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Review Article

Thirty Years Development Observation of Braekel Chicken (*Gallus turnicus*) into Arabic Chicken in Indonesia

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Abstract

Arabic chicken was first developed in Batu, Malang, East Java, Indonesia in 1995. After that, the chickens spread rapidly throughout the island of Java and even throughout Indonesia. Initially, Arabic chickens were used as laying hens. However, over the years Arabic chickens have also been developed to become meat producers to replace native chicken meat. Arabic chickens have high egg production ability, making it easier for farmers to produce large numbers of eggs. The chickens also have a similar growth rate and meat quality to those of Kampong chickens. This is the reason Arabic chickens now-a-days mainly are kept to produce meat. In Indonesia, Arabic chickens are developed by small farmers, making it difficult to control genetic pollution due to inbreeding with other types of chickens. There have been some deviations found in the qualitative characteristics of Arabic chickens. Originally, the colour of Arabic chicken feathers was only silver and gold, with a black beak, black skin, black shank and a single comb. However, currently, there are Arabic chickens with silver-golden and white-golden feathers, yellow and white beak, skin and shank and a walnut-shaped comb.

Key words: Arabic chicken, qualitative characteristics, feather colour, shank, skin, beak, comb

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INTRODUCTION

Local chickens are a type of poultry that has a significant position in the life of rural communities. Local chickens not only plays a role as a producer of meat and eggs for consumption but can also perform a role in various possessions such as: As an asset or savings which improve the social status of the owner, numerous types of local poultry are very important for the benefit of certain cultural ritual events and can play an integral part in farming as pets for hobbies, sports or pets¹.

One of the local chickens that have a significant contribution as a producer of meat and eggs is Arabic chicken. The local immigrant poultry first came from Saudi Arabia to the city of Batu Malang, East Java in 1995 and after that spread throughout the country². Arabic chickens are classified as light laying types^{3,4} with a small and slender body posture like Kampong chickens. The results of the growth and meat quality test showed that the growth rate, meat and fat qualities of Arabic chicken were relatively the same as those of Kampong chickens⁵⁻⁷. However, compared to the egg production of Kampong chickens, the egg production of Arabic chickens is higher. This is considered by breeders as an opportunity to produce large numbers of eggs that can hatch uniformly at the same time. These are the reasons why farmers use Arabic chickens as alternative poultry to meet the scarcity of Kampong chicken meat.

To date, there has been no review of the development of Arabic chickens in Indonesia since they first came to the country until now. This study aimed to review and provide an understanding of the origin of Arabic chickens and the qualitative deviations that occur so that they can be used as a basis for making selections for the formation of superior laying Arabic chickens.

Origin of Arabic chickens: Arabic chickens are descendants of Braekel chickens^{3,5}. The chicks entered Indonesia from Saudi Arabia in the form of 8 fertile eggs through the city of Batu Malang, East Java in 1995. The hatching results were kept in the yard of resident houses. This opened chances of interbreeding with local chickens. Result of the interbreeding spread throughout Java, even throughout Indonesia³. Braekel chickens were first developed in Belgium in 1416 A.D. and have been designated as Belgian chicken breeds. Braekel chicken breeds spread to various parts of the world such as the United States, Britain, Australia⁸ and Indonesia^{3,5}.

Braekel chickens in their home country are developed as multi-purpose chickens, namely as ornamental chickens, laying hens and meat producers⁹. Braekel chickens produce 120-180 eggs per year and the average egg weight ranges from 35-40 g per egg⁸. Braekel chickens have small and slender bodies causing them to be used mainly as egg producers².

Braekel chickens are characterized by silver and gold feathers (with a straight band pattern, a solid neck with white ear lobes and a single comb with a high tip). The comb and wattle of the males and females of the chickens are red. The chickens are easily startled, are relatively distant from humans and do not have a brooding nature.

Initially, there were two types of Braekel chickens, consisting of the heavy type which developed in the fertile Flanders Region and the light type which developed in the Kempten Region, classified as the less fertile area. However, at one point, inbreeding between the two chicken types occurred producing one species and making the difference between the two disappeared⁹. The strong points of Braekel chickens are relatively resistant to disease and very tolerant of climate change making them relatively easy to adapt to new environments^{9,11}. The chickens were tested on their heat resistance by comparing them with Hisex Brown laying hens and free-range chickens and it was found that Indonesian Braekel chickens (Arabic chickens) belong to the class of chickens that are quite tolerant of high environmental temperatures¹⁰⁻¹². In Arabic chickens, there are six genotypes of Heat Sock Protein (HSP) 70, which is the gene responsible for heat-exposed poultry^{9,12}. All of these genotypes belong to the HSP 70 genotype which was tolerant to high temperatures, using HSP 70 expression as a benchmark, physiological, haematological and hormonal dynamics^{9,12-13}.

Braekel chickens becomes Arabic chickens: The inbreeding between Braekel chickens and Kampong chickens in 1995 in Batu Malang City, East Java resulted in chickens that have higher egg production compared to that Kampong chickens³. Offspring of crossed between Braekel and Kampong chickens are characterized by silver and gold feathers, with black skin and shank and single comb. The cross result is now known as Arabic chicken. Currently, chickens are found throughout Indonesia². There are two versions of the origin of the Arabic word in naming chickens. The first version is because the ancestor of the chickens (Braekel chicken) came from Saudi Arabia. The second version says that Arabic is used because the feathers of the chickens from the head to the neck are covered by white colours like wearing a Hijab (Arabic clothing).

Since the beginning of its development in Indonesia, Arabic chickens have been used as egg-producing chickens with the ability to produce eggs up to 190-250 eggs annually³. Meanwhile, their ancestors (Braekel chickens) in their home country only manage to produce 120-180 eggs annually⁸. The high level of egg production of Arabic chickens is because Arabic chickens do not have a brooding nature². The chickens start producing eggs at the age of 4.5-5.5 months and they reach their production peak at the age of 8-9 months. Golden Arabic chickens and silver Arabic chickens have the same egg production ability¹⁴, although other sources reported that golden Arabic chickens have higher egg production abilities (300 eggs annually) compared to that silver Arabic chickens (250 eggs annually)³. Another study reported the opposite where silver Arabic chickens have a higher egg production ability compared to that golden Arabic chickens¹⁵. In terms of eggshell colour and egg weight, Arabic chickens have similar properties to Kampong chickens. The colour of the eggshell is white with an average egg weight ranging from 30-35 g per egg. These similar properties give advantages to Arabic chicken eggs, for the selling price of the eggs is the same as the selling price of Kampong chicken eggs and higher than the price of purebred chicken eggs having similar weight¹.

Arabic chickens belong to the local chicken group, which is lean, small and easily startled. These traits are the reasons why they are less efficient to be used as meat producers. The body size of silver Arabic chickens and golden Arabic chickens is presented in Table 1. It can be seen that the body sizes of the two types of Arabic chickens are not that different. The reason is that the two types of chickens come from the same chicken family. This is because of the influence of the genetics of Kampong chickens in Arabic chickens.

Production performance of Arabic chickens at the age of 12 and 14 weeks is presented in Table 2 which shows that the growth performance of Arabic chickens is similar to that of Kampong chickens.

The body weight of Arabic chickens is similar to that of Kampong chickens. The average body weight of female silver Arabic chickens was 1.2 kg¹⁶. Meanwhile, the body weight of adult male Arabic chickens ranged from 1.4-2.3 kg, while the body weight of the parent ranged from 0.9-1.6 kg³. The body weight of male adult golden Arabic chicken ranges from 1.4-2.1 kg, while the weight of the parent ranges from 1.1-1.6 kg³. The average body weight of Arabic chickens is far lower compared to the body weight of the oldest Braekel chickens, which ranges from 2-2.5 kg for adult roosters and between 1.8-2.2 kg for adult hens¹⁷.

Arabic chicken carcass weight at the age of 10 weeks is lower than the carcass weight of Kampong Unggul Balita (KUB-1) but higher than the carcass weight of male laying chickens. The carcass weights of Arabic chickens, male laying chickens and KUB-1 chickens were 61.50, 58.65 and 61.5%, respectively⁶. The level of meat deposit in the breast area of Arabic chickens ranks second after KUB-1 chickens and the lowest is male laying chickens. The level of meat deposits in the breast area for male laying chickens, Arabic chickens and KUB-1 chickens are 22.14, 24.08 and 23.35%⁶. Arabic chicken meat contains a relatively low-fat content⁷. The abdominal fat content of Arabic chickens is the lowest compared to the abdominal fat content of KUB-1 chickens and broilers. The abdominal fat content of Arabic chickens, KUB-1 chickens and laying-type male chickens are 1.014, 1.021 and 1.368%, respectively. Meanwhile, the fat content of Arabic chicken meat (0.48) is relatively the same as that of KUB-1 chicken (0.49) and lower than the fat content of male laying chickens (0.67)⁷.

Table 1: Body size of adult male and female silver and golden Arabic chickens

Size of body parts	Silver		Gold	
	Male	Female	Male	Female
Body length (cm)	36.1	35.4	35.7	32.4
Chest length (cm)	40.3	35.6	40.9	36.1
Back length (cm)	19.7	19.5	20.7	17.9
Wing length (cm)	24.3	21.2	24.9	21.1
Neck length (cm)	14.3	13.3	13.0	12.3
Beak thickness (mm)	24.3	11.6	-	-
Femur length (cm)	12.0	9.8	12.6	10.8
Tibia length (cm)	14.6	12.4	14.7	12.4
Shank length (cm)	8.1	7.7	8.2	7.4
Shank circumference (cm)	4.5	3.9	4.8	4.3
Head length (mm)	43.3	37.3	42.8	40.6
Head width (mm)	30.8	27.6	30.1	29.6
Comb height (mm)	63.1	30.8	58.9	24.4
Beak length (mm)	29.9	31.8	-	29.6
Beak width (mm)	14.1	13.8	-	12.6
Pelvic width (cm)	-	-	-	4.5

Source: Sulandari *et al.*³

Table 2: Production performance of 12 and 14 weeks old Arabic chickens

Production performance of Arabic chickens	Age (weeks)	
	12	14
Body weight (g/bird)	936.0	1142.5
Body weight gain (g/bird)	92.6	97.2
Feed conversion	4.06	4.06
Carcass weight (g (%))	596.7 (63.75)	691.0 (60.48)
Carcass primal cut weight (%)		
Breast weight (g)	157.58 (26.4)	203.24 (29.4)
Upper thigh weight (g)	111.21 (18.6)	132.05 (19.1)
Drumstick weight (g)	115.54 (19.4)	143.39 (20.8)
Wing weight (g)	98.89 (16.6)	122.5 (17.7)

Source: Suryanto *et al.*¹⁸

Arabic chickens maintained as meat producers until the age of 12 weeks can reach an average body weight of 320.14 g and the carcass value reaches $60.65 \pm 8.08\%$ ¹⁹. The weight of the chickens is relatively smaller compared to the body weight of KUB chickens which only reaches $1,108.42 \pm 84.52$ g¹⁶. On the other hand, the weight of Arabic chickens is relatively the same as that of KUB-1 chickens, which ranges from 306-373 g per head²⁰. However, the weight of the chickens is very low compared to the body weight of broiler chickens which reaches 2113 g²¹.

Changes and deviations in Arabic chicken properties: During the development of Braekel chickens into Arabic chickens in Indonesia, there have been several changes in the quantitative and qualitative characteristics of the chickens. The body weights of adult male and female silver Arabic chickens are 1.74 and 1.36 kg, while the body weights of adult male and female golden Arabic chickens are 1.78 and 1.34 kg, respectively⁴. The body weight range is far below the body weight of Braekel chickens in their home country, which ranges from 2-2.5 kg, while the parent weight ranges from 1.8-2.2 kg⁸. The decrease in body weight might be attributed to the fact one of the parents is Kampong chickens.

Changes in qualitative properties of the Arabic chickens can be seen in the feather colour, skin colour, scales and comb shape. At first Arabic chicken only consisted of two colours, silver and gold but a study by Tamzil *et al.*²¹ reported that silver-golden and white-golden colours were also detected. The most dominant feather colour in the study was silver, followed by silver-golden and white-golden. The definition of silver is a feather having white and black striated, white neck feathers, black eye circle, black skin, black shank and black beak, while golden is when the chickens have black striated red fur, black shank, black skin, black beak, red neck feathers, black eye circles^{3,5}. The description of the golden-silver colour is the same as the silver one, but the white feathers are decorated with golden feathers, while the golden-white colour is when the feather on the chicken's body is white and is decorated with golden colours, especially in the neck and wing areas²³. The occurrence of silver-golden and white-golden colours is predicted to be a consequence of silver and golden Arabic chickens being reared together in one cage. As a result, all males, both silver and golden, have the opportunity to mate randomly with all silver and gold females in the cage (group).

Changes also occur in skin colour, scales and beak. Originally, the silver and gold Arabic chickens had dark (black) skin, scales and beak³. However, Sohn *et al.*²² found colour deviations in which yellow and white colours appear, with a frequency of 0.04 and 0.05, respectively, while black colour

reaches the highest frequency of 0.91. This shows that there is sex-linked inheritance experienced by Arabic chicken²³. In chickens, the pattern of striated feathers (B-), silver (S-) and golden (ss) are characteristics of sex-linked feather patterns^{5,24}.

The striated feather pattern gene (B-) in roosters is incompletely dominant, in hens, the related genes are homozygous, while in roosters it can be homozygous or heterozygous, but black and white genotypes can affect the S and s alleles which can only be distinguished by mating tests²⁵. This is the reason for the appearance of golden-silver and white-golden feathers, yellow and white skin, beak and sank with very low frequency.

The colour of the skin in Arabic chickens is related to the colour of the scales of the beak. Arabic chickens with black skin have black beaks and shanks as well. The black colour of the skin is caused by the presence of melanin and lipochrome pigments in the dermis and epidermis²⁶. The phenomenon of skin, shank and beak colour in Arabic chickens is the same as that of the Nigerian duck whose skin colour is related to the colour of the beak and shank²⁷. It was also found that in Arabic chickens there was an increase of variance in the colour of the skin, scales and beak.

Another deviation that occurs in Arabic chickens is the addition of a variety of comb shapes^{19,23}. At first, the silver and gold-coloured Arabic chickens had a single comb, but recent research has found a different comb shape, namely the walnut shape. The changes in the colour of the feathers, skin, sank and beak of Arabic chickens may be caused by the fact that the population has been contaminated by other types of chickens. This is very possible because the breeding pattern of Arabic chickens is generally carried out by small farmers in Arabic chicken breeding centres, therefore, the opportunity for inbreeding with other types of chickens, especially native chickens is difficult to control²⁸. This gene mixing also affects the qualitative and quantitative characteristics of Arabic chickens. This kind of case has changed the variety of Kampong chickens²⁹. Another possibility that allows the emergence of new qualitative traits in Arabic chickens is the recessive trait of the parents that only appears after a certain amount of time.

CONCLUSION

Arabic chicken is a descendant of the Braekel chicken which was first developed in Belgium in 1416 AD. Arabic chickens entered Indonesia through Batu Malang City, East Java from Saudi Arabia in the form of 8 fertile eggs. From the city of Malang, it developed throughout Indonesia as a producer of eggs and meat. Arabic chickens are usually bred

by small farmers, making it difficult to avoid inbreeding with other types of chickens. This then results in genetic contamination and triggers the emergence of qualitative trait deviations.

SIGNIFICANCE STATEMENT

This study found that Arabic chickens in Indonesia are local exotic chickens, namely Braekel chickens. The chickens first arrived through the city of Batu Malang, East Java and afterwards spread throughout Indonesia as egg and meat-producing chickens. For the last 30 years, the chickens have developed many qualitative changes such as feather colour, shank colour and comb shape. The results of this study will be useful to obtain superior Arabic chicken.

REFERENCES

1. Aklilu, H.A., C.J.M. Almekinders, H.M.J. Udo and A.J. van der Zijpp, 2007. Village poultry consumption and marketing in relation to gender, religious festivals and market access. *Trop. Anim. Health Prod.*, 39: 165-177.
2. Hartawan, R., N.L.P.I. Dharmayanti, 2016. The *Meq* gene molecular profile of marek's disease virus serotype 1 from Kampung and Arabic chicken farms in Sukabumi, West Java, Indonesia. *HAYATI J. Biosci.*, 23: 160-167.
3. Sulandari, S., M.S.A. Zein and T. Sartika, 2008. Molecular characterization of Indonesian indigenous chickens based on mitochondrial DNA displacement (D)-loop sequences. *HAYATI J. Biosci.*, 15: 145-154.
4. Dinata, A.A.N.B.S., I.G.N.G. Bidura, I.M.G. Rusdianta, I.W. Sukasana and S. Guntoro, 2019. Productivity of Arabian chicken given probiotic *Lactobacillus* sp. isolated from the digestive tract of broiler chickens and laying hens. *Int. J. Fauna Biol. Stud.*, 6: 5-9.
5. Azharul, I.M., H. Ranvig and M.A.R. Howlider, 2005. Comparison of growth rate and meat yield characteristics of cockerels between Fayoumi and Sonali under village conditions in Bangladesh. *Livestock Res. Rural Dev.*, Vol. 17.
6. Tamzil, M.H., 2017. Comparison of fatness and meat quality of Kampung chickens, Arabic chickens and laying type cockerels at different slaughtering ages. *Int. J. Poult. Sci.*, 16: 105-111.
7. Ariza, A.G., F.J.N. González, A.A. Arbulu, J.M.L. Jurado, J.V.D. Bermejo and M.E.C. Vallejo, 2022. Variability of meat and carcass quality from worldwide native chicken breeds. *Foods*, Vol. 11. 10.3390/foods11121700.
8. Rizal, Y., Nuraini, Mirnawati, M.E. Mahata, R. Darman and D. Kurniawan, 2015. Production performance of gold Arab laying-hens fed diet containing *Neurospora crassa* fermented palm kernel cake. *Int. J. Poult. Sci.*, 14: 628-632.
9. Tamzil, M.H., R.R. Noor, P.S. Hardjosworo, W. Manalu and C. Sumantri, 2013. Acute heat stress responses of three lines of chickens with different heat shock protein (HSP)-70 genotypes. *Int. J. Poult. Sci.*, 12: 264-272.
10. Wasti, S., N. Sah and B. Mishra, 2020. Impact of heat stress on poultry health and performances, and potential mitigation strategies. *Animals*, Vol. 10. 10.3390/ani10081266.
11. Ghanima, M.M.A., M. Bin-Jumah, A.M.E. Abdel-Moneim, A.F. Khafaga, M.E.A. El-Hack, A.A. Allam and N.I. El-Kasrawy, 2020. Impacts of strain variation on response to heat stress and boldo extract supplementation to broiler chickens. *Animal*, Vol. 10. 10.3390/ani10010024.
12. Tamzil, M.H., R.R. Noor, P.S. Hardjosworo, W. Manalu and C. Sumantri, 2014. Hematological response of chickens with different heat shock protein 70 genotypes to acute heat stress. *Int. J. Poult. Sci.*, 13: 14-20.
13. Kennedy, G.M., S.N. Kuria, P.M. Panyako, J.K. Lichoti and S.C. Ommeh, 2022. Polymorphism of the heat shock protein 70 gene in indigenous chickens from different agro-climatic zones in Kenya. *Afr. J. Biotechnol.*, 21: 73-82.
14. Syafwan, Yatno, R.M. Mahulae, A. Lincoln and D.I.B.R. Sembiring, 2022. Requirements of energy and protein for Arabic chicken hens during late egg production period. *Bull. Anim. Sci.*, 46: 7-15.
15. Hidayat, C. and S.A. Asmarasari, 2015. Native chicken production in Indonesia: A review. *Indonesian J. Anim. Sci.*, 17: 1-11.
16. Depison, N.I. Puteri and Gushairiyanto, 2020. Growth patterns, body weight, and morphometric of KUB chicken, Sentul chicken and Arab chicken. *Bull. Anim. Sci.*, 44: 67-72.
17. Moula, N., C. Michaux, F.X. Philippe, N. Antoine-Moussiaux and P. Leroy, 2013. Egg and meat production performances of two varieties of the local Ardennaise poultry breed: Silver black and golden black. *Anim. Genet. Resour.*, 53: 57-67.
18. Suryanto, E., H. Sasongko, M. Maryam and R. Santosa, 2009. The effect of type of feed and slaughter age on the performances and carcass characteristic of male Arab chicken. *J. Indonesian Trop. Anim. Agric.*, 34: 181-188.
19. Zulkifli, Z., M. Mustaqim, Ulfatulhasanah and M. Wahyuni, 2021. The combination of indigofera leaf and corn as fermented feed on the growth of Arabic chicken (*Gallus turcicus*). *SEAS: Sustainable Environ. Agric. Sci.*, 5: 145-150.
20. Schmidt, G.S., E.A.P. Figueiredo and M.C. Ledur, 2006. Genetic gain for body weight, feed conversion and carcass traits in selected broiler strains. *Braz. J. Poult. Sci.*, 8: 29-32.
21. Tamzil, M.H., N.K.D. Haryani and I.N.S. Jaya, 2018. Polymorphism of qualitative traits of Arabic chicken: A case study in polymorphism of qualitative traits of Arabic chicken: A case study in istiqomah farmer group, Dasan Cermen, Mataram, West Nusa Tenggara, Indonesia. *Int. J. Poult. Sci.*, 17: 378-384.

22. Sohn, S.H., D.B. Park, H.R. Song, E.J. Cho, B.S. Kang and O.S. Suh, 2012. Genotype frequencies of the sex-linked feathering and their phenotypes in domestic chicken breeds for the establishment of auto-sexing strains. *J. Anim. Sci. Technol.*, 54: 267-274.
23. Al-Nasser, A., H. Al-Khalaifa, A. Al-Saffar, F. Khalil and M. Albahouh *et al.*, 2007. Overview of chicken taxonomy and domestication. *World's Poult. Sci. J.*, 63: 285-300.
24. Arlina, F., H. Abbas, S. Anwar and Jamsari, 2014. Variability of external genetic characteristic of Kokok Balenggek Chicken in West Sumatera, Indonesia. *Int. J. Poult. Sci.*, 13: 185-190.
25. Skoczyńska, A., E. Budzisz, E. Trznadel-Grodzka and H. Rotsztein, 2017. Melanin and lipofuscin as hallmarks of skin aging. *Adv. Dermatol. Allergology*, 34: 97-103.
26. Oguntunji, A.O. and K.L. Ayorinde, 2015. Phenotypic characterization of the Nigerian Muscovy Ducks (*Cairina moschata*). *Anim. Genet. Resour.*, 56: 37-45.
27. Tamzil, M.H., B. Indarsih, M. Ichsan and I.N.S. Jaya, 2020. Phenotypic characteristics of super kampong chickens raised as meat producers. *Int. J. Poult. Sci.*, 19: 524-530.
28. Asmara, I.Y., D. Garnida, W. Tanwiriah and R. Partasasmita, 2019. Qualitative morphological diversity of female Pelung chickens in West Java, Indonesia. *Biodivers. J. Biol. Diversity*, 20: 126-133.
29. Islam, M.S. and R.K. Dutta, 2011. Morphometric analysis of indigenous, exotic and crossbred chickens (*Gallus domesticus* L.) in Rajshahi, Bangladesh. *J. Bio-Sci.*, 18: 94-98.