

## Performance Analysis in Quantitative Traits of Local Chickens (*Gallus gallus* sp.) In Kediri Regency East Java

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### ABSTRACT

This study aimed to determine the phenotypic diversity of the quantitative characteristics and the results of the analysis of kinship relationships of local chickens in Kediri by using 60 adult male local chickens. Data were obtained by directly observing the quantitative characteristics according to the variables: head length, chest-length, wing length from right to left, shank length, back length, neck circumference, and chest circumference. The results showed that the majority of phenotypes were from local chickens in Kediri, consisting; of a wing length of 52.1cm, head length of 8.58cm, chest length of 28.8cm, shank length of 12.4cm, a back length of 25.35cm, neck circumference 13.98cm, and chest circumference 40.4cm. It can be concluded that local chickens in Kediri have a variety of quantitative characteristics, and the average results for each sub-district are not much different from the others. It is hoped that the results of this study can be used as primary data for further research to determine the quality and superior breeding selection.

**Keywords:** Body Length, characteristics, Local chickens, quantitative

### INTRODUCTION

Free-range chicken is a type of poultry that plays a very important role in increasing national food security as a food source for the community, especially as a source of animal protein from eggs and meat. Although not as fast as purebred chicken, free-range chicken can become an agricultural business. Hutt (1949) claimed that the domestic chicken descended from more than one chicken species but that the red cock was the ancestor of most of the existing chickens. In addition, Suharno (1996) states that the ancestor of chickens is grouse (genus *Gallus*), which consists of *Gallus gallus* or *Gallus bankiva*, *Gallus sonnerati*, *Gallus lafayetti* and *Gallus varius*. Indonesian local chickens are the result of the domestication of the Red Junglefowl (*Gallus gallus*) and the Green Junglefowl (*Gallus varius*). Indonesia has two species of red chicken: the Sumatran red chicken (*Gallus gallus gallus*) and the Javan red chicken (*Gallus gallus javanicus*). The results of this domestication are often called native chickens. Now spread throughout Indonesia, free-range chickens have become free-range chickens with diverse morphologies (Mansjoer et al., 1993).

Morphometric measurements can also assist in livestock selection and crossing between nations and species (Kurnianto et al., 2013). One fundamental study of genetic information is phenotypic observation with morphological measurements, as done by previous researchers (Udeh et al., 2011; Ojedapo et al., 2012).

Quantitative characteristics are characteristics that can be measured with measuring instruments. This feature is influenced by many pairs of genes and also by environmental factors (Kurnianto, 2009). Martojo (1992) and Warwick, Astuti and Hardjosubroto (1995) explained that quantitative traits are influenced by a large number of gene pairs, each of which has an additive, dominant and epistatic, and environmental (non-genetic) role influenced and is not distinguished. Nozawa (1980) reported that genetic and environmental factors cause variations in animal body size. The height of the body chicken determines the characteristics: Body weight, leg length (tarsometatarsus), pubic bone (pelvic bone) distance in chickens, leg length (tibia), thigh length (femur), and comb height. This study was conducted to determine the phenotypic diversity of quantitative characteristics and the results of the analysis of kinship relationships of local chickens in Kediri.

### MATERIALS AND METHODS

The material was 60 local roosters aged 12-15 months and taken from 6 sub-districts in Kediri Regency. The sub-district is Banyakan, Purwoasri, Ngadiluwih, Mojo, Semen and Ngasem. The determination of the location of the study was carried out deliberately with consideration of the location. The study is one of the locations with the largest local chicken population in Kediri Regency. Another consideration is that this location is a potential

area for developing local chicken livestock. The method was carried out on the quantitative characteristics of each sample of local chickens. The research procedure was obtained by observing the quantitative properties according to the variables. The research variables were head length, chest-length, wing length from right to left, shank length, back length, neck circumference, and chest circumference. Measurements are made using callipers and measuring tapes, as seen in Figure 1. The data that has been collected is tabulated using Microsoft Excel software so that an average is obtained then a kinship relationship test is carried out and analyzed descriptively.

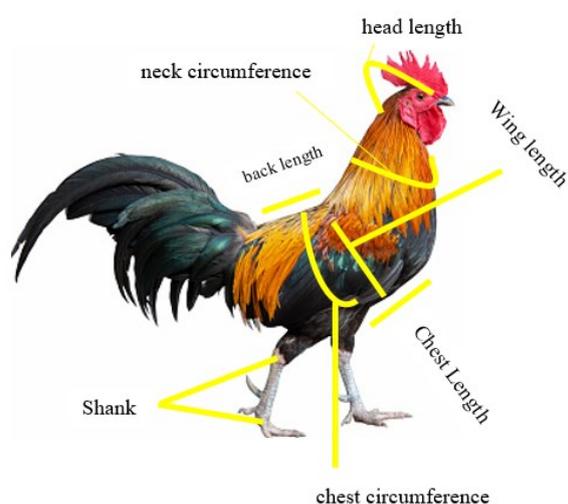


Figure 1. Chicken Measurement

## RESULTS AND DISCUSSION

### Quantitative traits

The frequency of quantitative traits observed in this study consisted of variable parts: head length, chest-length, wings length from right to left, shank length, back length, neck circumference and chest circumference. The differences in the results of this study are influenced by genetics and the environment. Diwyanto's (1994) opinion is that each body component has a different growth or development rate due to genetic and environmental influences.

The shortest wing length is in the Banyakan sub-district, which is at 49.2 compared to the average of 52.1, and the highest above the average is in the Semen sub-district, which is at 53.8—measured from the humeral bone to the end of the phalanges using a measuring tape (Permadi et al., 2020). According to Tamzil *et al.* (2020), in calculating wing length, that is by measuring the distance between the bases of the humerus bones. It is due to differences in maintenance, age, feed, and type of chicken, so there is a difference in wing length in each sub-district. Different rearing systems and environments cause differences in wing length. This follows the statement of Kusuma and Prijono (2007) that different environmental conditions of seed origin can cause variations in the body size of free-range chickens and different rearing environments. The shortest average length of the shank is in the Banyakan sub-district at 11.8 out of an average of 14. and the highest above the average is in the Ngasem sub-district, which is at 12.95. The shortest back length is in the sub-district Banyakan and Ngasem at 24.1 compared to an average of 25.2, and the highest above the average is in the Mojo sub-district, which is at 26.9.

Table.1 results of the average village chicken data in Kediri Regency

Variable	District Name						Total Average
	Banyakan	Purwoasri	Ngadiluwih	Mojo	Semen	Ngasem	
Wing length (cm)	49.2	53.7	52.2	51.8	53.8	51.8	52.1
Shank (cm)	11.8	12.95	11.9	12.4	12.2	12.95	12.4
Back (cm)	24.1	27.5	24.2	26.9	25.3	24.1	25.35
Chest length (cm)	28.2	27.3	28.9	29.9	29.9	28.7	28.8
Head length (cm)	8.3	9.3	8.7	8.6	8.6	7.95	8.58
Chest circumference (cm)	38	39.1	41.4	40.7	41.4	41.8	40.4
Neck circumference (cm)	12.55	14.1	13.2	15	13.3	15.5	13.98

The shortest chest length was in the Purwoasri sub-district at 27.3 compared to the average of 28.8, and the highest above the average was in the Mojo and Semen sub-districts, which were at 29.9. Different maintenance systems and environments cause differences in shaft length. This follows the statement of Kusuma and Prijono (2007) that different environmental conditions of seed origin can cause variations in body size in native chickens and different rearing environments. More meat is buried in the chest compared to other organs, so knowing the growth rate of the sternum can be used as an indicator of the height or leanness of an animal (Widodo 2012). The rate of bone growth is affected by protein consumption because protein is beneficial for growth in this livestock. Protein plays a role in the development of body tissues, according to Mahfudz *et al.* (2009). The spine and hips are composed of several fused bones. This rigid back structure supports strong wing muscle attachment and wing movement during flight (Suprijatna 2005).

The shortest head length is in the Ngasem sub-district, which is at 7.95 compared to the average of 8.58, and the highest above the average is in the Purwoasri sub-district at 9.3. The shortest chest circumference in the Banyakan sub-district is 38 compared to the average of 40.4, and the highest above the average is in the Ngasem sub-district, which is 41.8. This is due to differences in care, age, feed and type of chicken, so there are differences in wing length in each sub-district. This is under the statement of Kusuma and Prijono (2007) that different environmental conditions, the origin of the seeds, and different rearing environments can cause variations in body size in free-range chickens. Differences in body size in native chickens are caused by genetic, environmental, and maintenance differences. This is under the statement of Kusuma and Prijono, 2007) that variations in body size in native chickens can be caused by different environmental conditions of seed origin and different rearing environments.

The shortest neck circumference is in the Banyakan sub-district, which is at 12.55 compared to the average of 13.98, and the highest above the average is in the Ngasem sub-district at 15.5. It is due to differences in care, age, feed and type of chicken, so there are differences in wing length in each sub-district. Different maintenance systems and environments cause differences in shaft length. It is under the statement of Kusuma and Prijono (2007) that different environmental

conditions, origin of the seeds, and different rearing environments can cause variations in body size in free-range chickens. According to Kusuma and Prijono (2007), variations in body size in native chickens can be caused by differences in rearing environmental conditions and climatic influences.

### Kinship relations

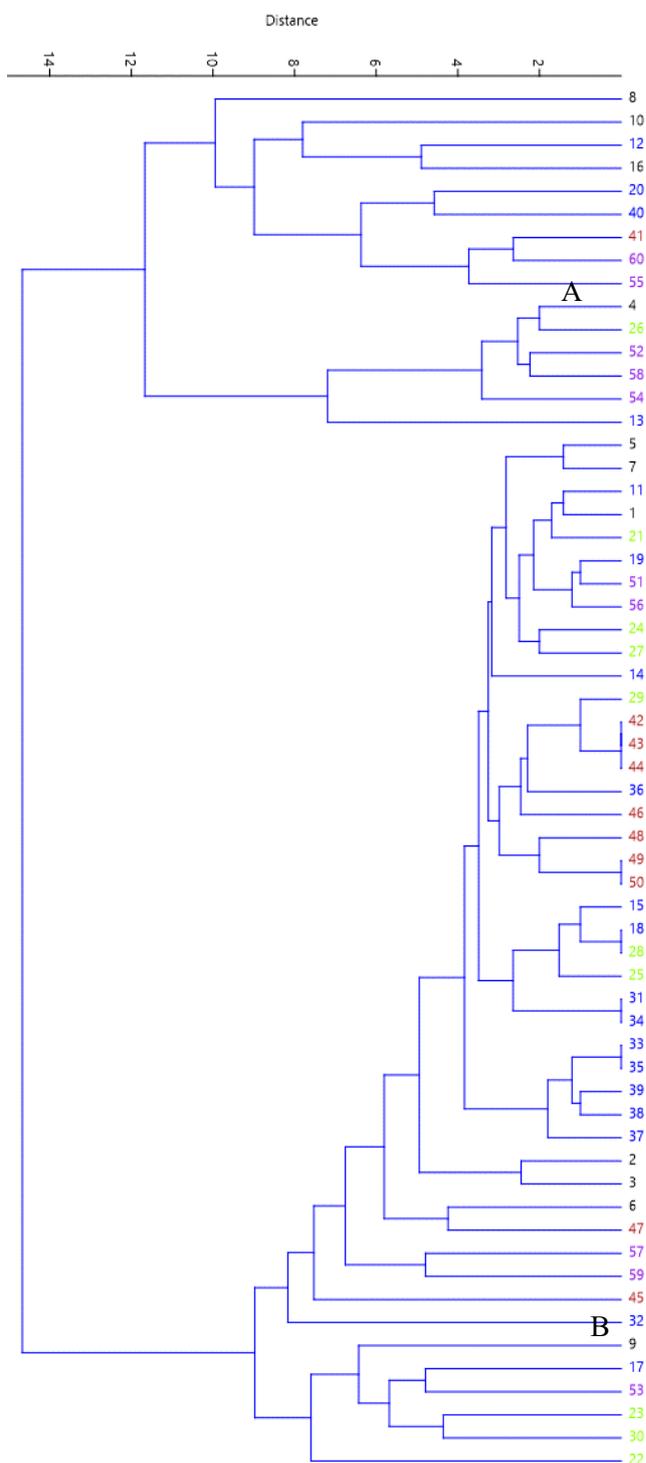


Figure 2. Kinship relationship

The most visible difference between the two is that in chart B they have similarities in the color of the beak, which is yellow and the color of the eyes, which is dark. Whereas in chart A, they only have similarities in dark eye color. In chart B, they have the same yellow beak color and dark eye color. And underneath, it has similarities, including the color of the yellow beak, the color of the dark eyes, the color of the black and white tail, and the color of the yellow shank. As well as the color of the yellow beak and dark eye color. Below, they have similarities, including the color of the yellow beak, dark eye color, the color of the chest feathers, the color of the belly feathers and the wing shutters are brown and white. The color of the shak is yellow, then in chart B the others have similarities, including the color of the yellow beak, the color of the crown, the color of the neck feathers, the color of the belly feathers, the color of the body feathers, the color of the wing feathers and the color of the feathers on the thighs are white.

In chart A, they have similarities, among others, yellow beak color, dark eye color and yellow shank color, and even closer, they have a proximity to yellow beak color, dark eye color, neck feather color, belly fur color, chest hair color and color on thigh feathers. black, yellow shank color. And the color on the beak is yellow, the color of the eyes is dark, the color of the neck feathers, the color of the chest hair, the color of the black thigh feathers and the color of the yellow shank,

While in chart A the others have the same dark eye color. Closer still has affinity for dark eye color, and the color on the shank is dark yellow. Closer still has affinity for dark eye color, red body coat color and dark yellow shank color. Even closer, they have the closeness of the pea comb shape, dark eye color, red crown color, red body hair color and dark yellow shank color. And in chart A, the others have similarities, including the shape of the pea's comb, the color of the yellow beak, the color of the red crown, the color of the red body feathers, the color of the black tail, and the color on the yellow shank.

In chart A, the others have affinities, including pea comb shape, dark eye color, black chest hair color, black thigh hair color and dark yellow shank color. Even closer, it has a close affinity for the color of the yellow beak, the color of the dark eyes, the color of red-brown crown, the color of the neck feathers, the chest feathers, the black belly feathers, the color of the black thigh feathers, and the color of the yellow shank.

Beneath it has affinities, among others, the shape of the pea's comb, the color of the yellow beak, the color of the dark eyes, the color of the crown is red, the color of the neck feathers, the chest hair and black stomach feathers, the color of the body feathers is red, the color of the thigh feathers is black and the color of the shank is dark yellow. Closer to each other, they have a pea beak shape, yellow beak color, dark eye color, red crown color, neck feather color, chest hair color, black stomach hair color, red body hair color, black thigh feathers and dark yellow shank color. With a parallel chart, it has the same shape as the pea's comb, the color of the beak is black, the color of the eyes is dark, the color of the crown is red-brown, the color of the chest hair is black and green, the color of the body hair is red-brown, the color of the thigh feathers is black, the color of the shank is yellow.

## CONCLUSION

The measurement interval in each sub-district of Kediri Regency varies due to several factors such as the type of chicken kept, the use of the cage used and the chicken's age. Environmental conditions of different breeds and rearing environments can cause variations in body size in native chickens. The kinship relationship that has the most distant kinship is the similarity between the colors of the eyes, namely dark. And the obvious difference is in the color of the beak. The most kinship is in chart A and the less in chart B. A clear difference also occurs where in chart A more chickens have not been domesticated much, as seen from the color of their still dark feathers. In contrast, in chart B many chickens have been domesticated because their feathers have turned brighter.

## REFERENCES

- Amlia, MA. Pagala, And R. Aka. 2016. Study of Qualitative and Quantitative Characteristics of Free-range Chicken in Lasalimu District, Buton Regency. *JITRO*. 3(1): 31-39.
- Arif, AN., WI. Purwati, EC. Utami, And ARI. Putri. 2022. Comparison of the Quantitative and Qualitative Properties of Female Kampung Chicken in Malang and in Klaten. *REKASATWA : Jurnal Ilmiah Peternakan*. 4(1): 27-35.
- Asa, BSRNP., Gushairiyanto, And Depison. 2020. Body Weight and Morphometric Characteristics of Some Local Chicken Strains. *Jurnal Ilmu dan Teknologi*

- Peternakan Tropis. 7(3): 256-263. DOI: <http://dx.doi.org/10.33772/jitro.v7i3.12150>
- Dandi, H., NK. Laya, F. Ilham, A. Ardiantoro And S. Dako. 2022. Frequency Analysis of Qualitative Characteristics of Kampung Chicken Qualitative Frequency Analysis of Kampung Chicken (Gallus Gallusdomesticus). Jambura Journal of Animal Science. 4(1): 126-132.
- Egenius E., EL. Sukaharto, And FM. Maker. 2019. Appearance of Qualitative and Quantitative Characteristics of Free- range Chicken in Nabire District, Nabire Regency. Jurnal Fapertanak. 4(1): 50-57.
- Ezri, SSM., JLP. Saerang, LJ. Lambey, And BJ. Takaendengan. 2020. Phenotypic Characteristics of Several Quantitative Properties of Free-range Chicken in Minahasa. Zootec. 40(2): 603-614.
- Hutt, F.B. 1949. Genetic of the Fowl, Mc-Grow-Hill Book Company Inc, New York, Toronto, London.
- Kurnianto, E., 2009. Livestock Breeding. First Print. Yogyakarta Science Graha.
- Kurnianto, E., S. Sutopo, E. Purbowati, E.T. Setiatin, D. Samsudewa and T. Permatasari. 2013. Multivariate analysis of morfphological traits of local goats in Central Java-Indonesia. Iranian J. App. Anim. Sci. 3 (2):361- 367.
- M. Lukmanudin, C. Sumantri, And S. Darwati. 2018. Body Size of Local Chicken IPB D-1 Cross Generation Fifth Generation Age 2 to 12 Weeks. Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan. 6(3): 113-120.
- Mansjoer, I, S.S., Waluyo. S.P and Priyono. 1993. Development of various types of native Indonesian chickens. Faculty of Animal Husbandry, Bogor Agricultural University, Bogor.
- Martojo, H. 1992. Increasing the genetic quality of livestock. Ministry of Education and Culture Directorate General of Higher Education. Inter-University Center. Bogor Agricultural Institute, Bogor.
- Nozawa, K. 1980. Phylogenetic studies on native domestic animal in east and Southeast Asia. Tropical Agriculture Research Center, JapanIV : 23-43.
- Ojedapo LO, Amao SR, Ameen SA, Adedeji TA, Ogundipe RI, Ige AO. 2012 Prediction of body weight and other linear body measurement of two commercial layer strain chickens. Asian J of Anim Sci. 1-10.
- Permadi ANN., E. Kurnianto, And Sutiyono. 2020. Morphometric Characteristics of Male and Female Kampung Chickens in Tirtomulyo Village, Plantungan District, Kendal Regency, Central Java. Jurnal Peternakan Indonesia. 22(1): 11-20. DOI: 10.25077/jpi.22.1.11-20.2020.
- Suharno, B and Nazarudin. 1996. Commercial Livestock. Self-help Spreader. Jakarta.
- Udeh I, Isikwenu JO, Ukughere G. 2011. Performance characteristics and prediction of bodyweight using linear body measurements in four strains of broiler chickens. Int J Anim Veter Adv 3(1): 44-46.
- Warwick J, Astuti M, Hardjosubroto W. 1995. Livestock breeding. Gajah Mada Press University, Yogyakarta.