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Pig Farm Management and Its Contribution to The African Swine Fever Incidences in Kupang, Indonesia

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Abstract

This study evaluated the husbandry and management practices adopted by the pig farmers and the potential of African Swine Fever (ASF) in Kupang, East Nusa Tenggara, Indonesia. Husbandry and management practices evaluated include educational background, main occupation, livestock pens, animal feed and drinking water systems, reproductive management, and pig body condition. Data were collected from 300 pig farmers using interviews and questionnaires. This study was conducted in the districts of Kupang Timor and Amabi Oefeto from June to October 2022. This study reported several factors that could potentially affect the ASF transmission. These practices can be improved to prevent the potential of ASF transmission. The educational background of pig farmers, primary occupation, caging management, swill feeding, and reproductive management may have potentially contributed to the ASF transmission in Kupang during the outbreak period.

Keywords: African Swine Fever, husbandry, Kupang, management, pig

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INTRODUCTION

Pig farming has contributed significantly to local and international trade, farmer economies, and global food security (Van der Waal and Deen, 2018). Because pigs are a significant source of both cash and meat, they have been playing a significant role in Kupang society's economy and cultural activities. They do so while traveling for trade and other reasons. In order to stem the spread of the illness, thousands of pigs had to be died in Kupang due to a number of ASF outbreaks. African Swine Fever (ASF) has been connected to the spread due to international trade, wildlife, inadequate biosecurity measures, swill feeding, a lack of knowledge and awareness, the illicit movement of pigs, a lack of immunization, and other risk factors (Dixon *et al*. 2020). Other factors include direct interaction with sick or vulnerable household animals. ASF transmission has also been linked to soft tick vectors, pig density, anthropogenic variables, habitat factors, and direct contact between ill and susceptible domestic pigs (Blome *et al*., 2013; Costard *et al*., 2013; Fasina *et al*., 2012; Ma *et al*., 2020).

The risk factors for ASF in Kupang are not well understood. We hypothesized that poor farm management may have exacerbated the likelihood of the introduction and spread of infectious illnesses, such as ASF on swine farms. As management and housing practices have changed as a result of increased animal intensification, there is a greater danger of illness spreading to animals (Fasina *et al*., 2011). Pigs should be cared for and managed in a way that reduces the likelihood that ASF may spread. This covers the manners in which people are housed, fed, and cleaned.

The study gap in this case may be due to a lack of knowledge on how exactly pig husbandry and management practices contributed to the emergence of ASF in Kupang, East Nusa Tenggara. Despite information about ASF outbreaks in other countries, such as Indonesia, more study into the local factors affecting the disease's spread in Kupang is required. Additionally, early ASF reports in Indonesia state that the illness has claimed the lives of over 50,000 pigs across a number of locations, resulting in significant losses for farmers and the

general public (Dharmayanti *et al*., 2021; Primatika *et al*., 2022). However, there is a lack of information on the Kupang pig husbandry-related ASF risk factors.

The study being done in the region is critical due to the importance of sustainable pig farming as a source of income for the local population, particularly in rural areas where pig farming is a significant source of income (Purnama *et al*., 2020). The findings of the study may contribute to the development of more effective control techniques to halt the spread of ASF and keep pig farming in the region economically viable. In order to better understand the husbandry and management practices in the Kupang area, which may prevent the potential of infectious diseases like ASF, this study was carried out.

MATERIALS AND METHODS

Samples

The study was conducted in Kupang, East Nusa Tenggara Province from June-October 2022. These high-risk subdistricts were chosen based on previous reports, discussions, and findings documented by the District Livestock Services of Kupang. A cross sectional study was conducted, involving 300 pig farmers in 2 selected subdistricts, i.e., East Kupang and Amabi Oefeto Districts (Figure 1), which were centers of pig production and high risk areas with high mortality rate of pigs was reported.

Figure 1. Study area in Kupang, Indonesia.

Study Design

Pig owners in Kupang Timur and Amabi Oefeto provided the primary data, which were collected through face-to-face interviews and questionnaires. Primary information on breeding practices, farm location, educational background, primary occupation, livestock cages, feed for the animals, reproductive management, and pig body condition were all included.

Data Analysis

Data from the survey were input into a Microsoft Excel 2011 for Windows spreadsheet and exported into the statistical program IBM SPSS Statistics version 26 for descriptive analysis. For each variable that was measured, frequency functions were computed.

RESULTS AND DISCUSSION

Characteristics of Pig Farmers

Only 4.3% of pig owners never attended school, whereas the majority (30.3%) completed junior high school (Table 1). Of the pig owners contacted, raising pigs is not their primary occupation. The remaining 5.3% are government employees, with agricultural farmers making up the bulk (94.7%).

The success of livestock management is influenced by farmers' educational backgrounds, particularly in terms of the adoption of technology and access to knowledge on animals. Pig farmers in Kupang Regency have a wide range of educational backgrounds, but the majority (30.3%) have finished junior high school. Farm productivity may benefit from having a strong educational foundation, particularly in terms of knowledge and skills for animal health and production (Davis *et al*., 2012).

Additionally, education increases farm productivity when contemporary technology is used (Paltasingh and Goyari, 2018). The extension program should take the owner's educational standards into account to make sure that any materials created are appropriate for the intended audience and provided in a reasonable way. It is crucial that farmers in Kupang use vaccinations more frequently. For the farmers

whose stories were heard, farming is a part-time job. The inadequate input for their pigs from this part-time activity leads to low productivity and poor animal health.

Husbandry Practices

The majority of farmers (55.7%) have built cages facing east for their homes, while the remaining farmers (44.3%) have built cages facing west, north, or south (Table 1). The majority of the cages that were constructed (55,7%) were also insulated with cement, while the other cages (44,3%) were either still composed of wood or were not insulated. The majority of cages (55.7%) have a 45-degree floor slope, which is similar to the slope of the cages. While the remaining breeders let their livestock to eat and drink in the same place or allow them to forage for food and water on their own, the majority of breeders (55.7%) have also equipped their cages with feeding and drinking containers for pigs. According to study results, 94.7% of farmers did not have a special cage for brooders.

In order to prevent stuffiness and odors that pigs dislike, the cage must be simple to clean, quick to dry, sheltered from severe temperatures, humidity, wind, and heat, and allow for good air circulation. The ideal relative humidity for pig pens may depend on a number of factors, such as the pigs' size and age, the climate where the pen is located, the type of ventilation system used, and other factors.

However, a fundamental recommendation for relative humidity in pig cages is provided by the American Society of Agricultural and Biological Engineers (ASABE). According to ASABE recommendations, pig cages should have a relative humidity of between 40% and 70%. This range is determined by the need for efficient moisture control, air filtration, and the need to lessen the risk of mold growth, respiratory problems, and other pig health issues American Society of Agricultural and Biological Engineer (ASABE), 2018).

Numerous factors, including the size and design of the pen, the age and size of the pigs, the environment, and the location of the pen, may influence the ideal wind pressure for pig pens. A general recommendation for wind pressure in pig pens is provided by the ASABE. According to ASABE recommendations, the maximum wind pressure for pig pens should not exceed 0.2 inches of water column, or 50 Pascals (Pa). This maximum pressure has been defined in order to decrease the likelihood of the pigs encountering cold drafts and respiratory issues as well as to ensure that pig pens have adequate ventilation. A minimum wind speed of 0.75 miles per hour is also recommended for pig pens, according to ASABE (Fabian, 2018).

Feed Management

Because they guarantee optimal nutrition, cost control, health management, improved productivity, greater efficiency, and regulatory compliance, a pig farm's feed storage system and feed management are essential to its success (Patience *et al*., 2015). The study found that 99.7% of farmers do not have a feed warehouse to keep animal feed on hand (Table 1). Effective handling and management of feed ingredients during storage is necessary to preserve feed quality and avoid financial losses brought on by feed deterioration. The establishment of feed warehouses can lessen losses brought on by feed deterioration during storage, thus farmers in Kupang should take note of this practice. Only 5.7% of farmers still using swill feeding, which is still considered to be an outdated practice. Swill feeding has been established as a risk factor for ASF transmission in several countries in Africa, Europe, Asia, and South America (Acosta *et al*., 2023; Arias *et al*., 2018; Fritzemeier *et al*., 2000; Pavlak *et al*., 2011; Ribbens *et al*., 2004). But the majority of farmers (94,7%) prepared the rest of the feed that they bought from outside sources. Swill feeding has negative effects on farmers as well, including the introduction and spread of disease viruses through the leftover feed. Swill feeding may have contributed to the spread of ASF in Europe.

Swill feeding is a common practice among pig breeders in Kupang. This is evident from the study's findings, which showed that 5.7% of the 300 farmers surveyed continued to use swill feed. The authorities do not prohibit the distribution of

Table 1. Evaluation of pig husbandry and management in Kupang during ASF outbreak

Variables	Number of farmers	Percentage with diseases status (95% CI)
Education background		
▪ Not attending school	13	30.8 (9.1–61.4)
▪ Primary school	85	42.4 (31.7–53.6)
▪ Junior high school	91	67.0 (56.4–76.5)
▪ Senior high school	81	60.5 (49.0–71.2)
▪ University graduated	30	3.3 (0.1–17.2)
Primary occupation		
▪ Agricultural farmer	284	46.8 (40.9–52.8)
▪ Civil servant	16	100 (79.4–100)
Caging management	167	0.6 (0.0–3.3)
▪ Cage facing East	133	90.2 (83.9–97.4)
▪ Cage not facing East	167	3 (1.0–6.8)
▪ Wall and floor not made of cement	133	97.7 (93.5–99.5)
▪ Wall and floor not made of cement	167	3 (1.0–6.8)
▪ Floor tilted	133	94.0 (88.5–97.4)
▪ Floor not tilted	167	6 (2.9–10.7)
▪ Feed and drinking water system available	133	97.7 (93.5–99.5)
▪ Feed and drinking water system not available	16	1.8 (0.4–5.2)
Swill feeding		
▪ Practiced	17	5.9 (0.1–28.7)
▪ Not practiced	283	0.0 (0.0–1.3)
Reproductive management		
▪ Natural mating	300	50.5 (44.7–56.3)
▪ Artificial insemination	0	0.0 (0.0–97.5)
▪ Natural mating with own boar	138	4.3 (1.6–9.2)
▪ Natural mating with boar from the same village	150	88.7 (82.5–93.3)
▪ Natural mating with boar from different village	12	100 (73.5–100.0)
Pig body condition		
▪ Fat	16	100 (2.5–100)
▪ Moderate	280	100 (29.2–100.0)
▪ Skinny	3	52.5 (46.5–58.5)
▪ Very skinny	1	0.0 (0.0–20.6)

swill feeding in Kupang, but it is estimated that swill feeding needs to be cooked properly at a certain temperature to inactivate the virus.

Reproductive Management

It involves a variety of techniques and treatments aimed at improving reproductive function, ensuring a steady and effective supply of premium pork. The results of the survey show that all pig farmers use the natural mating method (Table 1). The majority (50%) of families utilize boar from adjacent farms, while 46% of farmers use their own pigs and 4% use boar from nearby villages. A good knowledge of pig physiology and the capacity to use suitable management techniques are essential for effective reproductive management (Koketsu *et al*., 2017). To create a reproductive management strategy for a pig farm, it's crucial to engage with a veterinarian and other industry professionals. Pigs' reproductive performance can be optimized through a variety of methods designed to boost the herd's overall productivity and financial success of the pig farm (Cole, 2020). Breeding management, heat detection, artificial insemination (AI), gestation, farrowing, piglet management, and herd health management are crucial facets of reproductive management (Roca *et al*., 2011).

According to several studies conducted in the Netherlands, Belgium, and Serbia (Benard *et al*., 1999; Mintiens *et al*., 2003; Stanojevi *et al*., 2015), natural mating in pigs, in particular, has the potential to significantly contribute to the spread of infectious animal diseases like ASF. Additionally, ASF was discovered in the testicular tissue of infected boars during subclinical disease, according to a different investigation (Choi and Chae, 2002). Despite the fact that natural mating has been used in pig farming for millennia, we advise considering any potential negative effects as this method may raise the risk of ASF transmission by utilizing potentially infected boar.

Body Condition of Pig

The majority of farmers (93.3%) had pigs with a moderate body condition, followed by those with a fat body condition (5.3%), lean pigs (1%) and very thin pigs (0.3% of farmers) (Table 1). Pigs' physical health significantly affects their resistance to a variety of diseases, including infectious infections. Pigs' physical condition can have a big impact on their general health, happiness, and productivity (Miller *et al*., 2012). Keeping pigs in good physical condition has a number of advantages, including increased immunological function, enhanced growth and development, improved meat quality, and decreased mortality rates (Coffey *et al*., 2000; Cole, 2020). Sows that are kept in good health live longer and yield more consistent output.

CONCLUSION

It can be concluded that most of these variables in Kupang i.e., educational background, primary occupation, caging management, swill feeding, reproductive management, and pig body condition could have contributed to the ASF transmission in the study areas. Through farm meetings, visits, and extension programs supported by the government and other stakeholders, pig farmers' management and husbandry methods in Kupang can be improved to reduce the possible introduction and spread of infectious illnesses.

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