# PROFILE OF CROSSBRED INDONESIAN NATIVE CHICKEN BREEDING ENTERPRISES IN SAMARINDA CITY, EAST KALIMANTAN, INDONESIA

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## Abstract

Crossbred Indonesian native chicken breeding is practiced by smallholder farmers to produce breeding stock, hatching eggs, and day-old chicks (DOC), but information on the characteristics of these enterprises at the local level remains limited. This study aimed to characterize crossbred Indonesian native chicken breeding enterprises in Samarinda City, East Kalimantan, Indonesia, based on flock size, chicken types maintained, parent stock composition, management system, and production objectives. A descriptive observational study was conducted on five purposively selected breeding enterprises. Data were collected through direct observation and interviews with farmers or farm managers and analyzed descriptively. Four enterprises maintained 100–300 chickens, while one maintained fewer than 100 chickens. The chicken types maintained varied among enterprises and included KUB, Joper (Jowo Super), Black Australorp, Merawang, Indio Gigante, Elba, Shamo, Arab Chicken, White Leghorn, Plymouth Rock, Indoensian native chicken, and Bangkok chicken. Female breeders ranged from 30 to 50 birds and male breeders from 5 to 10 birds, with female-to-male ratios ranging from 4.29:1 to 6:1. Four enterprises used intensive management, whereas one used a semi-intensive system. All enterprises produced DOC, while three produced hatching eggs and two provided breeding stock. This study provides a baseline profile of crossbred Indonesian native chicken breeding enterprises in Samarinda City, highlighting variation in flock size, chicken types maintained, parent stock composition, management systems, and production objectives. The findings may support more targeted breeding management and future studies on reproductive performance, hatchery practices, DOC quality, and enterprise development.

**Keywords:**

crossbred native chicken; breeding enterprise; smallholder farm; breeding stock; Samarinda

## 1. Introduction

Crossbred native chickens are an important commodity in smallholder farming systems, producing breeding stock, hatching eggs, and day-old chicks (DOC). Native chicken breeding has developed at the farmer level, including KUB enterprises producing eggs and DOC to support poultry production (Nurhayu et al., 2021). Smallholder breeding enterprises may vary in flock size, chicken types, parent stock composition, management systems, and production objectives. KUB production has shown variation in flock size and management practices among farmers (Pratomo, 2021), while native chicken management may differ according to farm conditions and available resources (Hartini et al., 2022). Farm characteristics can therefore be described through flock size, male-to-female composition, production objectives, and types of products generated (Subiharta et al., 2023).

Chicken types maintained are also relevant to describing breeding enterprises. Farmers may maintain several chicken types, including crossbred chickens developed for specific production purposes. KUB × Arab crosses have been evaluated for production performance (Aldimas et al.,

2023), while Merawang × Arab crosses have been studied for egg production and reproductive performance (Darwati et al., 2019; Widayanti et al., 2019). In this study, chicken types were recorded descriptively without determining genetic relationships or crossing patterns because molecular and pedigree data were unavailable. Parent stock composition is another important characteristic, as female and male breeders are maintained for reproductive purposes. The number and composition of parent stock may vary among enterprises (Sarfan & Rajab, 2024), while previous research has demonstrated the role of parent stock management and egg production in crossbred chicken breeding (Darwati et al., 2019).

Management systems, including intensive and semi-intensive systems, further characterize smallholder breeding enterprises. Such systems can be documented through field observation and farmer interviews (Hartini et al., 2022), while intensive management has also been applied in native chicken production studies (Rizkuna et al., 2025). In this study, management system was treated as a descriptive characteristic rather than an indicator of superiority because productivity and efficiency were not compared. Information on flock size, chicken types, parent stock composition, management system, and production objectives can provide baseline information for breeding enterprise development (Melinda et al., 2025). More specific breeding indicators, such as egg production, fertility, and hatchability, require dedicated measurements (Paldi et al., 2023).

Samarinda City has an active smallholder poultry sector involving native and crossbred native chickens, but systematic information describing the characteristics of crossbred native chicken breeding enterprises remains limited. Field-based documentation is therefore needed to describe these enterprises based on observable conditions and information obtained directly from farmers. This study aimed to describe the profile of crossbred native chicken breeding enterprises in smallholder farms in Samarinda City based on flock size, chicken types, parent stock composition, management system, and production objectives. The findings are expected to provide baseline information for further research and development of breeding management, hatching egg production, incubation, DOC production, and native chicken enterprises under smallholder farming conditions.

## 2. Materials and Methods

### 2.1. Study Area and Data Collection Period

The study was conducted in five smallholder crossbred native chicken breeding enterprises located in Samarinda City, East Kalimantan, Indonesia. Data were collected through direct visits to each enterprise to document its characteristics and breeding activities. During each visit, observations were made of the chickens maintained, parent stock, management system, and main products produced or marketed. Semi-structured interviews were also conducted with the owners or managers to obtain information that could not be determined through direct observation.

### 2.2. Study Design and Selection of Breeding Enterprises

A descriptive observational design was used in this study. The unit of observation was a smallholder crossbred native chicken breeding enterprise, with five enterprises included in the study. Enterprises were selected purposively based on the following criteria: (1) actively conducting breeding activities or maintaining parent stock to produce hatching eggs, day-old chicks (DOC), and/or breeding stock, and (2) the owner or manager was willing to provide the information required for the study.

The five enterprises were coded U1 to U5 to maintain the confidentiality of the owners' or managers' identities. Each enterprise was treated as an individual observational unit because no treatment or

intervention was applied. This approach was used to describe the characteristics of crossbred native chicken breeding enterprises under the conditions observed during data collection.

### 2.3. Data Collection and Variables

Data were collected through direct observation and semi-structured interviews with the owner or manager of each enterprise. Data collection focused on five main characteristics used to describe the breeding enterprise profile: flock size, chicken types maintained, parent stock composition, management system, and production objectives.

Flock size was determined based on the total number of chickens maintained at the time of observation. Based on the observed flock size, enterprises were classified into two categories: fewer than 100 chickens and 100 to 300 chickens.

Chicken types maintained were recorded based on the names or types identified by the owner or manager and confirmed through direct observation of the chickens present at each enterprise. The recorded information included the chicken types or combinations of types maintained within each enterprise. This variable was used to describe the composition of chickens maintained and was not used to determine genetic relationships, genetic origins, or molecular genetic characteristics because no genetic testing was performed.

Parent stock composition was determined based on the numbers of female and male breeders maintained at each enterprise. The female-to-male ratio was calculated from the number of individuals observed using the following equation:

**Sex Ratio (female:male) = Number of female breeders : Number of male breeders**

The resulting ratio was expressed as the number of female breeders per one male breeder.

Management system was determined based on housing practices and the chickens' access to areas outside the housing facilities. The management systems were classified as extensive, intensive, or semi-intensive. An intensive system was defined as a system in which chickens were continuously maintained within a housing area. A semi-intensive system combined confinement with access to an outdoor area during certain periods. An extensive system was characterized by greater freedom of movement and access to outdoor areas, with relatively limited confinement. This classification was used solely for descriptive purposes and was not intended to determine the superiority of one management system over another.

Production objectives were determined based on the main products produced or marketed by each enterprise. Production objectives were classified as breeding stock, hatching eggs, or DOC production. When an enterprise had more than one main product, all applicable production objectives identified through observation and interviews were recorded.

### 2.4. Data Analysis

Data were analyzed descriptively to characterize the five observed crossbred native chicken breeding enterprises. Numerical data, including flock size and the numbers of female and male breeders, were presented based on the values recorded for each enterprise and used to describe flock size and parent stock composition. The female-to-male ratio was calculated from the number of individuals observed at each enterprise.

Categorical data, including chicken types maintained, management system, and production objectives, were analyzed by identifying the characteristics present in each enterprise. Comparisons among enterprises were made descriptively to identify patterns and variations in breeding enterprise characteristics.

No inferential statistical analysis was performed because of the limited number of enterprises observed and the descriptive objective of the study. Therefore, the findings were interpreted as a descriptive profile of the observed enterprises and were not intended to represent all crossbred native chicken breeding enterprises in Samarinda City statistically.

## 3. Results

The profile of the five crossbred native chicken breeding enterprises observed in Samarinda City is presented in Table 1. The recorded information included flock size, chicken types maintained, parent stock composition, management system, and production objectives.

**Table 1.** Profile of chicken breeding enterprises in Samarinda City

| Enterprise | Flock size | Chicken types maintained | Parent stock composition (Fml:Ml) | Management system | Production objectives |
|---|---|---|---|---|---|
| U1 | <100 birds | KUB and Joper | 30:5 | Intensive | DOC and hatching eggs |
| U2 | 100–300 birds | Black Australorp, Merawang, Indio Gigante | 35:7 | Intensive | Breeding stock, DOC, and hatching eggs |
| U3 | 100–300 birds | Elba, KUB, Shamo, Gigante, and Arab | 50:10 | Intensive | DOC |
| U4 | 100–300 birds | Elba, White Leghorn, Merawang, Australorp, and KUB | 30:7 | Semi-intensive | Breeding stock, DOC, and hatching eggs |
| U5 | 100–300 birds | Plymouth Rock chicken, native chicken, and Bangkok | 50:10 | Intensive | DOC and hatching eggs |

**Note:** DOC = day-old chick.

### 3.1. Flock Size and Production Objectives

As shown in Table 1, four of the five observed enterprises, namely U2, U3, U4, and U5, maintained flock sizes of 100 to 300 birds. One enterprise, U1, maintained fewer than 100 birds. Thus, 80% of the observed enterprises belonged to the 100 to 300-bird category, whereas 20% had fewer than 100 birds.

Production objectives varied among enterprises. U1 and U5 produced DOC and hatching eggs, whereas U3 focused on DOC production. U2 and U4 had multiple production objectives, including the production or provision of breeding stock, DOC, and hatching eggs. Overall, DOC production was recorded in all five enterprises, hatching egg production in three enterprises, and breeding stock provision in two enterprises.

### 3.2. Chicken Types Maintained

The types of chickens maintained varied among the observed enterprises. U1 maintained KUB and Joper chickens. U2 maintained Black Australorp, Merawang, and Indio Gigante chickens. U3 maintained Elba, KUB, Shamo, Gigante, and Arab chickens. U4 maintained Elba, White Leghorn, Merawang, Australorp, and KUB chickens. U5 maintained Plymouth Rock chicken, native chickens, and Bangkok chickens.

More than one chicken type was maintained in all five enterprises. The number of chicken types recorded within an enterprise ranged from two to five. U1 maintained two types, U2 maintained three types, U3 and U4 each maintained five types, and U5 maintained four types.

### 3.3. Parent Stock Composition

The number of female breeders observed ranged from 30 to 50 birds, whereas the number of male breeders ranged from 5 to 10 birds. U1 had 30 female and 5 male breeders, U2 had 35 female and 7 male breeders, U3 had 50 female and 10 male breeders, U4 had 30 female and 7 male breeders, and U5 had 50 female and 10 male breeders.

Based on the number of parent stock, the female-to-male ratio was 6:1 in U1 and 5:1 in U2, U3, and U5. U4 had a female-to-male ratio of 4.29:1. Overall, the ratio ranged from 4.29 to 6.00 female breeders per male breeder.

### 3.4. Management System

Four enterprises, namely U1, U2, U3, and U5, used an intensive management system, whereas U4 used a semi-intensive system. Thus, intensive management was applied in 80% of the observed enterprises, while semi-intensive management was applied in 20%. None of the five observed enterprises was classified as using an extensive management system.

## 4. Discussion

### 4.1. Flock Size and Characteristics of Breeding Enterprises

Four of the five enterprises maintained 100–300 chickens, while one maintained fewer than 100 chickens, indicating variation in flock size among smallholder breeding enterprises in Samarinda City. Similar variation in production and management characteristics has been reported in indigenous chicken farming systems. In a survey of 1,217 households in Kenya, Anyona et al. (2023) found substantial variation in indigenous chicken production and management practices among smallholder farmers, reflecting differences in farm conditions and production and marketing constraints. In Indonesia, Subiharta et al. (2023) also reported variation in flock size, male-to-female ratio, feeding practices, marketing, and production objectives among KUB chicken farmers. These findings indicate that flock size represents one component of an enterprise profile rather than a standalone indicator of performance.

All five enterprises in the present study produced DOC, while three produced hatching eggs and two provided breeding stock, indicating variation in enterprise outputs. Melinda et al. (2025) emphasized the importance of breeding stock availability in sustaining KUB chicken production from economic, welfare, ecological, and institutional perspectives. The enterprise with fewer than 100 chickens also conducted breeding activities and produced DOC and hatching eggs. However, egg production, fertility, hatchability, mortality, production costs, revenue, and profitability were not measured. Therefore, flock size in this study describes enterprise scale but

cannot be used to assess efficiency or economic performance and should instead be interpreted together with chicken types, parent stock composition, management system, and production objectives.

### 4.2. Variation in Chicken Types Maintained

All five enterprises maintained more than one chicken type, with two to five types recorded per enterprise. The types included KUB, Joper, Black Australorp, Merawang, Indio Gigante, Elba, Shamo, Arab, White Leghorn, Plymouth Rock chicken, Indonesian native chicken, and Bangkok. This variation indicates that smallholder breeding enterprises were not uniformly focused on a single chicken type.

Liswaniso et al. (2024) similarly reported variation in indigenous chicken characteristics and production systems among small-scale farmers. In the present study, the variation in chicken types should be interpreted as a characteristic of farmer choice and enterprise management. Because identification was based on farmer information and direct observation, and no pedigree or molecular analysis was conducted, the findings cannot be used to infer genetic origin, genetic relationships, or genetic diversity.

The use of different chicken types may be associated with specific production objectives. Aldimas et al. (2023) evaluated KUB × Arab crosses based on growth and egg characteristics, while Insani et al. (2022) investigated reproductive and growth performance in KUB crosses. Irmaya et al. (2024) reported differences in quantitative characteristics among Sentul × Arab and Merawang × Arab crosses. Zulfan et al. (2024) also evaluated the use of KUB roosters to produce super native chickens through crossing with ISA Brown. These studies demonstrate that combinations of different chicken types have been investigated for specific production characteristics.

Thus, the diversity of chicken types observed in Samarinda is better viewed as an enterprise characteristic rather than evidence of a particular breeding strategy. Further studies are needed to determine the factors underlying farmers' choices, including chick prices, DOC demand, production and reproductive performance, and market preferences.

### 4.3. Parent Stock Composition and Female-to-Male Ratio

The observed enterprises maintained 30–50 female breeders and 5–10 male breeders. The female-to-male ratio ranged from 4.29:1 to 6:1, with a ratio of 5:1 in U2, U3, and U5. Subiharta et al. (2023) reported a ratio of one male to five females in KUB production at the farmer level, which was comparable to three of the enterprises observed in the present study.

However, the observed ratios should not be interpreted as optimal breeding ratios because reproductive performance was not evaluated. The appropriate ratio may vary according to chicken type, flock size, mating system, breeding objectives, and management conditions. Fertility, hatchability, semen quality, and mating success were also not measured in this study.

Farmer decisions regarding parent stock may involve specific phenotypic and production characteristics. Desta and Wakeyo (2024) reported that indigenous chicken breeding practices were associated with farmers' preferences for particular male and female traits. Muluneh et al. (2024) similarly found that egg production was among the considerations in female selection, whereas males could be selected based on appearance, plumage color, and growth.

Selection based on measurable performance may also support the development of parent stock. Sarfan and Rajab (2024) described the use of performance characteristics in selecting base populations for native chicken breeding, while Avrilliani et al. (2024) reported a strong positive relationship between body weight and carcass weight in selected native chickens. Paldi et al. (2023) further demonstrated the

relevance of fertility, hatchability, and chick weight for evaluating KUB breeding performance. Miyumo et al. (2024) showed that indigenous chicken breeding strategies may be directed toward meat, egg, or dual-purpose production depending on production objectives and available resources.

Therefore, the female-to-male ratios observed in this study describe the structure of the parent flocks rather than their reproductive effectiveness. Future studies should incorporate breeder age, egg production, fertility, hatchability, mortality, and offspring performance to evaluate the relationship between parent stock structure and breeding outcomes.

### 4.4. Management System and Production Objectives

Four enterprises (80%) used intensive management, while one (20%) used a semi-intensive system. No extensive system was observed. The predominance of intensive management indicates that housing was the primary production environment in most of the observed enterprises.

Variation in indigenous chicken management systems has also been reported among smallholder farmers. Liswaniso et al. (2024) documented differences in production systems among small-scale indigenous chicken farmers, while Hartini et al. (2022) demonstrated the use of direct observation and interviews to characterize native chicken management practices. Anyona et al. (2023) further showed that indigenous chicken production systems are influenced by household conditions, production practices, and local constraints. Chebo et al. (2024) also reported that husbandry and breeding practices vary according to local production conditions.

Although intensive management provides greater control over housing conditions, the present study did not measure productivity or production efficiency. Therefore, intensive management cannot be considered superior to semi-intensive management based on the current findings. Ismoyowati et al. (2022) highlighted the relationships between management practices, disease occurrence, and mortality in native chicken production and identified housing, vaccination, farmer knowledge, and extension support as important management considerations. Rizkuna et al. (2025) demonstrated that intensively managed native chickens can be evaluated for growth performance, feed intake, and feed efficiency under experimental conditions, although that study focused on dietary protein levels rather than comparisons between management systems.

Regarding production objectives, all enterprises produced DOC, three produced hatching eggs, and two provided breeding stock. Subiharta et al. (2023) likewise reported diverse objectives among KUB chicken farmers, including breeding, grow-out, and dual-purpose production. However, the volume and economic contribution of each product were not measured in the present study, preventing assessment of their relative contribution to enterprise income.

**Figure 1.** Housing conditions of crossbred Indonesian native chickens in smallholder breeding enterprises in Samarinda City.

### 4.5. Implications for Smallholder Breeding Enterprise Development

Overall, the five enterprises varied in flock size, chicken types, parent stock composition, management system, and production objectives, while DOC production was common to all enterprises. These findings indicate that smallholder breeding enterprises should be viewed as systems involving several interrelated components rather than flock size alone.

Strengthening record keeping should be an initial priority, particularly for breeder identity, age, egg production, fertility, hatchability, DOC production, mortality, and offspring performance. Sarfan and Rajab (2024), Avrilliani et al. (2024), Desta and Wakeyo (2024), and Muluneh et al. (2024) indicate the value of measurable performance and farmer selection criteria in parent stock development. Paldi et al. (2023) further highlights fertility, hatchability, and chick weight as important indicators of breeding performance.

Breeding objectives should also be clearly defined according to the intended production direction. Miyumo et al. (2024) demonstrated that indigenous chicken breeding can be directed toward meat, egg, or dual-purpose production. Melinda et al. (2025) further emphasized that the sustainability of breeding stock availability involves economic, welfare, ecological, and institutional considerations. Thus, development should focus not only on increasing the number of breeders but also on maintaining and evaluating their breeding performance.

The predominance of intensive management also highlights the importance of consistent housing and environmental management. However, improvements in management should be accompanied by systematic production and reproductive records. Hartini et al. (2022) identified record keeping as an aspect requiring strengthening in smallholder native chicken production. Improved record keeping may therefore provide a practical foundation for subsequent adoption of more advanced breeding technologies.

This study has several limitations. Only five purposively selected enterprises were observed, and production performance, fertility, hatchability, DOC quality, mortality, production costs, revenue, and profitability were not measured. Consequently, the findings should be interpreted as a descriptive profile of the observed enterprises rather than a statistical representation of all crossbred native chicken breeding enterprises in Samarinda City.

Despite these limitations, the study provides baseline information on the structure of smallholder breeding enterprises in Samarinda City. The findings can support subsequent studies focusing on reproductive performance, hatching egg production, DOC quality, parent stock selection, and enterprise economics. Future development should consider the specific characteristics of individual enterprises because breeding practices observed among smallholder farmers were not uniform.

## 5. Conclusion

Five crossbred Indonesian native chicken breeding enterprises in Samarinda City showed variation in flock size, chicken types maintained, parent stock composition, management system, and production objectives. Flock size ranged from fewer than 100 to 100–300 chickens, with female-to-male ratios of 4.29:1 to 6:1. Intensive management predominated, with all enterprises producing DOC, while some also produced hatching eggs and breeding stock.

Overall, the enterprises shared a common orientation toward DOC production despite differences in other characteristics. These findings provide baseline information on smallholder crossbred Indonesian native chicken breeding enterprises and can support further research on reproductive performance, hatchery practices, DOC quality, and breeding management.

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## Conflict of Interest

The authors declare no conflict of interest.

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