

Research Article

Population Structure and Productivity of Pigs in Waroki Village, West Nabire District, Nabire Regency

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Abstract

This study aimed to determine the population structure and productivity of pigs in Waroki Village, West Nabire District, Nabire Regency. Results showed that the most common number of pigs owned was 1-5 (74.55%). The sex ratio was 41.39% to 58.61%. The male pig population comprised 154 (41.39%), with 8.87% adults, 12.90% young, and 19.62% kids. The female pig population comprised 218 (58.61%), with 17.20% adults, 19.63% young, and 21.78% kids. Pig productivity was low, with a litter size of 6-10 pigs at 70.31% and a mortality rate of 1-2 pigs at 71.88%.

Keywords: Number of Pigs Owned, Sex Ratio, Pig Population Structure, Pig Productivity.

INTRODUCTION

Pig farming essentially has two main purposes: to obtain production outputs (such as meat and economic value for the farmers) and to fulfill social and cultural needs (Sihombing, 2006). The productivity of pig farming is influenced by two main factors—internal and external. Internally, the biotechnological factors include breeding techniques, feed provision and its nutritional quality, as well as general farm management and business operations. External factors, also known as non-technical factors, include social and economic conditions, government policies and regulations,



and the natural environmental conditions of the farming area. These factors interact with each other, both positively and negatively, with varying degrees of influence that change over time (Aritonang & Silalahi, 2001).

Population structure is closely related to population dynamics. Population dynamics refer to the fluctuations or changes in livestock numbers within a particular area. The increase in livestock population and productivity can be achieved by improving animal productivity, which can in turn stimulate the development and expansion of livestock farming. The increase in population and productivity serves as a measure of management effectiveness, both in terms of production and the quality of the livestock. With good farm management practices and high-quality animals, optimal growth in population and productivity can be achieved (Kristina & Dewi, 2017).

Nabire is one of the regions that has great potential in terms of natural resources for livestock development, especially pig farming. The Nabire District, in particular, is known to have a relatively high pig population, including in Waroki Village, which is one of the main centers of pig farming activity.

METHOD

Time and Location

This research was conducted over a period of one (1) month, specifically during September 2025, in Waroki Village, West Nabire District, Nabire Regency.

Research Objects and Tools

The objects of this research are pig farmers residing in Waroki Village, West Nabire District. The tools used in this study include a questionnaire (list of guided questions), writing materials, books, and a camera.

Research Method

The method used in this research is a descriptive method, employing survey and direct interview techniques in the field. Data collection was carried out through direct interviews with pig farmers in Waroki Village, West Nabire District, using a pre-prepared list of questions as a guide.

Data Collection Techniques and Types of Data

Data collection in this study was conducted through the following steps:

- a. Field survey, as an initial stage to identify the research location and determine the respondents for the study.
- b. Questionnaire, consisting of a list of questions about the farmers' profiles, population structure, and productivity of pigs owned by each respondent.
- c. Interviews, used to obtain accurate data and information. Both structured interviews (using questionnaires) and unstructured interviews were conducted.
- d. Field observation, carried out by observing and recording factors that might influence the research outcomes. The survey aimed to obtain data on the condition of pig farms, population structure, and productivity of pigs in Waroki Village, West Nabire District, Nabire City, Central Papua Province.

The types of data collected in this research consist of two categories:

- a. Primary data, obtained directly from pig farmers through interviews regarding their profiles, population structure, and pig productivity.
- b. Secondary data, obtained from the Office of Animal Husbandry, the Agricultural Extension Agency, the District Office, and other related government institutions associated with this research.

Determination of Respondents

The respondents in this study include all pig farmers residing in Waroki Village, West Nabire District. Therefore, data collection was conducted using the census method, where every farmer in the area was included as a respondent.

Observation Variables

The observation variables in this research include:

1. Farmer profiles, consisting of age, education level, years of farming experience, farming system, and number of livestock owned.
2. Pig population structure, including the number of pigs owned based on sex within different age groups (adult, young, and piglets).
3. Pig productivity, including age at first mating, age at first farrowing, litter size, and piglet mortality rate.

Data Analysis

The collected data were analyzed using tabulation techniques to determine the percentage of each component within the pig population structure and productivity in Waroki Village, West Nabire District, Nabire City, Central Papua Province.

RESULT AND DISCUSSION

General Description of the Research Location

This research was conducted in Waroki Village, West Nabire District. According to data from the Central Bureau of Statistics (BPS) in 2022, West Nabire District is located between 135°24.59' E, 3°28.30' S and 135°31.62' E, 3°21.85' S. The district covers an area of 82.62 km² and consists of five villages: Bumi Raya, Wadio, Gerbang Sadu, Kali Semen, and Waroki. The topography of West Nabire District is generally lowland, with elevations ranging from 3 to 13 meters above sea level.

The geographical boundaries of Waroki Village are as follows:

1. North: bordered by the waters of Cenderawasih Bay
2. South: bordered by Kalisemen Village
3. West: bordered by Kalibobo Sub-district
4. East: bordered by Bumi Mulia Village

Profile of Pig Farmers in Waroki Village, West Nabire District

The results of the study describing the profile of pig farmers in Waroki Village, the research location, are presented in Table 1 below.

Table 1. Profile of Pig Farmers in Waroki Village, West Nabire District.

| No | Farmer/Respondent Profile | Number of Respondents (KK) | Percentage (%) |
|----|---------------------------|----------------------------|----------------|
| 1. | Age (Years): | | |
| | - < 30 | 2 | 3,64 |
| | - 30-50 | 36 | 65,45 |
| | - 51-60 | 15 | 27,27 |
| | - > 61 | 2 | 3,64 |
| | Total | 55 | 100 |

| | | | |
|----|--------------------------------------|----|-------|
| 2. | Education Level: | | |
| | - Did not complete elementary school | 5 | 9,09 |
| | - Elementary school | 10 | 18,18 |
| | - Middle school | 15 | 27,27 |
| | - High school | 24 | 43,64 |
| | - Bachelor's degree | 1 | 1,82 |
| | Total | 55 | 100 |
| 3. | Breeding Period: | | |
| | - 1-5 years | 14 | 25,45 |
| | - > 5 years | 41 | 74,55 |
| | Number | 55 | 100 |
| 4. | Livestock Systems | | |
| | - Extensive | 3 | 5,45 |
| | - Semi-Intensive | 52 | 94,55 |
| | - Intensive | - | - |
| | Number | 55 | 100 |
| 5. | Number of Livestock | | |
| | - 1-5 head | 41 | 74,55 |
| | - 6-10 head | 7 | 12,73 |
| | - 11-15 head | 5 | 9,09 |
| | - > 16 head | 2 | 3,63 |
| | Total | 55 | 100 |

Source: Primary Data Processing (2025).

The results of the research obtained from field data and questionnaire responses in Waroki Village, West Nabire District, showed that there were 55 pig-farming households (respondents). Most of these farmers have long been residents of Waroki Village, West Nabire District.

From Table 1, it can be seen that the age of pig farmers in Waroki Village is mostly dominated by individuals aged 30–50 years, accounting for 63.45% or 36 households out of a total of 55 respondents. This age range falls within the productive age group. According to Manulang (1974), the productive age is reached around the 30s, while Adiwilaga (1973), as cited in Suradisastro and Kusnadi (1980), stated that a worker's productive age is between 40–50 years, a period when both physical and mental conditions are generally optimal. This indicates that the pig farming business in Waroki Village is mostly managed by individuals within the productive age range, capable of efficiently running their livestock operations.

In terms of education level, 5 households (9.09%) of pig farmers did not complete elementary school, while the remaining 50 households (90.91%) had an educational

background ranging from completed elementary school to university graduates (Bachelor's degree). The highest education level attained by most farmers was senior high school graduates, totaling 24 households (43.64%), followed by elementary school graduates (10 households or 18.18%), junior high school graduates (15 households or 27.27%), and university graduates (1 household or 1.82%). The level of education influences thinking patterns, motivation, and the ability to absorb new knowledge, technology, and innovations. According to Haryadi and Syahlani (1999), higher education levels tend to increase farmers' work motivation due to greater maturity in thinking.

Pig farming activities in Waroki Village have been established for quite a long time. The research data show that 74.55% (41 households) have been raising pigs for more than five years, while 25.45% (14 households) have been farming for 1–5 years. The length of farming experience is an important factor in farmers' decision-making regarding the types of livestock they raise and how they manage them. The longer a farmer has been engaged in pig farming, the more experience they gain in handling problems, acquiring knowledge, and developing their business. Thus, longer farming experience is directly linked to greater success in livestock management. Pig farming has long been a traditional and established livelihood in Waroki Village.

The study also found that the majority of pig farmers in Waroki Village (74.55% or 41 households) own between 1–5 pigs, while a small portion (3.63%) own more than 16 pigs. Additionally, 7 households (12.73%) own 6–10 pigs, and 5 households (9.09%) own 11–15 pigs. This distribution indicates that most pig farmers in Waroki Village are engaged in small- to medium-scale or household-level pig farming. The number of pigs owned is still relatively low compared to large-scale commercial pig farms, which are managed as specialized, high-capacity operations.

Structure of Pig Population in Waroki Village, West Nabire District

The research results describing the pig population structure in Waroki Village, the study area, are presented in Table 2 below.

Table 2. Pig Population Structure in Waroki Village, West Nabire District.

| Cattle | Category | Number (tail) | % of Total | % of Populatio |
|--------|----------|------------------|------------|-------------------|
|--------|----------|------------------|------------|-------------------|

| | | | | n |
|-------------------------|--------------|------------|-------|--------------|
| Male | Adults | 33 | 21,43 | 8,87 |
| | Young People | 48 | 31,17 | 12,90 |
| | Children | 73 | 47,40 | 19,62 |
| Amount | | 154 | | 41,39 |
| Female | Adults | 64 | 29,36 | 17,20 |
| | Young People | 73 | 33,49 | 19,63 |
| | Children | 81 | 37,15 | 21,78 |
| Amount | | 218 | | 58,61 |
| Total Population | | 372 | | 100 |

Source: Primary Data Processing (2025).

The research data on the pig population structure in Waroki Village are presented in Table 2 above. From the table, it can be seen that female pigs (58.61%) are more numerous than male pigs (41.39%). The population structure in Waroki Village shows that, within the male group, the piglets represent the largest proportion at 47.40%, compared to the young and adult pigs. Meanwhile, within the female group, adult (sow) pigs account for 29.36%, which is lower than both young pigs (33.49%) and piglets (37.15%).

When viewed from the overall population structure, the young pig group in Waroki Village constitutes the largest proportion at 32.53%, followed by both adult and piglet groups, which have equal proportions of 33.74% each. When comparing the number of adult (sow) pigs with piglets (both male and female), the ratio suggests that, on average, one adult sow produces only one piglet. This indicates that the breeding performance of the existing sows has not yet reached optimal productivity levels.

Ideally, based on the genetic potential of pigs, a sow should produce between 6 to 12 piglets per litter. Therefore, the findings suggest that the reproductive performance of sows in Waroki Village is still suboptimal and has room for significant improvement.

Productivity of Pigs in Waroki Village, West Nabire District

The research findings describing the productivity of pigs in Waroki Village, the study area, are presented in Table 3 below.

Table 3. Pig Livestock Productivity in Waroki Village, West Nabire District.

| No | Pig Livestock Productivity | Number of Parents (tails) | Percentage (%) |
|----|----------------------------|---------------------------|----------------|
|----|----------------------------|---------------------------|----------------|

| | | | |
|----|---|----|-------|
| 1. | Age at first marriage | | |
| | - Age 7 - 8 months | 51 | 79,69 |
| | - Age 9 - 10 months | 13 | 20,31 |
| | - Age > 10 months | - | - |
| | Amount | 64 | 100 |
| 2. | The age of the mother's first calving | | |
| | - Age < 12 months | 52 | 81,25 |
| | - 12 months old | 12 | 18,75 |
| | - Age > 12 months | - | - |
| | Amount | 64 | 64 |
| 3. | Number of litters per litter (litter size) | | |
| | - 6-10 | 45 | 70,31 |
| | - 11-12 | 15 | 23,44 |
| | - >12 | 4 | 6,25 |
| | Total | 64 | 64 |
| 4. | Piglet mortality rate/birth | | |
| | - 1-2 piglets | 46 | 71,88 |
| | - 2-3 piglets | 11 | 17,18 |
| | - > 3 piglets | 7 | 10,94 |
| | Number | 64 | 100 |

Source: Primary Data Processing (2025).

The research data on pig productivity in Waroki Village are presented in Table 3 above. From the table, it can be seen that the age at first mating for most pigs ranged between 7–8 months, representing 51 households (79.69%), while a smaller portion of pigs had their first mating at 9–10 months, representing 13 households (20.31%). No pigs were reported to have their first mating age above 10 months. Generally, the pigs in Waroki Village reach their first mating age at 7–8 months, which is earlier than the typical mating age of 8–10 months. This indicates that the pigs in Waroki Village have a good fertility rate, likely due to the fact that most of them are local breeds, which are known for their strong reproductive performance.

Interviews conducted during the study revealed that there has been significant support from the Waroki Village administration, which regularly provides livestock aid—including pigs and other animals such as Bali cattle—through village funds or

assistance from the Nabire Regency government. This has contributed to the growth and maintenance of pig farming as the dominant livestock activity in the area.

Regarding the age at first farrowing, the majority of sows gave birth for the first time at less than 12 months, accounting for 52 households (81.25%), while 12 households (18.75%) reported their sows farrowing at exactly 12 months. None reported sows farrowing beyond 12 months of age. This finding is consistent with the first mating age, as the reproductive cycle typically leads to first farrowing occurring before 12 months of age.

The litter size, or the number of piglets born per farrowing, ranged from 6–10 piglets for 70.31% (45 households), 6–12 piglets for 23.44% (15 households), and more than 12 piglets for 6.25% (4 households). These results indicate that the average litter size in Waroki Village falls below the ideal range, as Baliarti et al. (1999) stated that a sow typically produces 6–12 piglets per litter. The relatively small litter size observed may be influenced by nutritional deficiencies in the feed—both in quality and quantity—as well as the condition of the sows themselves. Factors affecting litter size include sow age, breed, milk production, body condition, feed quality, and the boar used for mating [(Anon., 2002)]. Improved feeding management is known to help increase litter size.

The piglet mortality rate was found to be relatively low. 71.88% (46 households) reported 1–2 piglets dying per litter, 17.18% (11 households) reported 2–3 piglets, and 10.94% (7 households) reported more than 3 piglets dying per litter. The relatively low piglet mortality in Waroki Village corresponds to the smaller litter size, which is consistent with the statement of Baliarti et al. (1999) that low litter size tends to result in low mortality, while larger litters are associated with higher mortality rates.

From the survey results conducted in Waroki Village, it can be concluded that pig farming in this area is still at the smallholder or household level. The majority of pigs raised are local breeds, and the farming system remains traditional and small-scale. In terms of production, the farms have not yet reached an optimal level of efficiency. Most pigs in Waroki Village—whether adult, young, or piglets—are primarily raised for sale, indicating that pig farming serves as an important economic activity for the local community.

CONCLUSION

Based on the results of the research, the following conclusions can be drawn:

The majority of pig farmers own 1–5 pigs (74.55%). The sex ratio between male and female pigs is 41.39% : 58.61%. The population structure of male pigs totals 154 heads (41.39%), consisting of 8.87% adult pigs, 12.90% young pigs, and 19.62% piglets. The population structure of female pigs totals 218 heads (58.61%), consisting of 17.20% adult pigs, 19.63% young pigs, and 21.78% piglets.

The productivity level of pigs in Waroki Village is relatively low, with a litter size of 6–10 piglets (70.31%) and a piglet mortality rate of 1–2 deaths per litter (71.88%)..

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