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Morphometric Diversity and Genetic Relationship of "Bangkok" Chicken (Thai Game Fowl) in East Java, Indonesia

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Abstract

Commercial chickens that were selected for both meat and egg production were domesticated from the descendants of red junglefowl (*Gallus gallus*) species that have been widely spreading in Asia, including Indonesia. There were an estimated 32 strains of local chicken in Indonesia with high morphological diversity. The one of contributors to the diversity of Indonesian local chicken is called "Bangkok" chicken. As a reference to the name of the chicken, it is a suspected descendent of Thai game fowl (*Gallus gallus domesticus* Linnaeus, 1758) which was introduced in Thailand region many years ago. The objective of this study was to explore the existence of this chicken related to the genetic relationship with the Indonesian local chicken. This study was conducted in East Java Province which covered sample areas Banyuwangi, Pasuruan, and Madiun Regencies. The materials were "Bangkok" chicken offspring with a total of 450 birds. The observed variables consisted of qualitative and quantitative morphological characters, both male and female of adult chickens (1 yr to 1.5 yr old). The highest frequency of the comb shape was Single comb (36.9 %) and the lowest was Rose shape (11.8 %). While the highest frequency of shank colour was blackish-yellow (45.6 %) and the white color (3.6 %) was the lowest. The closest genetic distance base on morphometric diversity was between Pasuruan and Banyuwangi chickens (96.04). It was suspected due to the distance area between Pasuruan and Banyuwangi closer than Madiun and Banyuwangi, while Madiun and Pasuruan was the farthest genetic distance (682.03). Hence, the breeding program of Bangkok chicken based on the genetic distance needs further consideration to prevent inbreeding from occurring. Otherwise, the closest distance should be called for to upgrade the purity of the Bangkok chicken ancestor.

Keywords: Cock, Comb, *Gallus gallusdomesticus* (Linnaeus, 1758), Genetic distance, Morphological character, Native chicken, Shank color

1. Introduction

Native chickens are included in the chicken family and there is no comprehensive information on strains or breeds. These local chickens are raised by farmers and generally have a large phenotypic diversity (FAO, 2012). However, this animal diversity is important for the life and food security of small-holder farmers (Widodo *et al*., 2019). The genetic potential of native chicken to meet changing environmental conditions is a potential source of genes related to resistance or tolerance among emerging diseases and is compatible with consumer preferences for meat and egg products (Carbales, 2013); while the ancestor of Indonesia's local chicken was also descendent from *Gallus gallus* species. Hence, chicken has been one of the genetic resources of animal biodiversity in Indonesia. The Indonesian local chickens have different appearance characteristics that were found around 32 types of local chickens in Indonesian, namely Ayunai, Balenggek, Banten, Bangkok, Burgo, Bekisar, Cangehgar (or Cukir or Alas), Cemani, Ciparage, Gaok, Jepun, Kampung, Kasintu, Kedu (Black and White Kedu), Pelung, Lamba, Maleo, Malay, Merawang, Nagrak, Nunukan, Nusa Penida, Olagan, Rintit or Walik, Sedayu, Sentul, Siem, Sumatra, Tolaki, Tukung and Wareng (Nataamijaya, 2010; Iskandar 2012; Widodo *et al.,* 2022). However, Rusdin *et al.* (2011) reported that were found around 31 local chicken strains in Indonesia with different morphological diversity.

The total population of Indonesia's local chickens was about 312 × 10^6 birds in 2019 (BPS, 2020). While, by 2020, the world's chicken population has reached more than 33 ×10^9 birds and about 46 % of them were in the Asian continent (FAO 2022). Therefore, the potency of native chicken is high, which can be important to fulfil protein demand. Sulandari *et al.,* (2008) reported that Indonesia is the one of main centres of chicken domestication in the world. The one contributor to the genetic diversity of Indonesia local chicken is "Bangkok" chicken or Thai game fowl chicken. This chicken was presumably developed genetically in part of Thailand

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