. The data obtained were statistically analysed by T-test to determine the differences between BS3 and BS6 chickens. The results showed that the body size of the BS6 was higher than BS3. However, both of their body size were decreased compared to the parental male in each variable. Meanwhile, the wing length size was increased for the BS3 chickens at 10 weeks of age and BS6 chickens at the age of 2, 6, 8, and 10 weeks.

**Keywords:** body size · crossbred · Kampung Unggulan Balitbangtan (KUB) · Murung Panggang

## 1 Introduction

Animal protein need in Indonesia is increasing along with the increase of population. The livestock sector has a very important role in achieving food security for the Indonesian people. In addition, livestock development is directed at increasing the income and welfare of farmers and increasing the fulfilment of animal protein consumption from livestock [1]. One of the efforts that can be made in developing the potential of animal sector to achieve food security is by conducting livestock breeding through crossbreeding. This is performance to obtain superior breed with high genetic quality.

In order to achieve the breeding goal, crossbreeding among superior breed is needed. Murung Panggang chickens and KUB chickens are local chickens in Indonesia that can be potential as parental group in creating crossbred chicken. Murung Panggang chickens have excellent qualities and advantages including productive meat and egg producers,

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lower feed conversion, more disease resistance, higher meat and egg production compared to other native chickens, and egg hatchability percentage of more than 75% as well as a less broody nature. Besides Murung Panggang chickens, KUB chickens can grow faster than ordinary native chickens, and the taste of savoury and delicious meat [2]. According to the potencies of local chickens like Murung Panggang and KUB, this study was conducted to review the improvement of local chickens by analyzing the body size of the crossbred chickens.

## 2 Materials and Method

### 2.1 Data Collection

This study used 5 Murung Panggang chickens (parental males) and 131 crossbred chickens (BS chickens). The BS chickens were formed by performing crossing activity between Murung Panggang (males) and KUB (females). KUB chickens consisted of KUB 1 and KUB 2. There were two groups of BS chickens used in this study, namely BS3 and BS6. The mating pattern to form BS3 and BS6 was shown in Fig. 1. The variables observed in this study were breast width, shank length, breast circumference, and wing length. Chickens were measured five times at weeks 2, 4, 6, 8 and 10. A measuring tape was used to measure breast circumference and wing length, and a vernier calliper was used to measure shank length and breast width. Breast width was measured as the distance between the right and left sides of the breast using a vernier calliper. Shank length (SL) was measured along the tarsometatarsus bone using a vernier calliper. Breast circumference (BC) was measured by wrapping the measuring tape from the back under the wing to the breast. Wing length (WL) was measured as the distance between the base of the humerus bone to the tip using a measuring tape.

### 2.2 Data Analysis

The data obtained were statistically analysed by T-test to determine the differences between BS3 and BS6 chickens. The data of paternal (males) provided in the table but excluded from t-test analysis due to its minimum sample size.

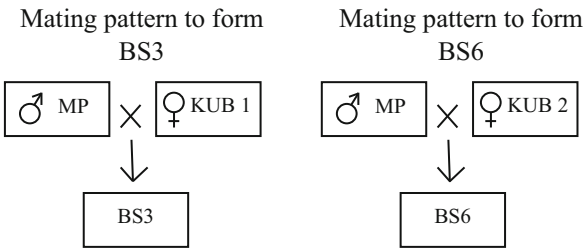


**Fig. 1.** Mating pattern to form BS3 and BS6.

## 3 Result and Discussion

Data from the body size measurements of BS3 chickens, BS6 chickens and Murung Panggang chickens consisting of breast width (BW), shank length (SL), breast circumference (BC) and wing length (WL) at 2 weeks, 4 weeks, 6 weeks, 8 weeks and 10 weeks of age are presented in Table 1.

**Table 1.** Body size of BS3, BS6 and Murung Panggang chickens at 2–10 weeks of age

| Weeks of Age | BS3 | | | | BS6 | | | | Murung Panggang | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n = 77 | | | | n = 54 | | | | n =5 | | | |
| | BW | SL | BC | WL | BW | SL | BC | WL | BW | SL | BC | WL |
| 2 | 25,53 ± 3,31 | 26,67[a] ± 3,57 | 96,90[a] ± 0,94 | 89,06 ± 0,86 | 26,51 ± 4,17 | 28,27[b] ± 5,45 | 104,33[b] ± 1,45 | 92,13 ± 1,35 | 29,58 ± 8,35 | 31,98 ± 7,51 | 117,40 ± 1,66 | 90,00 ± 4,47 |
| 4 | 35,18 ± 0,38 | 38,17 ± 0,44 | 129,77 ± 0,99 | 121,43 ± 1,46 | 36,19 ± 0,49 | 40,24 ± 0,56 | 134,85 ± 1,48 | 124,61 ± 1,74 | 36,40 ± 1,94 | 46,20 ± 1,02 | 146,60 ± 4,53 | 132,00 ± 4,90 |
| 6 | 43,23 ± 0,54 | 47,40 ± 0,44 | 153,10 ± 1,44 | 152,16 ± 1,67 | 45,96 ± 0,61 | 50,54 ± 0,58 | 161,24 ± 1,63 | 154,76 ± 2,04 | 47,60 ± 1,91 | 50,60 ± 1,33 | 169,00 ± 2,45 | 153,00 ± 2,00 |
| 8 | 49,87 ± 0,77 | 57,03 ± 0,70 | 174,39[a] ± 1,43 | 177,27 ± 1,67 | 52,63 ± 0,80 | 60,54 ± 0,79 | 185,70[b] ± 2,07 | 187,26 ± 1,89 | 53,00 ± 1,26 | 61,40 ± 0,75 | 201,40 ± 6,24 | 181,00 ± 6,40 |
| 10 | 56,16 ± 0,63 | 67,05 ± 0,91 | 196,87 ± 1,82 | 200,44 ± 1,92 | 57,39 ± 0,87 | 68,94 ± 1,00 | 199,07 ± 2,40 | 202,69 ± 2,64 | 61,00 ± 1,30 | 71,00 ± 2,41 | 213,00 ± 4,36 | 190,00 ± 5,48 |

[a, b] Different superscripts showed significantly different ($P < 0.05$)

In results, there was no significant difference ($P > 0.05$) between the breast width of BS3 and BS6 chickens at the age of 2 weeks to 10 weeks. BS6 chickens had higher mean of breast width (BW) than BS3 chickens at 2 weeks to 10 weeks of age. For shank length (SL), there was a significant difference ($P < 0.05$) at the age of 2 weeks, but there was no significant difference ($P > 0.05$) at the age of 4 weeks to 10 weeks. BS6 chickens had a higher shank length than BS3 chickens at the age of 2 to 10 weeks. The results showed that there was a significant difference ($P < 0.05$) at the age of 2 weeks and 8 weeks in the breast circumference (BC), while at the age of 4 weeks, 6 weeks, and 10 weeks there was no significant difference ($P > 0.05$). BS6 chickens had a higher breast circumference (BC) than BS3 chickens. For wing length (WL) showed that there was no significant difference ($P > 0.05$) between BS3 chickens and BS6 chickens at the age of 2 weeks to 10 weeks. BS6 chickens had a higher mean of wing length (WL) than BS3 chickens at the age of 2 weeks to 10 weeks. Compared to the Murung Panggang chicken which is the parental male, most of the body sizes of BS3 and BS6 chickens were smaller except for some variables. BS3 chickens had a higher mean wing length (WL) at 10 weeks of age (200.44 ± 1.92) than Murung Panggang chickens (190.00 ± 5.48). BS6 chickens at weeks 2, 6, 8, and 10 had higher wing length (WL) values than Murung Panggang chickens, while Murung Panggang chickens had higher for wing length (WL) values than BS6 chickens only at week 4 (132.00 ± 4.90 for Murung Panggang chickens' wing length and 124,61 ± 1,74 for BS6 chickens' wing length). While in other research, hometric (femur, tibia, and sternum length) was significantly different ($P < 0.05$) at 7 weeks between heavy and light native chicken hens [3]. Other

study related to crossbred local chicken conducted by [4] stated that SKkedu and keduSK chickens (crossbred chickens between Kedu chickens and Sentul Kampung chickens) had larger body size than their parental, which means the result of crossing these two breeds of chickens has increased the effect of heterosis.

The differences for various traits can be influenced by genetic and environmental factors [5]. The difference in body size is thought to be caused by genetic factors because in this study all chickens received the same environment and feed treatment. Differences in body size in livestock groups given the same feed are caused by genetic factors [6]. The size of an animal largely depends on the size and number of bones and muscles. Factors affecting bone growth can be divided into exogenous factors (feed) and endogenous factors (mostly by hormonal factors) [7]. Bone growth is mostly regulated by genetic or endogenous factors [8]. The body size of the chicks is smaller than the elders due to the crossing with local chickens, namely Murung Panggang chicken (males) with KUB (females). This is in accordance with the opinion of [9] who stated that crossing with fellow local chicken's results in a lighter body size compared to the parents. Chickens that have a distant kinship relationship can occur positive heterosis [10]. Livestock with close kinship have a small chance of increasing heterosis in their crosses [11].

## 4 Conclusion

In conclusion, there were no significant differences ($P > 0.05$) in every variable from 2 to 10 weeks of age, except for the shank length (SL) at the age of 2 weeks and breast circumference (BC) at the age of 2 weeks and 8 weeks which were significantly different ($P < 0.05$). BS6 had higher mean of body size values in every variable in every week of age than BS3. Generally, Murung Panggang chickens as the parental male had larger body size values than the crossbred chicks (BS3 and BS6). It shows that the crossbred chickens body size was decreased compared to the parental male. BS3 chickens had higher mean of body size values than Murung Panggang chickens at 10 weeks of age for the wing length (WL) variable, while BS6 chickens had higher mean of body size values than Murung Panggang chickens at 2, 6, 8, and 10 weeks of age for the wing length (WL) variable.

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**Authors' Contributions.** D.M., H.S., and M.H.W. designed and convinced the research. A.P.Z.N.L.S. designed and convinced the analysis. Y.V.S. designed and convinced the analysis, supervised the work and collected the data. A.C.K. collected the data and wrote the paper.

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