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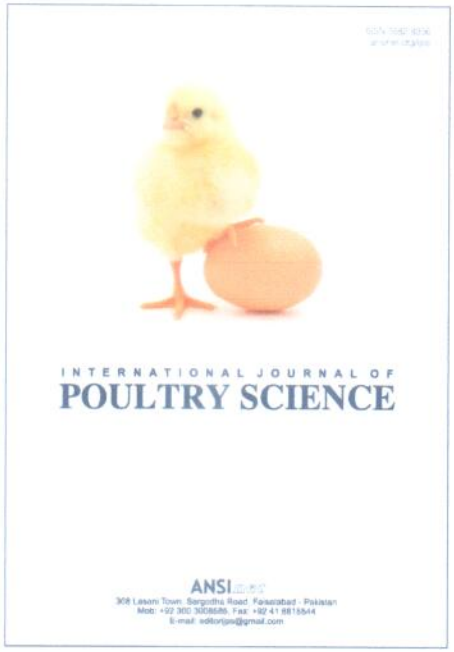

Polimorphism of qualitative traits of arabic chicken

by Muhammad Hasil Tamzil

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Research Article

Polymorphism of Qualitative Traits of Arabic Chicken: A Case Study in Istiqomah Farmer Group, Dasan Cermen, Mataram, West Nusa Tenggara, Indonesia

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Abstract

Background and Objective: Data on the polymorphism of qualitative traits of Arabic chicken are not available. The study was designed to determine the variety of qualitative traits of Arabic chickens reared in Mataram city. **Methodology:** The study was conducted in Istiqomah Farmer Group in Dasan Cermen, Sandubaya, Mataram, Indonesia, using a survey method, in which farmer samples were selected by random sampling purposive method. Collected data were tabulated and analyzed descriptively. **Results:** The study found that Arabic chickens reared in the city of Mataram had the addition of plumage color, skin color, shank color, beak color and comb shape. The highest frequency of plumage color was silver, followed by golden, gold silver and white gold, respectively. The highest frequency of color of skin, shank and beak was black, followed by white and yellow. The highest frequency of comb shape was singular shape followed by the pea shape. **Conclusion:** Arabic chickens in Mataram city have been experiencing degradation of colors of plumage, skin, shank, beak and comb shapes.

Key words: Arabic chicken, plumage, skin, shank, comb

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

In Indonesia, there are some types of meat-producing poultries, i.e., broiler, local chickens, culling hens and ducks. In national level, broilers are the main poultry meat provider contributing up to 80.5% of national demand, followed by local chickens (12.9%), culling hens (4.9%) and ducks (1.9%)[1]. One of local chicken types that contribute significantly in providing meat and egg for consumption is Arabic chicken [Braekel chicken (*Gallus turnicus*)]. The exact number of Arabic chicken population is not known yet since the data of the chicken are mixed in the data of local chicken.

Arabic chicken is known to be able to produce more eggs compared to kampong chicken[2-5], but this type of chickens have growth rate, meat quality and fat similar to those of kampong chicken[6,7]. The chicken also has a moderate tolerance when being maintained at a high-temperature environment[8-11].

Arabic chicken is a local chicken type that has been developed since 1995[2,3]. There are two types of Arabic chickens that are developed as egg producers, i.e., Arabian silver and Arabian gold. The color of the Arabian silver is white with a combination of black spots that line up all over the body. The color of the eye circle is black, same with the colors of the skin, shank and beak[2,3,12]. Meanwhile, the specific characteristics of the Arabian gold are their plumage colors consisted of several mixed colors, i.e., golden red with barred pattern, reddish yellow neck, black eye circumference, black skin, black shank and black beak[2,3,12].

Arabic chicken is Indonesian local chicken originated from the Europe. However, the chicken were first brought to Indonesia in the form of 8 eggs from Saudi Arabia, where the chicken had emigrated first[2,3,12]. After that, the eggs were incubated and hatched and the chickens spread. Eventually, they crossbred with local chickens and produced what is known as the present Arabic chicken[12]. Currently, this type of chicken is growing rapidly all over Indonesia including in Surabaya, Jakarta and other areas, such as Lombok. This means that Arabic chicken have experienced genetic drifts: A small group of Arabic chickens were moved from their origin place to a new place for breeding purpose[13]. During the breeding process, there is a possibility of crossbreeding with local chicken that contributes to the emergence of genetic changes including phenotypic changes.

This study was designed to collect data on phenotypic characteristics that can be utilized as a basis for genetic purification of Arabic chicken in an effort to increase the role of Arabic chicken as a source of eggs and local poultry meat. The result of this study is expected to overcome the shortage of kampong chicken number that can be used as ingredients for traditional cuisine.

MATERIALS AND METHODS

Model and research location: This field study was conducted using direct observation on the chickens in the Istiqomah Farmer Group in Dasan Cermen, Sandubaya Sub-district, Mataram City, Lombok, West Nusa Tenggara, Indonesia. Istiqomah farmer group is a 15 years old group. The group consists of 10 farmers. Every farmers owned 50-200 chickens. Feed, medicines and feed supplements were obtained from poultry shops, while the day old chicks were bought from other farmer groups focusing specifically on hatchery.

Sampling method: Farmers participated in this study were selected through purposive sampling where the farmer should have chickens in production phase kept in a litter house as criteria. Observations were conducted directly on 110 Arabic Chickens aged 6 months. Variables observed were the colors of plumage, skin, beak and shank as well as the shape of the comb.

Data analysis: Data obtained were tabulated and their frequencies were calculated and analyzed descriptively and also were analyzed using analysis of qualitative trait[14].

RESULTS AND DISCUSSION

Phenotypic characteristics of Arabic chicken bred by Istiqomah Farmer Group in Dasan Cermen, Mataram are presented in Fig. 1-5. Figure 1 shows that there are additional color variations in Arabic chickens. Originally, Arabic chickens only consisted of two colors, i.e., gold (Fig. 6) and silver (Fig. 7)[2,3,12]. In the observed population of Arabic chickens in the present study, two additional colors were found, namely golden silver (Fig. 8) and golden white (Fig. 9). The most dominant colors found in this study were silver, followed by gold, golden silver and golden white, respectively.

The definition of silver and gold in this study is similar with the definition from previous studies. Silver is described with the following characteristics: White plumage mixed with barred pattern, white plumage on the neck, black eye circles, black skin, black shank and black beak. Meanwhile, gold description is red plumage mixed with barred pattern, black shank, black skin, black beak, red plumage on the neck and black eye circles[2,3,12]. The description of golden silver is similar

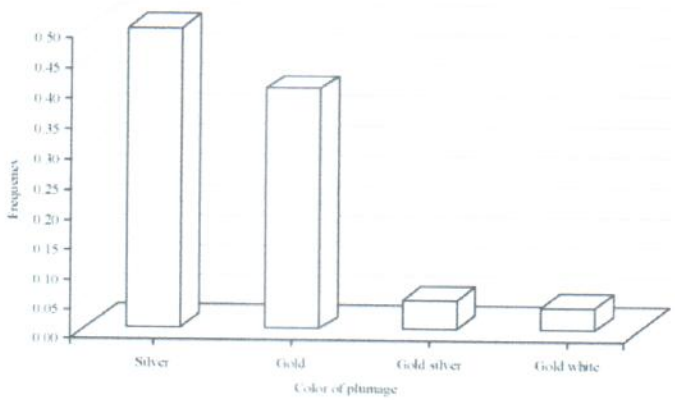

Fig. 1: Frequencies of plumage colors of Arabic chickens

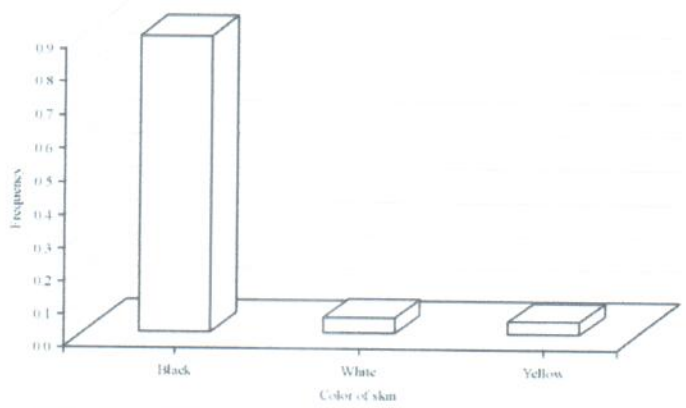

Fig. 2: Frequencies of skin colors of Arabic chickens

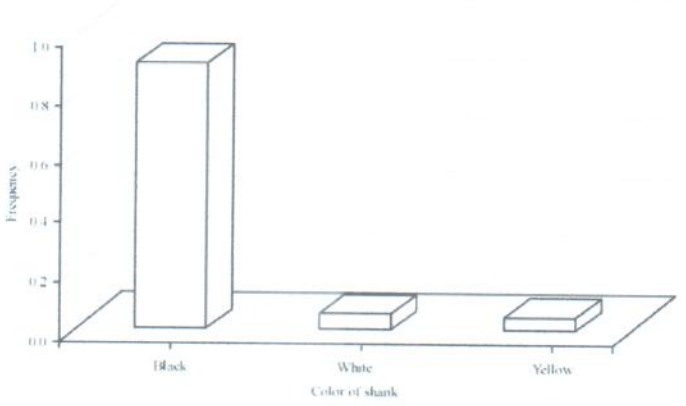

Fig. 3: Frequencies of shank colors of Arabic chickens

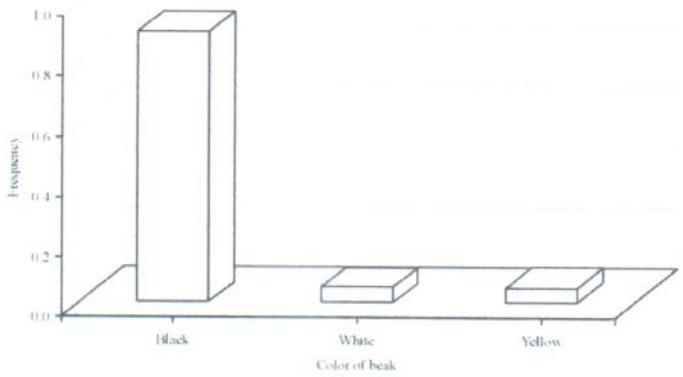

Fig. 4: Frequencies of beak colors of Arabic chickens

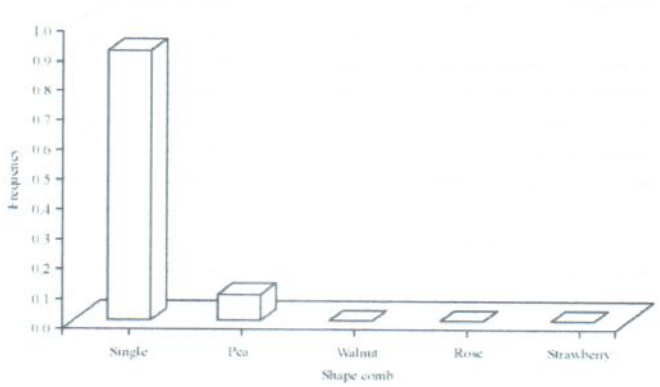

Fig. 5: Frequencies of comb shapes of Arabic chickens

with that of silver and the difference lies in the presence of golden color spreading among the white. Golden white is defined when the plumage of the body is white with some gold spreads on it, specifically on the neck and wings.

The presences of golden silver and golden white are related to the rearing method used, i.e., both Arabic silver and gold are reared in the same flock in the house. As a result, silver and golden males have the same chance to mate randomly with all golden and silver females in the flock.

Based on the data obtained in this study, it could be seen that the highest color frequency of Arabic chicken were found in silver and gold colors with frequencies of 0.45 and 0.36, respectively. These color frequencies are followed by golden silver and golden white with frequencies of 0.06 and 0.05, respectively.

This study also found that in Arabic chickens there were various color additions on the skin, scales and beak. Originally, both silver and golden Arabic chickens have black skin, black shank and black beak[2,3]. However, this study found, in addition to black, there were also yellow and white colors with frequencies of 0.04 and 0.05, respectively, which was low compared to 0.91 of black frequency. This means that black is the dominant color inherited from the chicken parents which are silver and golden chickens.

Data obtained in this study indicate that the observed Arabic chickens have experienced sex link[13]. Chickens with barred pattern (B-), silver plumage pattern (S-) and golden plumage pattern (ss) are the characteristics of chickens experiencing sex linked[13,15]. The genes of barred pattern (B-) on male chicken are incompletely dominant. Mean while,

Fig. 6: Gold Arabic chicken

Fig. 7: Silver Arabic chicken

Fig. 8: Golden silver Arabic chicken

Fig. 9: Golden white Arabic chicken

on female chickens, their linked genes are homozygous, whereas, on the male chickens, it is either homozygous or heterozygous. However, black and white genotypes can affect S and s alleles that can only be distinguished by marriage testing[15]. This is the reason why in this study golden silver and golden white plumage, as well as yellow and white skin, beak and shank colors appear.

The color of chicken plumage is influenced by the presence of melanoblast pigment that occurs after 8 h of incubation[16]. The variety of plumage color highly depends on the location of the plumage on the body, while the plumage pattern is the result of genetic interactions and the influences of male and female hormones[17].

Fig. 10: Single-shape comb

Fig. 11: Pea-shape comb

This study found that skin color had a relationship with the colors of scales and beak. Arabic chickens having black skin have black beaks and black shanks as well. The black color of the skin is due to the presence of melanin pigment and lipochrome in the dermis and epidermis[18]. The phenomena of the same colors of skin, shank and the beak in this study are similar to that occurring in Nigerian Muscovy Ducks[19].

Addition of comb shapes of Arabic chicken was also found in this study. At first, Arabic Chickens, both silver and gold had a single-shape comb (Fig. 9), but during the observation in this study, pea-shape comb was identified as well (Fig. 10).

The variety of colors of plumage, skin, shank and beak and shape of comb of Arabic Chicken in this study was caused by the mixing of chicken population with the other types of chickens. This can happen because in Lombok, the breeding of Arabic chickens are conducted by small farmers spreading sporadically in the various locations of Arabic chicken farms, causing cross breeding of Arabic chicken with other types of chickens, especially kampong chickens, is difficult to control[20]. The presence of the external genes also influences qualitative and quantitative characteristics of Arabic chickens. This is also the reason why the variety of kampong chickens has also changed[21]. The addition of variety of colors of plumage, skin, shank and beak, as well as the shape of comb in this study, indicates that qualitative characteristics of Arabic chickens in Mataram has changed and there has been a genetic change as well. Therefore, to increase Arabic chicken roles as meat and egg producers, it is required to purify the qualitative and quantitative characteristics by separating maintenance of silver from and golden Arabic chickens.

CONCLUSION

Arabic chickens in Mataram have experienced degradation of the plumage color, skin color, scales color, beak color and the shape of the comb. The highest plumage frequency goes to silver followed by golden, golden silver and golden white, respectively. The highest frequency of color of skin, shank and beak is black, followed by white and yellow.

SIGNIFICANCE STATEMENT

The study found that Arabic chickens in Mataram have experienced degradation of colors of plumage, skin, shank and beak, as well as comb shape. The highest frequency of the chicken plumage color goes to silver, followed by gold, golden silver and golden white, respectively. The colors of shank and beak are same with the color of skin. The most dominant colors are black, followed by white and yellow. The result of this study could be used as a basis for genetic purification of Arabic chickens.

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