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Research Note

Live Weight Uniformity on The Day-Old Chick of Indonesian Local Chickens

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ABSTRACT

The uniformity of live weight in the early stage (DOC) is an indicator applied to evaluate the quality of brooding, raising, and growth management. This study aims to compare the live weight uniformity of DOC in three local breeds as a parental group, namely Merawang A and B (n:196), Murung Panggang (n:157), and KUB (n:416), as well as in five groups of Bulaksumur (BS) for crossbred group, namely BS-1 (n:136), BS-2 (n:76), BS-3 (n:106), BS-5 (n:81), BS-6 (n:164). The live weight data of DOC was obtained in Gunungkidul Regency under similar management. The results show that the BS groups had higher live weight (31.9 g ± 3.1) compared to Merawang A (24 g ± 3.1), Murung Panggang (28.2 g ± 2.3), and KUB (28.1 g ± 2.8). Furthermore, the live weight uniformity on the BS DOC averaged 71% across all groups, with the highest uniformity being BS-3 (87%). Murung Panggang had a higher live weight uniformity (82%) compared to Merawang A and B (42%, 64%) and KUB (63%). The average coefficient variance was less than 10%, except for Merawang A and BS-2 with 13.09% and 11.35%, respectively. In conclusion, the DOC of the crossbred (BS) was more uniform than its parental groups. However, to distinguish the significantly different in the chicken live weight in early stage, further analysis needs to be conducted in the future.

Key words: Bulaksumur, DOC, live weight, local chicken, uniformity

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The organism's performance in the field, including chicken, was affected by flock uniformity. Meanwhile, low chicken uniformity affects breeding and reproduction (Sutopo *et al*., 2021). The low uniformity from the genetic point of view is derived from the poor selection program (Zen *et al.,* 2020). Therefore, the uniformity of chicken needs to be measured to perform an appropriate selection. Flock uniformity shows the percent of individuals within 10% of the mean body weight and variability, expressed by the coefficient of variation (CV) of the individual body weights. A high CV may imply poor flock uniformity, associated with less efficient growth, increased mortality, increased feed conversion ratio (poor FCR), reduced growth rate, and bird rejection (Vasdal *et al.,* 2019). The performance of a poor chicken's slaughter is inferred from the poor live weight uniformity of the flock. Consequently, the slaughterhouse cannot meet the market's demand, resulting in economic losses. Thus, uniformity is a key performance indicator and economic driver in commercial practice (Hughes *et al*., 2017).

Uniform flocks have several management benefits, including assisting in the management of large groups that are simultaneously exposed to changes such as lighting, feeding, and environment, as well as ensuring the birds achieve an effective performance close to their genetic potential (Kosba *et al*., 2010). The quality of day-old chick plays an essential role in breeding success and chicken productivity (Junnu & Pohuang, 2019). Uniformity has a significant influence on the growth and final growth performance of the poultry, and the weight of the chicken is generally used as an indicator of the quality of the chick. The amount of competition may be reduced by raising the homogeneity of the weight of the chicken entering the processing unit or by improving the uniformity of the chicks or initial weight segregation, especially in chicks from small eggs or young flocks (Kosba *et al*., 2010; Neto *et al*., 2013). Although uniformity is an essential aspect of production, especially within the flock, little attention has been paid to it by most poultry producers (Abbas *et al*., 2010).

For local marginal communities in developing nations with limited resources, local chickens are a source of money and protein. Because their meat is so tender, local chickens are favored over exotic kinds (Mengesha, 2012; Liswaniso *et al.*, 2020). Local farmers rely on chicken sales as a source of revenue on an economic basis. The benefit in this aspect is that most of these hens are raised at low cost, making them affordable for practically any household (Manyelo *et al.*, 2020). Local chickens have the potency to be commercialized, but the limitation is their slow growth rate. Selection and crossbreeding are performed to produce a high-performing local chicken breed (Darwati *et al.*, 2015). The aim of this study was to identify the uniformity in the live weight of the local breeds and the crossbreds of Indonesian local chickens.

The research was conducted in Mijahan, Semanu, Gunungkidul Regency. This study used the parental group consisting of three local Indonesian chickens, namely, Merawang, Murung Panggang, and KUB which produced five Bulaksumur chickens by crossbreeding. The parental group chickens used were 32-36 weeks old while their offsprings were one day old. We identified the average egg weight for the parental chicken groups i.e. 43.79 g (Merawang), 45.92 g (KUB), and 44.62 g (Murung Panggang). While the average egg weight for BS chicken groups were 44.26 g (BS-1), 43.51 g (BS-2), 48.86 g (BS-3), 43.96 g (BS-5), and 47.31 g (BS-6). All samples were reared under similar management and in a battery cage. The total number of Merawang A and B, Murung Panggang, and KUB were 196, 157, and 416 chickens, respectively. Meanwhile, the crossbred comprises 136 of BS-1, 76 of BS-2, 106 of BS-3, 81 of BS-5, and 164 of BS-6.

In order to produce BS chickens, the mating patterns among the local chickens were, Merawang A (male) × KUB 1 (female) for BS-1, Merawang B (male) × KUB 1 (female) for BS-2, Murung Panggang (male) × KUB 1 (female) for BS-3, Merawang B (male) × KUB 2 (female) for BS-5, and Murung Panggang (male) × KUB 2 (female) for BS-6. The live weight data of the day-old chicks of each breed and cross was measured using a digital scale with 1 g sensitivity.

The live weights data was tabulated in Excel, and the uniformity of the day-old chicks for every group was analyzed. This study used descriptive statistics, including mean with its standard deviation, mean + 10%, mean - 10%, the number of birds in the range, CV, and uniformity. The following mathematical model was used to analyze the CV and uniformity.

$$CV(\%) = \frac{\text{Standard deviation}}{\text{Mean of body weight}} \times 100$$

$$Uniformity(\%) = \frac{\text{Number of birds in the range}}{\text{Birds weighed}} \times 100$$

The measurement of live weight uniformity was performed to evaluate the flock condition from the early stage (DOC). The collected data served as an indicator for evaluating the farm management and as the basic data for selecting the crossbred local chickens from their parental groups (local breeds) to improve the genetic quality. Furthermore, the local chickens were of three groups, namely Merawang which is divided into A and B, Murung Panggang, and KUB. The results of the local crossing chicken were BS-1, BS-2, BS-3, BS-5, and BS-6. The analysis of live weights data showed that the BS chicken groups had a higher live weight (31.9 g ± 3.1) compared to Merawang (24 g ± 3.1–36.1 g ± 3.6), Murung Panggang (28.2 g ± 2.3) and KUB (28.1 g ± 2.8) chickens. Hence, it showed that the live weight tends to improve after crossbreeding, which also enhances the genetic quality of local chickens and results in higher live weight on the crossbred DOC (Darwati *et al*., 2018).

The parental chicken groups were used because of their superior traits. Male Merawang chickens can weigh up to 2.41 kg, while females can weigh up to 1.81 kg. Additionally, intensively raised Merawang chickens grew more quickly than those raised using traditional methods (Sartika, 2018; Nuraini *et al.,* 2021). While another parental group, Murung Panggang chicken, originating in South Kalimantan, were primarily dark or black in color, mature at 5 months, and can weigh up to 4 kg (Suryana, 2014; Mustofa *et al.,* 2021). Meanwhile, the selective range chicken known as Kampung Unggul Balitbangtan (KUB) had a high egg production rate and is often used as dual purposes chicken both for meat and egg (Rubianti *et al.,* 2021; Masito *et al.,* 2022). Those superior traits from the parental lines potentially supported the genetic improvement in the crossbred chickens. Offspring from crossbreeding will have favorable genes for growth, high levels of reproduction, high egg output, and good meat quality (Rowianti *et al.,* 2021). According to Lapihu *et al*. (2019), chicken breeds had an impact on the growth of crossbred chickens. The result of the higher rate of weight gain was caused by heterosis. When compared to the average value of both parents, heterosis is the term used to describe a rise in the character value of F1 hybrids (Begna, 2021). Sapkota *et al*. (2020) reported the results of studies related to selective breeding have improved the production, reproduction, and endurance performance of local Sakini chickens from Generation 0-3. The study explained that there was an increase in egg-laying weight, egg production, and endurance of Sakini chickens from the G0-G3 generation. Another study showed that the number of yearly eggs produced by crossbreeding Aseel and Dahlem Red rose from 91 to 189 eggs (Padhi, 2016). There was also a case where Horro x Rohde Iceland crossbreeding produced improved body weight performance (Wondmeneh, 2015). Due to its quick results and possible advantages for poor farmers engaged in small-scale poultry production, crossbreeding is still a viable method for improving chicken genetics (Fulla, 2022). In this study, the mean of the body weight had increased for all groups in the crossbred lines and the live weight uniformity on DOC of BS chickens was 71% on average for all groups. Furthermore, this varied from the BS-1, BS-2, BS-3, BS-5, and BS-6. BS-3 had the highest live weight uniformity at 87%, while BS-2 and BS-5 had the lowest uniformity at 57%. Among the local chickens, Murung Panggang had higher live weight uniformity 82% compared to Merawang and KUB with 42%–64% and 63%, respectively. The BS-3 crossbred chicken and the Murung Panggang local chicken had good live weight uniformity of DOC. The level of uniformity reached 80% because the brooding period is the first basis for uniformity in the subsequent period (Wardi *et al.,* 2019). Furthermore, DOC's uniformity is important as it contributes to the economic efficiency of the flock and is essential for the production of excellent quality chicks (Augusto *et al.,* 2019). From this point, rearing the high uniformity DOC group offers better production prospects than the low live weight uniformity group. Besides the uniformity analysis, the CV was performed, which shows an average of less than 10% for all groups except Merawang A and BS-2 with 13.09% and 11.35%, respectively. Low uniformity is relatively shown by CV 10% (Hughes & Wilkinson, 2021), hence, the live weight uniformity results are associated with the CV. Additionally, the group of chickens with good uniformity has a good CV. This emphasizes that the results of the crossbreeding activity improve the live weight and the uniformity of the local chickens used in this study. Table 1 shows detailed information about the live weight uniformity of the day-old chicks of local Indonesian chickens.

Table 1. Live weight uniformity on the day-old chicks of local Indonesian chickens

Chicken breeds	Mean (g)	Uniformity (%)	Coefficient of variation (CV) (%)
Local breeds			
Merawang A (n=77)	24 ± 3.1	42	13.09
Merawang B (n=119)	36.1 ± 3.6	64	9.88
Murung Panggang (n=157)	28.2 ± 2.3	82	8.20
KUB (n=416)	28.1 ± 2.8	63	9.96
Crossbreds			
BS-1 (n=136)	32.3 ± 3.0	67	9.23
BS-2 (n=76)	31.3 ± 3.6	57	11.35
BS-3 (n=106)	32.6 ± 2.3	87	7.17
BS-5 (n=81)	32.6 ± 3.2	57	9.94
BS-6 (n=164)	30.9 ± 3.0	79	9.75
All BS chickens (n=563)	31.9 ± 3.1	71	9.68

CONCLUSION

Based on this study, the BS-3 has the highest live weight uniformity among the BS groups, while the BS-2 and the BS-5 have the lowest uniformity level (57%). This study has identified that the live weight in the early stage (DOC) of the crossbred (BS) was more uniform compared to their parental groups, indicating that the uniformity is increased in the crossbred. This can be beneficial information in breeding management. To distinguish the significantly different in the chicken live weight in the early stage, further analysis needs to be conducted in the future.

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ETHICAL STATEMENT

The experimental method was approved by the Research Ethics Committee of the Faculty of Veterinary Medicine, Universitas Gadjah Mada (00033/EC-FKH/Eks./2021).

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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