

Study of Qualitative Nature and Structure of the Local Chicken Population in Southeast Sulawesi

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Abstract

Kampong chicken, also known as a local chicken, is a native Indonesian chicken that has adapted, lived, developed, and reproduced for a long time, both in certain habitat areas and in several places. The study aimed to determine local chickens' qualitative nature and population structure in Southeast Sulawesi with six months in Kolaka Regency, Konawe Regency, and Buton Regency. Determination of the research population is based on the most significant, medium, and low population of chickens in each district. The research sample, which is 300 people, uses the purposive sampling method with data collection methods in interviews observation documentation. The results showed that native chickens in Southeast Sulawesi had colored and colorless plumage, wild and Columbian black feather patterns, plain striated feather patterns, and flickering gold and silver feathers, while the shank colors were white/yellow and black/gray, and the shape of a comb. Peas, single, and rose.

Keywords

qualitative traits;
population; local chicken



I. Introduction

Local chicken in Indonesia is a natural wealth and an invaluable national asset. Kampong chickens, or so-called local chickens, are native Indonesian chickens that have adapted, lived, developed, and reproduced for a long time, both in certain habitat areas and in several places (Nafiu et al., 2014; Pagala and Ulupi, 2014; Ulupi and Pagala, 2014). The breeding is carried out without any mixed marriages with purebred chickens (a type of chicken that is deliberately introduced). Local chicken is a long derivative of the genetic history of poultry in the country. Kampong chicken is indicated from the domestication of red jungle fowl (*Gallus gallus*) and green jungle fowl (*Gallus varius*) (Amlia et al., 2016; Herlina et al., 2016; Pagala et al., 2018). These chickens lived in the forest, then domesticated and developed by rural communities. Most of the local Indonesian chickens are reared in an extensive traditional system so that the chickens are free to roam around looking for food and sleeping anywhere such as in trees, valleys, and on every edge of people's houses (Azhar et al., 2019; da Silva et al., 2019).

Indonesian local chickens consist of 31 lines, have different morphological diversity. The diversity of Indonesian local chicken species is a potential genetic resource that should be developed to support the formation of pure and superior Indonesian chicken lines so that the dependence of imported chickens for meeting the national meat needs can be gradually reduced. However, local chickens also have several weaknesses, including the difficulty of obtaining good seeds and low productivity, diseases such as Newcastle Disease. It is feared

that the local chicken population will decrease, even native chickens with specific characteristics will become extinct.

Preservation of livestock genetic diversity is needed to maintain livestock phenotypic characteristics that can be used to improve genetic quality and breed local chicken populations in the future by identifying regional chicken population diversity and structure. Identification is done by finding the characteristics of each type of local chicken based on the size and shape calculated by the Principal Component Analysis method. In contrast, the population structure is done by counting the number of adult male and female chickens and the number of chicks. This research is expected to provide knowledge about the diversity of local chickens to maintain the distinctive characteristics possessed by local chickens because, in recent years, local chickens in several areas in Southeast Sulawesi have been mixed with other types of chickens.

II. Review of Literature

Local chicken is a dual-purpose type, indicating that the chicken has a dual function, namely as a producer of meat and also as a producer of eggs (Milas et al., 2020; Permadi et al., 2020). Local chickens have great potential to be developed into superior seeds to support food security and improve farmers' welfare. Creating local livestock-based livestock is one of the potential regional development strategies (Kunuti et al., 2021; Surbakti et al., 2021). Local chickens are livestock that can be developed in developing countries. However, there are several obstacles so that the preservation of the nature and characteristics of local chickens must continue to be carried out. The main problem is to identify the diversity and structure of the local chicken population to see its productivity. Because so far, the development has not been optimal (Liu et al., 2019; Tran et al., 2021). Indonesia, in general, has a comprehensive and distinctive variety of local chicken. However, there has been no study that can identify the number of these diverse native local chicken clumps. In addition, the existence of a variety of local chickens is significant for genetic resources (Larkina et al., 2021; Puspita et al., 2021) for breeding programs through crossbreeding chickens in the future to produce new breeds with various advantages (Shi et al., 2020; Maulidi et al., 2020) so that it can support the availability of food, especially animal food.

Local chicken is a domestic resource owned by the Indonesian people which are generally maintained by farmers in rural areas. The actors in the demand for local chickens are consumers, while those who offer local chickens are the Local chicken breeders. In conducting supply and demand, consumers and breeders are influenced by several factors. From the consumer side, these factors include the price of local chicken itself, the price of substituted meat, income, and the number of dependents, and from the farmer it depends on the amount of local chicken supply in each region. (Akbar, M. et al. 2021)

Human life that constantly interacts with the surrounding ecosystem, including a variety of unique local chicken variations and the character of each strain (Liu et al., 2020), management (Kilatsih and Daryono, 2020), and traditional conservation of a variety of local chickens in an area (Ilahi et al., 2020). However, the diversity of local chickens in the community decreases over time. This is due to the introduction of modern chickens from other regions with superior production. Although production is low, local chickens are more resistant to tropical diseases (Yang et al., 2021). The maintenance of local chickens into superior chickens from outside by the community can lead to changes in the chicken management system by the people in this region. Therefore, the community managing chickens depends on various external inputs, including feed and medicine. The impact, among others, the cost of raising chickens to increase. This generally does not support

sustainable development in the community, and local knowledge about various local chickens can be reduced.

Nationally, local chicken for rural communities in Indonesia is a mainstay commodity that has the potential and opportunity to be developed in the future. The existence of local chickens is a solution to fundamental problems in developing local chickens in rural areas. Still, as many as 80% of these chicken lines are threatened with extinction due to lack of conservation efforts, the threat of disease (Wu et al., 2021), and the increasing popularity of imported chicken. Local chickens in an area have undergone selection utilizing crossbreeding or special cultivation to produce offspring with superior characteristics. The desired excellent properties include fast growth (Bortoluzzi et al., 2021), high egg production, large body, good meat taste, disease resistance (Bhardwaj et al., 2021), good stamina, strong leg bones, good voice, and beautiful coat shape and color. Improving the quality of local chickens, it is necessary to establish clear standardization of each variety, management of cultivation, in-depth research, formation of cooperative or community units, regulation, marketing, socialization, and counseling in the commu

III. Research Method

3.1. Time and Location

This research took place for six months in three regencies: Kolaka Regency, Konawe Regency, and Buton Regency, Southeast Sulawesi Province.

3.2. Research Population

The population of this study was all local chicken farmers in Kolaka Regency, Konawe Regency, and Buton Regency, Southeast Sulawesi Province. Determination of the research population is based on the most significant, medium, and low population of chickens in each district.

The research sample that became the respondents were all local chicken farmers in Kolaka Regency, Konawe Regency, and Buton Regency, Southeast Sulawesi Province, amounting to 300 people using the purposive sampling method.

3.3. Types and Techniques of Data Collection

The data collected are primary data and secondary data. Primary data is data obtained from breeders and direct observation, measurement, and weighing of body weight and body dimensions of chickens (catch qualitative data). Preliminary data were collected directly through interview techniques with the help of prepared questionnaires and direct observations in the field. Secondary information is obtained by studying related literature and the district's potential and from associated agencies and agencies.

3.4. Data collection technique

The methods used in data collection are:

1. Interviews, namely data collection using questionnaires and direct interviews with farmers
2. Observation, namely the way of collecting data by holding data collection directly from the research location (qualitative data measurement)
3. Documentation, namely data collection by copying reports that have been documented by the relevant parties/agencies

IV. Results and Discussion

4.1 Overview of Local Chicken in Southeast Sulawesi

The results of research in Southeast Sulawesi Province show that, in general, the origin of local chicken breeds comes from the effects of hatching themselves or buying hens ready to lay eggs. The rearing system is semi-intensive in the morning, being fed before being released. Still, usually, the chickens are left free to look for their food during the day and in the afternoon provided back before being put in the cage. The purpose of rearing is to produce consumption meat, hatching eggs, and eggs. Feeding is usually in bran, corn, and leftover food. Feeding is done on average two times a day, in the morning and evening.

4.2. Structure of Local Chicken Population in Southeast Sulawesi Province

Population structure is the arrangement of a group of organisms that have a particular taxon and live and occupy a specific area at a particular time. The population structure in livestock includes brooders, males, young females, male and female offspring. The population structure needs to be known as a parameter in regulating breeding systems, maintenance management, and data on population numbers. Thus, it is known how many productive females and young females are and the ratio between females and young females and males.

The population structure of local chickens in Southeast Sulawesi Province is 10,189,893.00 heads. The most ownership is in Muna Regency with 1,625,836.00 heads, Kolaka Regency, and South Konawe Regency with 1,544,078.00 and 1,439,146.00 heads. Meanwhile, the lowest population was Konawe Kepulauan Regency, with a population of 6,438.00 individuals. Local chickens have several advantages that are appreciated by the community so that their existence is maintained. These advantages include the unit selling price of the product is higher than that of purebred chicken. For more details, the number of local chicken populations in Southeast Sulawesi Province is presented in Table 1.

Table 1. Total Population of Local Chicken in Southeast Sulawesi Province

No	Regency/City	Local Chicken Population
1	Buton	327.191,00
2	Muna	1.625.836,00
3	Konawe	1.327.096,00
4	Kolaka	1.544.078,00
5	South Konawe	1.439.146,00
6	Bombana	674.647,00
7	Wakatobi	37.506,00
8	North Kolaka	954.500,00
9	North Buton	86.500,00
10	North Konawe	163.259,00
11	East Kolaka	455.670,00
12	Konawe Islands	6.438,00
13	West Muna	780.000,00
14	Central Buton	269.932,00
15	South Buton	153.402,00
16	Kendari City	167.897,00
17	Bau-Bau Kota	176.795,00
Total	Southeast Sulawesi	10.189.893

Source: Southeast Sulawesi Statistics Agency, 2021

4.3 Frequency Phenotype External Characteristics of Local Chicken

Local chickens in Southeast Sulawesi Province have colored and colorless feathers, black, wild, and Columbian feather patterns, striated and plain feather patterns, and gold and silver feathers. The study results on the qualitative nature of the feather color of local chickens in Southeast Sulawesi Province (Table 2) and (Figure 1) the percentage of colored feathers was 74.00% male and 72.00% female. The plain white feather color was 26.00% male and 27.17% Female. Local chickens are defined as chickens that do not have distinctive characteristics. In other words, the appearance of the phenotype is still very diverse, and local chickens have qualitative factors that vary in feather color, feather pattern, feather pattern, feather flicker, comb type, and shank color.

Table 2. Phenotype Frequency of Local Chickens in Southeast Sulawesi Province

Characteristics	Rooster		Hen		Total (N=1200)	Jumlah Phenotype (%)
	Total (N=600)	Phenotype (%)	Total (N=600)	Phenotype (%)		
Feather Color						
Colored	444	74.00	437	72.83	881	73.42
Plain White	156	26.00	163	27.17	319	26.58
	600	100	600	100	1200	100
Feather Pattern						
Black	167	27.83	198	33	365	30.42
Wild	219	36.5	195	32.5	414	34.5
Colombian	214	35.7	207	34.5	421	35.08
	600	100	600	100	1200	100
Feather Pattern						
striated	420	70.00	406	67.7	826	68.83
Plain	180	30.00	194	32.3	374	31.17
	600	100	600	100	1200	100
Feather Flicker						
Silver	116	19.3	106	17.7	222	18.5
Gold	484	80.7	494	82.3	978	81.5
	600	100	600	100	1200	100
Shank color						
White/Yellow	354	59.00	320	53.3	674	56.17
Black/Gray	246	41.00	280	46.7	526	43.83
	600	100	600	100	1200	100
comb shape						
Pea	136	22.7	218	36.3	354	29.5
Rose	161	26.83	202	33.7	363	30.25
Single	303	50.5	180	30	483	40.25
	600	100	600	100	1200	100

Description: N (sample)

The high diversity of traits is because local chickens have not experienced much improvement in genetic quality. This is because the local chicken rearing system in Southeast Sulawesi Province is generally still traditional and mixed with other types of chickens. Genetic mixing cannot be avoided, as is generally the case with other conventional domesticated chickens. There has been a mix of local chicken genes with the genes of superior chicken breeds such as White Leghorn, Barred Plymouth Rock and most of them are from Rhode Island Red. The gene flow of the nation comes from Europe and America.

The color of the local chicken feathers is presented in Figure 1.



Figure 1. Color of local chicken feathers (a) Columbian colored pattern with glittering golden feathers, (b) Plain white, (c) Lurik, (d) Colombian colored pattern with glittering golden feathers and silver and (e) plain black.

The results (Table 2) the percentage of Columbian feather pattern phenotypes are 35.7% male and 34.5% female, wild feather pattern is 36.5% male and 32.5% female, and black feather pattern is 27.83% male and 33% female. The results of previous studies show that the color of the feathers of local chickens that are commonly found in the pattern of wild feathers, which is 54.37% for males and 52.73% for black feathers for females. This difference is thought to be due to the influence of foreign genes that have entered Indonesia, and the percentage of striated fur pattern phenotype is 70.00% male and 67.7% female. The plain coat pattern is 30.00% male and 32.3% female.



Figure 2. Color of local chicken shank (a) Black, (b) White and (c) Yellow

The golden feather flickering phenotype was 73.14% in males and 65.14% in females. Local chickens had the highest percentage of flickering gold feathers with a rate of 73.12%, and local chicken feathers flickering phenotype 69.81%. The shank color of local chickens in Southeast Sulawesi Province is white/yellow and black/grey. The color phenotype of the male white/yellow shank is 59.00%, and the female is 53.3%, while the percentage of the male black/grey shank is 41.00% and the female is 46.7%. The color of the white/yellow shank may be from another breed of chicken due to crossbreeding, while the black/grey shank may have been inherited from the red jungle fowl.

The shape of the local chicken's comb in Southeast Sulawesi Province has the form of a pea, single, and rose with a phenotype percentage of male local chickens' combs of 22.7% and females of 36.3%, male single combs of 50.5% and females of 30.00%, while the percentage of the male local chicken's comb shape is 26.83% and the female is 33.7%.



Figure 3. The shape of a local chicken's comb (a) Single, (b) Pea, and (c) Rose

V. Conclusion

Local chickens in Southeast Sulawesi have different phenotypes such as the Columbian plumage pattern of 35.7% males and 34.5% females, the wild feather pattern is 36.5% males and 32.5% females, and the black plumage pattern is 27.83% males and 33% females, golden feather flickering 73.14% in males and 65.14% in females, the percentage of golden feather flickering was 73.12%. Silver feathers flickering was 69.81%, the phenotype of white/yellow shank color for males was 59.00%, and females was 53.3%, color black/grey shank 41.00% male and 46.7% female, male local chicken pea comb 22.7% and female 36.3%, male single comb shape 50.5% and female 30.00%, and the shape of the rooster's comb rose by 26.83% and the female by 33.7%..

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