

THE IMPROVEMENT OF INDONESIAN NATIVE CHICKEN; ESTIMATION OF GENETIC PARAMETERS, RESPONSE TO SELECTION, AND DISEASE RESISTANCE ABILITY

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SUMMARY

Indonesia is a country rich of biological diversity, among which are the native chickens. Several clumps of chickens in Indonesia are the indigenous animal genetic resources which still need to be explored its potential as a producer of meat, eggs, and beautiful display. One on the top issues of native chickens is a tasty meat flavor. The people are more prefer to consume this type of chickens than that of commercially broiler chickens. Therefore, the demand for native chickens is always increasing year to year, while only a small portion of it has been met. In spite of having potency to be developed, native chickens has a major constraint in production and reproduction. (JIIPB 2011 Vol 21 No 1: 1-5)

I. INTRODUCTION

1.1 General Background

Indonesia is a country rich of biological diversity, among which are the native chickens. Several clumps of chickens in Indonesia are the indigenous animal genetic resources which still need to be explored its potential as a producer of meat, eggs, and beautiful display. To date, the Indonesian native chicken has been identified for more than 30 distinctive breeds of local chickens [1]. Genetically, they are estimated to come from the descendants of the red jungle fowl (*Gallus gallus*) [2] and green jungle fowl (*Gallus varius*) [3].

One on the top issues of native chickens is a tasty meat flavor. The people are more prefer to consume this type of chickens than that of commercially broiler chickens. Therefore, the demand for native chickens is always increasing year to year, while only a small portion of it has been met [4]. To full fill the demand, the poultry industry replaces it with a male layer chicken that is a by-product from commercially layer chicken breeding farm. However, taste and texture of the meat

derived from this cock are not exactly the same. Presently, the native chicken represents almost 16.7% of the market share of commercial meat-type birds in Indonesia [5]. Furthermore, the native chicken eggs are also more expensive than commercial layer chicken eggs, because it can be used as part of traditional herbal drink call “Jamu”, which is very popular in Indonesia.

The second issue on the native chicken is that they have better disease resistance as a result of long adaptation to the harsh environment. The recent study on Mx gene, an antiviral gene candidate, among Indonesian native chickens revealed that the frequency of the resistant allele (Mx+) was 65% and 60% in laying hens and in cocks, respectively [6]. From this study, it is indicated that Indonesian local chicken has a potential genetic resource in the formation of meat chicken strains or layers that could be resistant to the AI virus.

In spite of having potency to be developed, native chickens has a major constraint in production and reproduction. In production, they are growing very slowly and having bad feed conversion. In

reproduction, they are having low egg production, because they are still having nesting and brooding behaviour which cause a long interval between egg productions [7].

To support the development of native chickens, Indonesian government through Agricultural minister also takes a role as regulator, facilitator, and motivator. Some of the real efforts from the government are by introducing several programs such as INTAB (intensification of native chicken), training for the farmers, and the establishment of village breeding centres [8]. Basically, there are some measures in order to improve the productivity of the native chickens. They are including;

- The improvement of genetic quality of the livestock through breeding and selection. Therefore, it is important to have a data base on various parameters of phenotype and genotype that supports production and reproduction to implement the system of breeding. These are including the data on; growth rate, egg production, nesting behavior, feed conversion, the value of heritability and repeatability on several traits, and breeding value thereof.
- The improvement on production and feeding management system. It is well explained that raising native chicken under extensive farming system could increase egg production and body weight gain. For instance, keeping native chicken in the battery cage system could decrease the nesting behaviour [9].
- The improvement on disease management control. Since Indonesia has some genotypes of native chicken, selection on genotype displaying better disease resistance ability would be of interest for the selection program instead of designing a better

vaccination program and disease control.

1.2. Characteristics of Indonesian native chicken

In general, Indonesian native chickens are having very high genetic variation and diverse physical appearance such as colour, size, production and reproduction ability, and sound. Most native chicken in Indonesia are raised under extensive traditional system where they are free to scavenge around farmer's house during the day. The Indonesian native chickens have not been modified genetically yet, therefore, the characteristic of the growth and reproduction traits remain the same to those Southeast Asian native chickens [2]. Almost all of the breeds are very low in production and reproduction. They grow very slowly and have a poor feed efficiency. For instance, the eggs production under extensive traditional system is only 45 eggs/bird/year or equivalent to 12.5% per day [10]. By improving the management on semi-intensive systems, the egg production is around 18.4% hen day and with intensive system on battery cage, the egg production could reach 34.8% hen day [11]. This is too far away compared with genetically modified strain like Isa Brown which has hen day production above 80%. They usually laid 10-20 eggs per period with the interval between egg productions approximately around 14-30 days. The growth rate of the bird is also very low. It takes 90 days to get the weight of 900 to 1120 g [12]. The profiles of the growth rate and egg production from several strains which are more popular are presented on table 1 and 2 respectively.

Table 1. The profile of egg production of native chicken reared extensive [13],

Characteristics	Rearing management		
	Extensive	Semi Intensive	Intensive
Egg Production (pcs/bird/year)	47	59	146
Egg Production (%)	13	29	40
Number of lying (times/year)	3	6	7
Hatchability (%)	74	79	84
Egg weight (g/pcs)	39-48	39-48	39-43
Feed consumption (g/bird/day)	< 60	60-68	80-100
Feed conversion	> 10	8-10	4,9-6,4
Mortality up to 6 weeks (%)	50-56%	34-42	<27
Total Mortality (start to end production)	>15	15	<6

Table 2. Growth characteristics of local chicken (gr) [14]

Age	Nunukan Chicken	Black Kedu Chicken	White Kedu Chicken	Pelung Chicken
DOC	30.2	27.7	25.5	29.6
4 weeks	168	171	151	186
8 weeks	482	602	550	589
12 weeks	843	1087	975	1162
16 weeks	1 304	1 462	1 352	1 183
20 weeks	1 507	1 753	1 575	2 290

1.3. The development of Indonesian native chicken

In the beginning of poultry industry in Indonesia, shortly after the independence until the end of 1970, there was no commercial breed of poultry to enter the country. The people rely on the native chicken as a source of meat consumption. Therefore, the local chicken had dominated the market and become the second source of meat production after sheep. However, since 1979 the government start importing some commercial breeds for broiler and layer

due to accelerate the compliance of human nutrition and due to low meat and egg producing abilities of native chicken, the population data of chickens in Indonesia is presented on table 3. Since then onwards, the commercial layer and broiler industry has been developed. At present, broiler meat contributes more than twice as much meat as the native chicken industry, while four times as many eggs are produced commercially than as produced by native chickens. The population of native chicken from 1983 onward increased 2-3 % annually.

Table 3. The population of chicken in Indonesia from 1978 to 1983 [15]

Year	1978	1979	1980	1981	1982	1983
Native chicken	108.916.000	114.350.000	126.310.000	132.878.000	139.787.000	148.174.000
Broiler	-	-	25.462.000	28.110.000	31.033.000	34.135.000
Layer	6.071.000	7.007.000	22.940.000	24.568.000	26.312.000	28.933.000

II. Constrains and challenges

As a developed country Indonesia has been struggling to optimize local resources including local chickens. Since the village community of Indonesian people are familiar to raise this animal as extra income, meat and egg for family, and hobbies, it is of interest for the government to support the development of this chicken with still pay attention to the genetic preservation. As a local resource, the production of native chicken is expected to increase per capita income of Indonesian society.

Principally, there are many techniques relay of improving the genetic quality of the animal. Although the more recent technology in genetics engineering has been revealed some major questions regarding with the interaction between phenotype and genotype, the conventional method such as selection and breeding practices is still necessitate to be involved in the development of the genetic quality of the animal. In fact, genetically modified animal still need selection and breeding system to select specific desired traits.

Although native chickens have better disease resistance, but there is no comparative research carrying to investigate the potential differences among the genotype. This is very important because Indonesia is an archipelago country which has a potential to have different type of source infection or different endemic area cluster.

Another problem facing the development of the native chicken in Indonesia is the availability of the basic data describing production, reproduction, heritability, genetic correlation and phenotypic correlation which is still rare. The people have been crossing the native chicken chickens randomly without regard to the genetic parameter thereof. This can lead to the loss of the indigenous animal genetic resources.

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