# Qualitative Traits of *Walik* Chickens, The Rare Indigenous Chicken, in West Java, Indonesia

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## Abstract

*The Walik chicken is one of the rare indigenous chickens in Indonesia owned frizzling feathers. Since the external genetic information of Walik chickens is very limited, therefore, the study on the qualitative traits of such rare indigenous chicken is necessary to support their comprehensive repertoire that would be useful for their preservation efforts and potency development. Thirty six Walik chickens (15 cocks, 21 hens), and 42 Walik chickens (16 cocks, 26 hens) from Sumedang and Bogor District, respectively, were used in this study. The variety on base color of feather, color of the plumage, flick feather, feather pattern, shank color, and comb types of the chickens were identified based on Hutt (1949), and Somes (1988). The frequency of autosomal genes, sex-linked genes, and feather pattern were quantified based on Nishida et al. (1980), and Stanfield (1982). The Walik chickens from Sumedang and Bogor District population have shown predominantly similarities on the plumage color (i), the wild feather pattern (e+), single comb (p), and white/yellow shank (Idid). However, the Walik chickens from Bogor District population were dominated by the strip feather/B (52%), and the silvered-flick feather/S (54%). The Walik chickens from Sumedang District population were dominated by the plain feather/b (54%), and golden flick feathers/s (84%). The low frequency occurence of some qualitative traits could be useful for selection in order to conserved the rare traits. Further studies on the quantitative traits, and the molecular analysis need to be done to complete a set of characterization of the Walik chickens.*

*Key words: qualitative traits, walik chicken*

## Introduction

The *Walik* chicken is chategorized as one of the rare indigenous chickens in Indonesia based on their small population number, very limited data of their morphological features and biological parameters, and very limited data on their

current utilization (Sartika & Iskandar, 2007). The *Walik* chicken own a frizzling type of feather (Sartika & Iskandar, 2007), and has various names based on the geographic region of sampling, such as *Walik* or *Rintit* chickens in West Java. The monogenic traits based on pigmentation differences, and comb types are one of approach that can be used to describe the genetic variations in chickens. The qualitative traits of the chickens also have important economic, cultural, and religious function, therefore the specific characteristics must be carefully identified and considered in developing breeding programs. In term of *Walik* chicken in Indonesia, till now, the data on their qualitative traits is very limited. Therefore, the objective of this study was to identify the qualitative traits of the *Walik* chicken populations cared under traditional farming system in West Java to provide base line data that would be useful for their conservation efforts and potency development.

## Materials and Methods

The study areas were selected based on purposive sampling method. The initial survey to identify the individual households kept the *Walik* chickens was done by interviewing the head of villages, and the oldest people in a society who know well the people in the study areas as described on the snow ball methods. Thirty six *Walik* chickens (15 cocks, 21 hens) from 4 villages (Padanaan, Palasah, Ujungjaya dan Keboncau) in Sumedang District, and 42 (16 cocks, 26 hens) *Walik* chickens from 9 locations (*Kampung* Cangkrang, *Desa* Cikarawang, *Kampung* Carang pulang, *Desa* Situgede, *Desa* Babakan Lebak, *Desa* Babakan Lio, *Desa* Cibeureum Dramaga, *Desa* Neglasari, and *Desa* Kahuripan) in Bogor District, West Java, Indonesia were used in this study. The variety on base color of feather, color of the plumage, flick feather, feather pattern, shank color, and comb types of the chickens were identified based on Hutt (1949), and Somes (1988). The frequency of autosomal genes (plumage color and comb types), sex-linked genes (variety on base color of feather, flick feather, and shank color), and feather pattern were quantified based on Nishida *et al.*, (1980), and Stanfield (1982).

## Results and Discussion

The frequency distribution pattern of the qualitative traits in Walik chickens is presented on Table 1. The *Walik* chickens, either from Sumedang and Bogor District have shown predominantly similarities on the plumage color (i), the wild feather pattern ($e^+$), single comb (p), and white/yellow shank (Idid). However, the *Walik* chickens from Bogor District population were dominated by the strip feather/B (52%), and the silvered-flick feather/S (54%). Whereas the Walik chickens from Sumedang District population were dominated by the plain feather/b (54%), and golden flick feathers/s (84%).

The coloured plumage of brown, black, and mixture were predominantly observed among *Walik* chickens to white colour either in Bogor or Sumedang District population (Table 1). Pigmentation differences, which are attributable to melanin, produce a variety of plumage colours in the chickens. The presence and level of melanin pigments such as trichochrome is related to feather colour and is considered to be indicative of genetic differences among certain plumage colours (Smyth, 1991). There are 2 kinds of melanine, namely eumelanine and pheomelanine. Eumelanine forms the black and blue colour of feather, whereas the pheomelanin forms the red-brown, salmon and dark yellow (Brumbraugh and Moore, 1968). The strip base color of feather present if the distribution of melanine on seconday feather

Table 2. Frequency Distribution of Qualitative Traits in Walik Chickens found in Sumedang and Bogor District, West Java, Indonesia

| Qualitative Traits | Gene Frequency | |
|---|---|---|
| | Sumedang (n=36) | Bogor (n=42) |
| Plumage Color | | |
| qI | 0 | 0.01 |
| qi | 1.00 | 0.99 |
| Variety on base color of feather | | |
| qZB | 0.47 | 0.52 |
| qZb | 0.54 | 0.48 |
| Flick feather | | |
| qZS | 0.16 | 0.54 |
| qZs | 0.84 | 0.47 |
| Feather pattern | | |
| qE | 0.20 | 0.10 |
| qe+ | 0.43 | 0.51 |
| qe | 0.37 | 0.38 |
| Comb type | | |
| qP | 0.24 | 0.17 |
| qp | 0.76 | 0.83 |
| Shank color | | |
| qZId | 0.5 | 0.79 |
| qZid | 0.5 | 0.21 |

qI= white, qi= colored-plumage, qZB= strip; qZb= plain, qZS= silver, qZs= golden, qE= black, qe+ = wild, qe= columbian, qP= pea, qp= single, qZId= white/yellow; qZid= black/green.

is blocked. The variety of base color of feather is the sex linked gene that will be found as $Z^BW$ and $Z^BZ^B$ or $Z^BZ^b$, respectively in male and female (Hutt, 1949).

The relatively low frequency of the white plumage colour (Tabel 1) can be attributed to the fact that white chickens (especially cocks) are important components in traditional religious of the community, therefore they are readily to be sold. Large variation in plumage colour on the indiginous chicken population is indicative of unconscious selection effort. Ensminger (1992) stated that plumage color and pattern, skin color, shank, and comb type are inherited by single pairs of genes that able to influence the preference of the consumers. However, till know there was a very limited data that the variation in plumage colour of the indiginous chickens in Indonesia is mainly due to the lack of conscious selection or breeding programs towards choice of colour.

Our finding also showed that the single comb/p predominates with a frequency of 76%, and 83% for *Walik* chickens in Sumedang and Bogor District population, respectively, to pea comb (24%, and 17%). The higher frequency of single to pea comb indicated that Walik chickens are mainly recessive for comb type. If the heterozygote genotipe has any relative advantages, improvement of the stock would be slow to medium since only 17% and 24 % posessed the pea comb that is generally regarded as the dominant comb type.

The higher frequency of white/yellow shank color (79%) to black/green color (21%) of *Walik* chickens in Bogor District population is in line with the report of Sartika & Sofjan (2007) who found the white/yellow skin was dominant in the indiginous chickens in Indonesia. The melanine on epidermis relates to the black color of chicken shank, whereas the lipochrome on epidermis and melanine on dermis relate to the green color of chicken shank (Jull, 1951). It has been generally assumed that the red junglefowl is the sole wild ancestor of the domestic chicken (Crawford, 1990, Fumihito *et al.* 1994, Romanov & Weigend, 2001, Sulandari & Zein, 2008). However, Eriksson *et al.*, (2008) demonstrates that though the white skin allele originates from the red junglefowl (Gallus gallus), the yellow skin allele originates from a different species, most likely the closely related to grey junglefowl (Gallus sonneratii). Therefore, the molecular characteristics is also important to be observed to complete a set of identification and characterization of the indiginous chickens in Indonesia, mainly the *Walik* chickens. The rearing of *Walik* chickens either in Sumedang and Bogor Districts is also an integral part of the smallholder farming system, where they kept by the rural poor to fulfill multiple function. This could also become a sources of variation of the qualitative traits of chickens since the presence or absence of the carotenoid pigments, primarily xanthophylls, in the feed is also responsible for the diversity in skin colour of chickens (Eriksson *et al.* 2008).

Indigenous chickens of the tropics are important reservoirs of useful genes and posses a number of adaptive traits (Horst, 1989). However, diverse human needs

in the form of selective breeding for distinct phenotypes also contributed to the diversity of the present day chicken populatios maintaned in different parts of the tropics (Dessie *et al.*, 2011). From our findings, we predict that the *Walik* chicken have a high similarity with the *Kampong* chicken which naturally have $e^+$ gene, as described by Nishida *et al.* (1980). We also predict that the *Walik* hens from Sumedang Districts, which were dominated by the plain feather (54%), have shown similarities with the Single Rhode Island Red that mainly was developed as the meat producing chickens. The foreign gene from Barred Plymouth Rock was also identified based on the strip feather of Walik chicken from Bogor District population. Historically, the Barred Plymouth Rock are developed as egg producing chickens. Weigend and Romanov (2001) stated that the identification and characterization of the chicken genetic resources generally requires information on their population, adaptation to a specific environment, possession of traits of current and future value and socioecultural importance, which are crucial inputs to decisions on conservation and utilization. Therefore we recommend that the further studies on the quantitative traits, in term of egg and meat production need to be done to predict the utilization potencies of *Walik* chicken.

## Conclusions

The *Walik* chickens from Sumedang and Bogor District population have shown predominantly similarities on the plumage color (i), the wild feather pattern ($e^+$), single comb (p), and white/yellow shank (Idid). However, the *Walik* chickens from Bogor District population were dominated by the strip feather/B (52%), and the silvered-flick feather/S (54%). Whereas the Walik chickens from Sumedang District population were dominated by the plain feather/b (54%), and golden flick feathers/s (84%). The low frequency occurence of some qualitative traits could be useful for selection in order to conserved the rare traits. Further studies on the quantitative traits, and the molecular analysis need to be done to complete a set of identification and characterization of the *Walik* chickens.

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