

Outbreak Investigation of African swine fever in a Multi-Farm Pig Cluster at Gudugba, Ewekoro (Ogun State) Nigeria

Ajanaku, D.¹, Adetunji, D.², Aderounmu, E.¹, and Ibitoye, E.B.³

¹Department of Veterinary Services, Ministry of Agriculture and Food Security, Ogun State, Nigeria.

²Department of Veterinary Public Health and Preventive Medicine, University of Ibadan, Oyo State, Nigeria.

³Department of Theriogenology and Animal Production, Faculty of Veterinary Medicine, Usmanu Danfodiyo University Sokoto, Nigeria.

Corresponding author email: kemiajanaku50@gmail.com ; +234 906 516 7851

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ABSTRACT

African Swine Fever (ASF) is a highly contagious viral infection of pigs that causes severe losses in pig farming worldwide, with Nigeria among the countries most affected. Frequent outbreaks in the country have been associated with weak biosecurity, unrestricted pig movement, and communal slaughter facilities that facilitate rapid viral dissemination. This study describes the epidemiological and clinical features of a confirmed ASF outbreak in a pig farm cluster settlement in Ogun State. A field investigation was conducted on May 20, 2025, following a report of unusual pig deaths in Zone C of the settlement. Clinical observations, descriptive epidemiology, and trace-back techniques were used to assess the situation. The affected farm housed 82 pigs, of which 45 died and 12 were culled through emergency slaughter, this represents an attack rate of 69.5% and a case fatality rate of 78.9%. Observed clinical manifestations included anorexia, abortions, generalized weakness, hemorrhagic skin lesions, and sudden death, features that strongly suggested ASF. Trace-back assessments revealed that several farms across different zones had experienced similar morbidity and mortality in preceding months without formal reporting. These findings suggest silent transmission of ASF within the settlement, likely facilitated by the communal slaughter slab. Samples submitted to the National Veterinary Research Institute (NVRI), Vom, tested positive for ASF virus by Polymerase Chain Reaction assay. The clinical signs, epidemiological features and laboratory test confirmed an active outbreak and highlighted the urgent need for strengthened surveillance, improved reporting, and enhanced biosecurity within the settlement. This outbreak emphasizes the importance of regulating communal slaughter activities, enforcing movement control, and adopting robust biosecurity protocols to limit the spread of ASF in Nigeria's pig industry.

Keywords: African swine fever; ASFV; outbreak investigation; pig farms, morbidity and mortality; rate, attack rate- case fatality rate, communal slaughter slab; biosecurity; PCR diagnosis; epidemiology Therefore could be used cautiously in therapeutic procedures



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INTRODUCTION

African swine fever is a severe viral disease of domestic and wild pigs caused by a DNA virus in the family 'Asfarviridae'. It is characterized by high mortality, severe economic losses and disruption of pig production systems worldwide (Dixon et al., 2020). ASF outbreaks typically trigger drastic measures such as herd culling, movement bans and trade restrictions, which heavily impact farming livelihoods. According to WOA's global animal health data summaries, between early 2024 and May 2025 there were over 14,000 ASF outbreaks reported worldwide, resulting in hundreds of thousands of pig losses, underscoring ASF's ongoing global impact (WOAH, 2025). Nigeria has experienced recurrent ASF outbreaks for more than three decades, particularly in the southwestern states where pig farming is concentrated.

Ogun State hosts dense pig-rearing clusters ranging from smallholder units to semi-commercial operations. Close proximity between farms, inconsistent hygiene practices, and frequent animal movements contribute substantially to the spread of infectious diseases within these systems. Outbreaks of African Swine Fever (ASF) in Nigeria continue to pose significant threats to pig production due to high mortality and poor farm preparedness, with recent studies documenting low biosecurity practices and outbreak risks across multiple states (Ogundijo et al., 2023, Olono et al., 2025). Ayinla A, Fadele J, (2025) conducted active ASF surveillance in Southern Nigeria using molecular diagnostics and detected ASFV in all pigs sampled during outbreak periods, identifying circulating strains as genotype II and emphasizing farm-level biosecurity gaps as major drivers of transmission. Several studies have identified key risk factors for ASF transmission in Nigeria, including the use of communal slaughter slabs, movement of pigs without health checks, exchange of contaminated tools, and delays in notifying authorities when mortality increases (Awosanya et al., 2015). Importantly, there is currently no licensed or approved ASF vaccine available for use in Nigeria, and control of the disease relies entirely on preventive measures such as strict biosecurity, surveillance, movement control, and outbreak response (WOAH, 2025; FAO, 2025). Weak compensation mechanisms and limited farmer awareness further hinder timely detection and control (Fasina et al., 2012). Given the reliance of many households on pig farming for income and food security, each outbreak poses a serious threat to livelihoods. A sudden rise in pig mortality at Zone C in May 2025 prompted a rapid investigation. This study documents the clinical presentation, epidemiological features, possible sources of introduction, and laboratory confirmation of the outbreak, with the aim of informing more effective prevention and response strategies within clustered farming systems.

METHODOLOGY

Study Area

The Pig cluster settlement consists of approximately 450

practicing pig farmers distributed across six zones (A–F). A pig farm located in Zone C operates two pens and was the primary focus of the current investigation following a report of unusual pig mortality from the farm. The Pig cluster farm settlement is located in Gudugba, Ewekoro in Ewekoro Local Government Area, Ogun State. The settlement lies at geographic coordinates Latitude 6.83549° N and Longitude 3.12473° E. The farms operate in a humid tropical environment. Most farm units within the settlement are situated very close to one another. This closeness facilitates interaction and easy movement of humans and sharing of materials among the farms. The settlement is equipped with access roads, communal water sources, feed distribution points, and designated areas for waste disposal.

Report from the focal farm of the outbreak

Clinical and post mortem signs were assessed in live pigs and carcasses. Live pigs were checked for fever, weakness, loss of appetite, skin discoloration, difficulty breathing, diarrhea, and sudden death. Carcasses were examined for swollen spleens, bleeding spots on organs, and enlarged lymph nodes (Figures 2-8). These steps follow the field diagnostic methods used in previous ASF investigations in Nigeria (Odemuyiwa et al., 2008; Dixon et al., 2020).

Trace-back and collection of epidemiological data from farms within the settlement.

Data collected by the disease outbreak rapid response team from the Veterinary department, Ogun state involved interviews, direct observations, checking of mortality records and trace-back investigations. Interviews were done with farm owners and workers to gather information about pig management and recent movements of animals. Observations were made on the farm to check housing, hygiene, and general conditions. Mortality records were reviewed to understand the pattern of deaths, and trace-back investigations were conducted to identify the possible source of infection, following standard procedures used in ASF outbreak investigations (World Organization for Animal Health [OIE], 2021; Dixon et al., 2020).

Laboratory investigations

A total of five (5) serum samples, two nasal swabs, and two oral swabs were collected and submitted to the NVRI, Vom laboratory under cold chain. In the laboratory, samples were processed using standard ASF diagnostic protocols. Viral DNA was extracted from all sera and swabs using a commercial extraction kit. Real-Time PCR was performed targeting ASF-specific gene regions, and results were confirmed using conventional PCR.

Analytical Methods

Data collected from affected farms were analyzed to

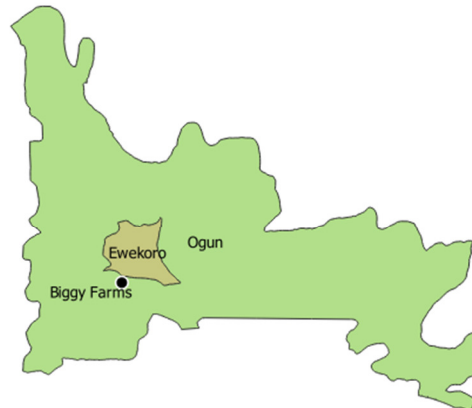


Figure 1: The map of multi farm clusters at Gudugba. Ewekoro, Ogun State.



Figure 2: Moribund pig showing clinical signs of African Swine Fever, including weakness.

Figure 3: Carcasses of pigs found dead during the outbreak investigation, illustrating skin hemorrhage, a common typical clinical sign of ASF.

quantify the impact of the African Swine Fever (ASF) outbreak and identify likely transmission pathways. The following methods were applied:

Descriptive epidemiology:

Mortality rate (%) = (Number of pigs that died ÷ Total pigs on the farm) × 100

Morbidity rate (%) = (Number of pigs affected ÷ Total pigs

on the farm) × 100

Attack rate (AR, %) = (Number of pigs that became sick ÷ Total pigs at risk) × 100

Used to measure the proportion of pigs affected during the outbreak

Case fatality rate (CFR, %) = (Number of pigs that died ÷ Number of pigs affected) × 100

These calculations were used to determine the severity of the outbreak at each farm and across zones.



Figure 4: Illustrates abortion in pigs, a significant clinical sign in ASF. **Figure 5:** Collection of serum samples from affected pig.



Figure 6: Serum sample from affected pig.

Clinical and pathological assessment

Clinical signs and gross lesions observed in affected pigs were summarized to describe disease presentation and severity patterns.

Epidemiological tracing

Farm management practices, pig movements, and communal slaughter activities were analyzed to identify potential transmission routes contributing to ASF spread.

Laboratory confirmation

Polymerase Chain Reaction (PCR) was used to confirm ASFV presence in suspected cases. Laboratory results were cross-referenced with field data to validate outbreak

reports.

RESULTS

Trace-back findings revealed earlier, unreported mortalities in multiple farms across the settlement: Mortality rate refers to the proportion of animals that died during the outbreak, while morbidity rate represents the proportion of animals that showed clinical signs of disease. In Zone A, a farm with 96 pigs experienced 48 deaths in December 2024 following the introduction of an old boar. The remaining pigs were slaughtered. The mortality rate was 50% (48/96), and the morbidity rate reached 100% (96/96), as all pigs were either affected or slaughtered. In Zone C, 45 out of 82 pigs died due to the disease, giving a mortality rate of 55% (45/82). The morbidity rate was 70%

Table 1: Mortality and Morbidity rates (%) recorded in selected farms/zones during the outbreak. This table illustrates the mortality and morbidity rate in the farm settlement.

Farm/zone	Mortality (%)	Morbidity (%)
Zone C	55.0	69.5
Zone A	50.0	100.0
Zone D	43.4	55.4
Zone F (Farm 1)	71.0	71.0
Zone F (Farm 2)	20.0	20.0

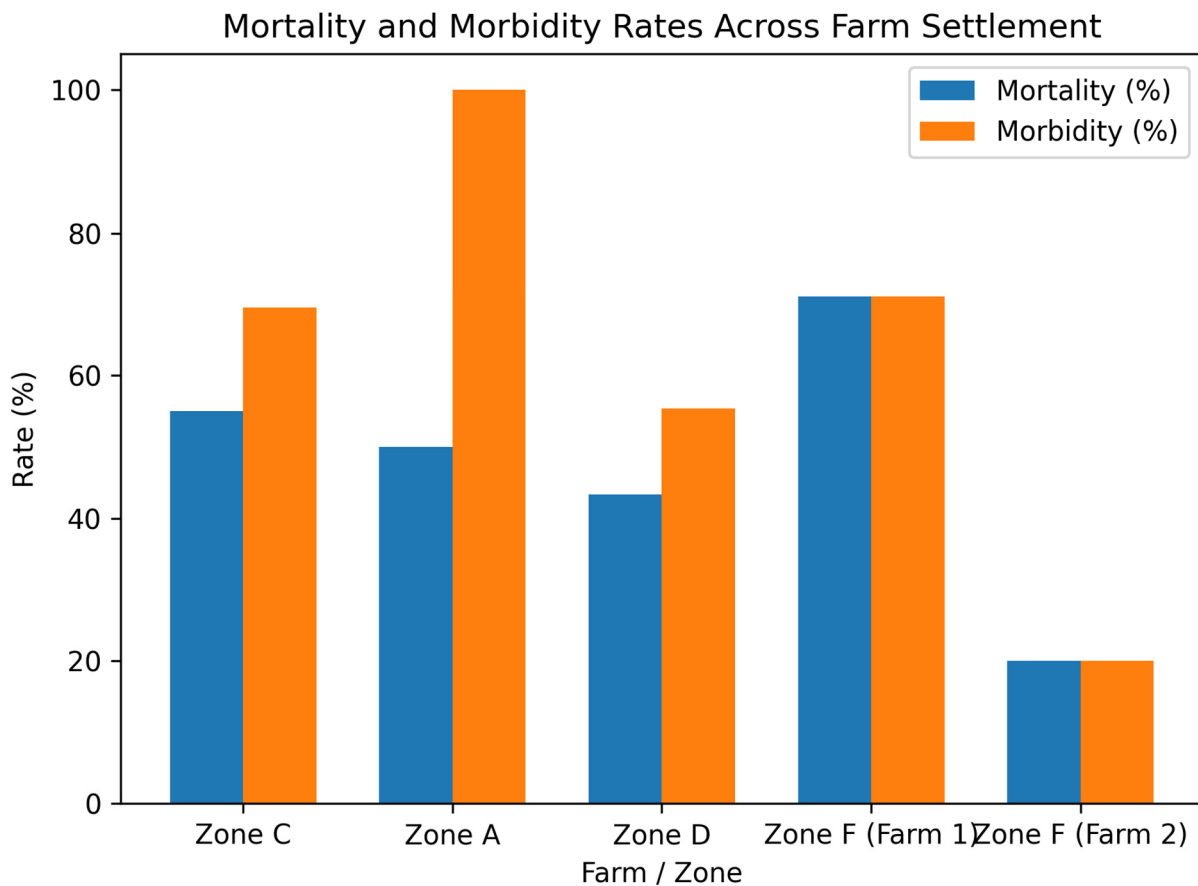


Figure 7: Graphical representation of mortality and morbidity rates across all the farms in the farm settlement

(57/82), including pigs that showed clinical signs but did not die (Table 1). In Zone D, 36 of 83 pigs died, and an additional 10 pigs showed clinical signs of the disease. The mortality rate was 43.4% (36/83), and the morbidity rate was 55.4% (46/83). In Zone F, one farm recorded 106 deaths out of 150 pigs, resulting in a mortality and morbidity rate of 71% (106/150). Another farm in the same zone reported 30 deaths out of 150 pigs, with both mortality and morbidity rates at 20% (30/150). Many of these farms shared proximity to, or had recently used, the communal slaughter slab, which emerged as a likely focal point for virus dissemination.

DISCUSSION

The clinical signs and post-mortem lesions observed in this outbreak were strongly consistent with acute African swine fever (ASF). High mortality, abortions, extensive hemorrhages, sudden death, and rapid disease progression align with reported manifestations of ASF caused by virulent strains. These findings agree with previously documented ASF outbreaks in Nigeria and across Africa (Fasina et al., 2012). Trace-back investigations revealed major biosecurity failures within the settlement, consistent with reports identifying poor



 VETERINARY PATHOLOGY DIVISION NATIONAL VETERINARY RESEARCH INSTITUTE Federal Ministry of Livestock Development P. M. B. 91, VOM, PLATEAU STATE FINAL DIAGNOSTIC REPORT					
Clinic No	Date: 28/5/25	Lab/Post Mortem No: DSD2025-Pc/998			
Clinician's Name and Address: c/o Dr Adereomwa		Owner's Name and Address: Mrs Omolabake Biggy Farms (Zion farm settlement), Gudugba, Ewekoro LGA Ogun State. L.V.T: 6166549 LONG: 3192473			
Species: Porcine	Breed: NA	Age: mixed (1 yr, 5 months)	Sex: M&F	Identity:	
No. of Animals in the Group: 82	No. affected: 82	No. Dead: 45	Mortality Rate: 55%	Previous Treatment: Treatment and disinfection	Vaccinations:
Specimens Submitted: 5 Sera, 2 nasal and 2 oral swab samples.					
Tissues Submitted to the Laboratory: 3 Sera, 2 nasal and 2 oral swab samples.					
Examination Required: Bacteriology: <input type="checkbox"/> Virology: <input type="checkbox"/>		Parasitology: <input type="checkbox"/>		Necropsy: <input type="checkbox"/>	
Clinical Pathology		Histopathology		Toxicology: <input type="checkbox"/>	
SEROLOGY: <input type="checkbox"/>					
History: The farmer had experienced the following clinical signs: Abortion, high morbidity and mortality.					
Lab. Test:					
1. Biotechnology: Tissue samples submitted tested Positive for African swine fever antigen using Real Time and conventional PCR.					
REPORTED BY:					
 DR. JAMES S. AHMED (HOD) (08055005732)					

Figure 8: NVRI Final diagnostic report



Figure 9: Showing Farmers at ASF sensitization program organized by the Veterinary department.

farm hygiene and management as key drivers of ASF spread (Okoli & Mogaji, 2022). Specifically, the introduction of an aged boar into Zone A in December 2024 appears to have been the primary catalyst for the cluster outbreak. This highlights a classic biosecurity failure: the introduction of adult breeding stock from an external, unverified source without a mandatory quarantine period and also the close proximity of farms to the communal slaughter slab. Evidence of earlier unreported cases in other zones indicated that Zone C was not the primary source of infection. The communal slaughter slab emerged as a critical transmission hotspot. Multiple affected farms had processed pigs at this facility, facilitating virus spread through contaminated equipment,

surfaces, and carcasses, a pattern consistent with previous ASF outbreak investigations in Nigeria (Okoli & Mogaji, 2022). In addition, delayed reporting and unauthorized disposal or slaughter of sick pigs significantly hampered early containment, allowing continued transmission within the settlement. Overall, the outbreak was driven by a combination of uncontrolled animal movement, shared infrastructure, and delayed response. Polymerase chain reaction (PCR) testing conducted at the National Veterinary Research Institute (NVRI), Vom confirmed the presence of African swine fever virus (ASFV), validating the clinical and epidemiological findings and demonstrating active virus circulation. This laboratory confirmation highlights the importance of molecular diagnostics for guiding outbreak response, strengthening surveillance, and informing biosecurity interventions aimed at limiting further spread.

Control measures

Following laboratory confirmation of African swine fever (ASF), a series of immediate control measures were instituted to limit further spread of the virus. Affected farms were placed under quarantine to restrict the movement of pigs and prevent transmission to neighboring holdings. The communal slaughter slab was closed, thereby removing a major point of amplification and reducing opportunities for cross-farm contamination. Emergency culling was carried out, and carcasses were disposed of safely under Veterinary supervision to ensure that infected remains did not re-enter the food chain or the environment. In addition, contaminated equipment and premises were thoroughly disinfected to minimize viral persistence. Finally, farmers were sensitized through Government community engagement initiatives, which emphasized the importance of timely reporting and discouraged the unauthorized slaughter of sick pigs (Figure 9).

Conclusion

This outbreak investigation confirmed active ASF circulation with high mortality and significant biosecurity lapses. The communal slaughter slab was identified as a critical transmission hotspot, while delayed reporting and unauthorized disposal of sick pigs hindered early containment. Control efforts focused on quarantine, culling, disinfection, and farmer sensitization, but their impact was reduced by late implementation. This event highlights the susceptibility of densely clustered farming systems and emphasizes the importance of implementing coordinated, community-wide disease control measures. Future ASF control in Nigeria will require rapid reporting systems, strict enforcement of biosecurity, and closure of communal slaughter points during outbreaks, alongside sustained farmer education. These measures are essential to improve containment and reduce the risk of devastating herd losses.

Recommendations

(1) Pig farms within and around the affected area should implement strict biosecurity measures, including controlled access to pig pens, use of dedicated farm clothing and footwear, routine disinfection of equipment, and restriction of visitors. Footbaths containing effective disinfectants should be maintained at entry points, and compliance should be regularly monitored by Veterinary personnel.

(2) Unregulated movement of live pigs, pork, and pig by-products remains a major risk factor for ASF transmission. Enforcement of movement control regulations, especially during outbreaks, is essential. Transport of pigs should be accompanied by veterinary health certification, and illegal slaughter or sale of sick pigs should attract appropriate sanctions.

(3) Government-supported compensation mechanisms should be established to encourage prompt reporting and humane culling of infected animals. Adequate compensation will reduce the tendency to conceal outbreaks or sell infected pigs, thereby limiting disease spread.

(4) Veterinary services should be adequately equipped and staffed to respond rapidly to ASF outbreaks. Enhancing diagnostic laboratory capacity at state and regional levels will improve confirmation timelines and support evidence-based control decisions.

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Ethics Approval

Not required.

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