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CASE REPORT

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African swine fever in a medium-scale farm in Abuja, Nigeria

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Abstract

African swine fever (ASF) is a threat to food security globally. A medium-scale peri-urban farmer in Abuja, Nigeria, reported the death of 8 out of 21 pigs over 7 days. Some died suddenly, while others showed loss of appetite and weakness. Post-mortem findings revealed hyperemic enlargement of the spleen, and lymph node enlargement and haemorrhage were observed. The farmer's description of clinical signs was vague, suggesting a limited resemblance to ASF acute infection. However, to rule out ASF, a detailed diagnosis was carried out. Confirmation was obtained via serology, PCR, virus isolation and immunoblotting, as described by the WOAH manual. In addition, applying disinfectant daily for 7 days significantly halted mortality to zero and the survival of all piglets and some sows on the farm. All samples (blood and faeces) subsequently collected were negative for ASF antigen detection using RT-PCR by 36 dpi, while some pigs had high antibody titres (≥ 98%) by 70 dpi.

Keywords: African swine fever virus, Biosecurity, Disinfectant, Medium-scale farm, Outbreak management

Introduction

African swine fever virus (ASFV) is a large, double-stranded DNA virus within the family *Asfarviridae* and genus *Asfivirus*, regarded as arthropod-borne. The virus infects only members of the *Suidae* across all age groups, including the wild pig: warthog (*Phacochoerus aethiopicus*) and bushpig

(*Potamochoerus porcus*) (Anderson *et al.,* 1998). The virus is transmitted mainly through direct contact with infected animals or indirectly through fomites, infected soft ticks (*Ornithodoros* spp.), bites, and farm equipment contaminated with body fluids (Penrith & Vosloo, 2009).

African swine fever (ASF) has been reported to be a highly contagious viral haemorrhagic disease of domestic pigs and wild boars associated with a severe economic impact on the farmer and pig production. Clinically, the disease is manifested between the acute-to-chronic phase, with fever, cutaneous hyperemia, abortions, oedema, and haemorrhage in internal organs. There is no available treatment or approved vaccine for it; however, early detection and implementation of strict preventive measures (biosecurity) constitute the only way to prevent and control the disease spread on a farm (Beltran-Alcrudo *et al.,* 2017). The clinical outcome of the disease depends on the virulence of the virus isolate, the route of entry, the infection dose, and the host's immune status (Sanchez-Vizcaino *et al.,* 2015). Currently, four clinical forms of the disease have been described. Peracute ASF occurs from highly virulent strains characterized by sudden death. Infected pigs may show loss of appetite, lethargy, high fever and die within 4 days post-infection (Sanchez-Vizcaino *et al.,* 2015; Salguero, 2020).

Similarly, moderate or highly virulent isolates account for the most common forms of the disease. The acute form leads to pigs vomiting, mucoid to bloody nasal discharges, inactivity, and sometimes crowding, as well as erythema or cyanosis of the skin and abortion in sows (Gomez-Villamandos *et al.,* 2013; Sanchez-Vizcaino *et al.,* 2015). The mortality rate in a naïve population can be up to 100% within 7 days. The clinical signs of the subacute form of ASF resemble those of the acute form, but infection with this strain may lead to a chronic form of the disease. A post-mortem examination is characterized by hyperemic splenomegaly and multifocal haemorrhagic lymphadenitis (Salguero, 2020). Secondary bacterial infections can complicate severe pulmonary edema, petechial haemorrhages, and chronic forms.

In Nigeria, the first outbreak of the disease occurred in 1997 (El Hicheri, 1998). The disease was first restricted to Africa but later spread to other parts of the world (Americas, Asia, Europe, and the Caucasus). Initial spread to non-African countries was eradicated via drastic control measures, except for the island of Sardinia. A new wave of the disease spread in 2007 making the disease endemic in eastern Europe and the Caucasus (Costard *et al.,* 2013; Sanchez-Vizcaino *et al*., 2015). This article aims to report the outbreak and management of the disease in a medium-scale (21-50 pigs) farm in a peri-urban area in Nigeria in 2024.

Case Presentation

Carcasses and blood samples from a pig farm of different ages were submitted to the Central Diagnostic Laboratory and Biotechnology Centre of the National Veterinary Research Institute (NVRI), Vom. The farmer reported that within three days, 8 of 21 (38.1%) pigs had died, some suddenly, while some following anorexia, weakness, dyspnea, and skin haemorrhages. Pigs are housed in a well-secured farm, with the boars, sows, gilts, and piglets housed differently. The case originated with the sows and subsequently expanded to the gilts. Pigs were treated symptomatically with Oxytetracycline 20% (1ml/10kg) and multivitamins.

Post-mortem examination revealed enlargement of the spleen (Plate Ia) and subcutaneous haemorrhages. Haemorrhages were also observed on the lungs and intestine, while the tonsils were slightly hyperemic (Plate Ib), enlarged petechiae on the lungs (Plate 1c) and haemorrhages on the heart (Plate 1d). Dead pigs were in good body condition, while the orifices and skin were also normal.

To prevent potential contamination on the premises, a disinfectant, Zix Virox, was applied to the farm daily for 7 days as recommended by the manufacturer (1:100 dilution). The disinfectant was applied to the walls, floors, feet dip, vehicles, and materials in the pens. Within the course of the outbreak, two sows farrowed 25 piglets, adding to the 13 pigs that survived the outbreak. Eventually, with the application of disinfectants, mortality stopped, and, the total number of pigs on the farm was 38.

The lesions observed were similar to those seen in septicemic diseases (erysipelas, salmonellosis, porcine reproductive and respiratory syndrome (PRRS), pasteurellosis, ASF, classical swine fever (CSF), etc. Since none of the signs observed were pathognomonic, further laboratory investigation was requested to rule out ASF as the causative pathogen. Tissue samples were collected from lymph nodes, lungs, heart, spleen, and liver and submitted for confirmatory diagnosis.

Laboratory diagnosis

The Biotechnology Centre of the National Veterinary Research Institute (NVRI), Vom, performed laboratory tests on all samples submitted according to the official testing guidelines and recommendations of the World Organization for Animal Health (WOAH).

The samples were submitted to the laboratory on 31 July 2024 and were analyzed immediately. Positive results were obtained by extracting the viral genome using a commercially available QIAamp viral DNA kit and run on a conventional PCR machine (ABiosystem 9700, USA), Plate II. Sera samples were screened for antibodies to ASFV using a commercially available multi-antigen (p32, p62, p72) ELISA (ID Screen®; IDvet; Grabels; France). Sera samples were screened for antibodies to ASFV using a commercially available multi-antigen (p32, p62, p72) ELISA (ID Screen®; IDvet; Grabels; France) according to the manufacturer's instructions, and one out of the seven sera samples submitted tested positive.

A 10% pool tissue (lymph node, liver, lungs, heart) suspension was prepared and inoculated into peripheral blood monocyte (PBM) cells (Plate III) according to the EURL protocol (Gomez-Villamandos *et al*., 2013) for the observance of hemagglutinating activity of the virus and confirmed using immunoblotting.

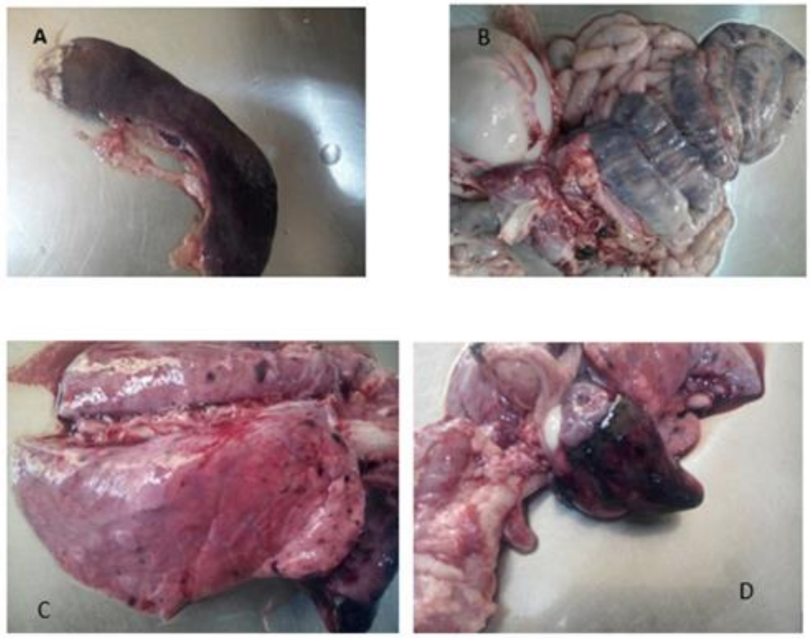

Plate I: Lesions in pigs from a suspected African swine fever outbreak showing (A) enlarged spleen, (B) haemorrhagic intestine, (C) enlarged petechiae on the lungs, and (D) haemorrhage in the heart

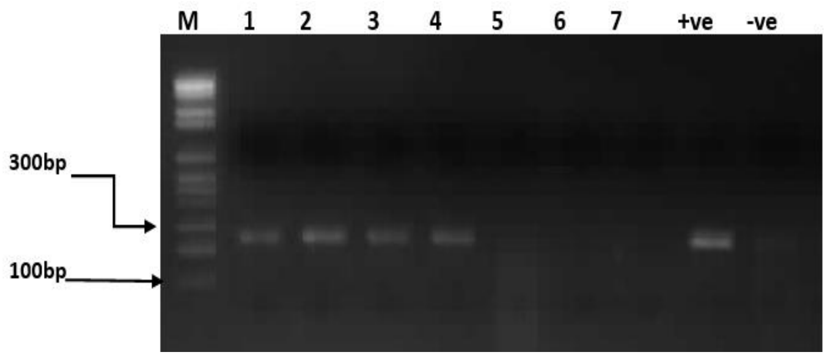

Plate II: Gel showing ASFV positive samples with M: marker, 1- 4 are positives with the expected band size of 271 bp, 5-7 are negative samples, while +ve and -ve are positive and negative controls

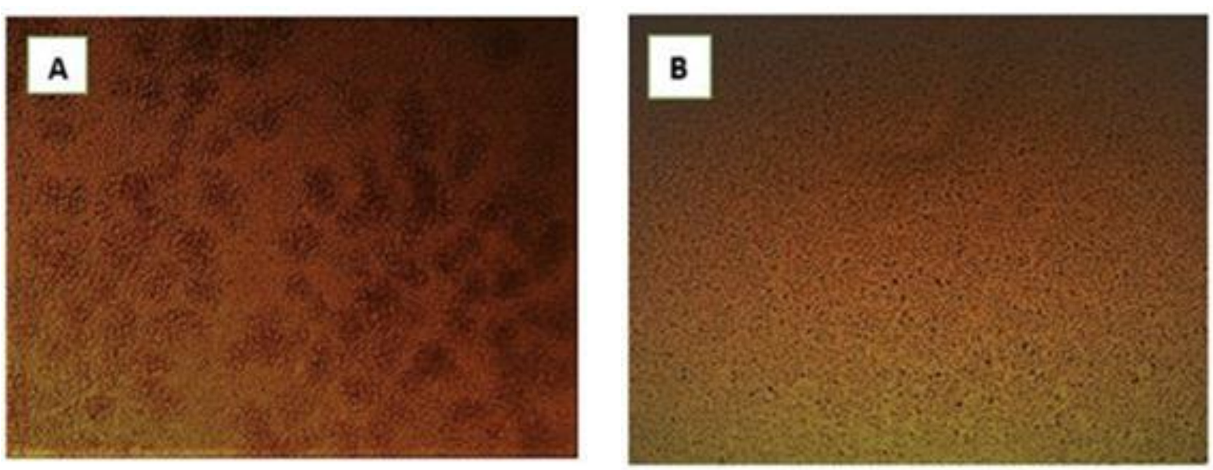

Plate III: Virus isolation using porcine leukocyte cells showing haemadsorption (A) and the control showing no viral activity (B)

Table 1: ASF antibody detection

Animal group/pen	Antibody test	Days post exposure				
		14 dpi	28 dpi	42 dpi	56 dpi	70 dpi
Boar pen	ELISA	NEG	NEG	NEG	NEG	NEG
	IBT	NEG	NEG	NEG	NEG	NEG
Sow pen	ELISA	NEG	POS	POS	POS	POS
	IBT	NEG	POS	POS	POS	POS
Gilt pen	ELISA	NEG	NEG	POS	POS	POS
	IBT	NEG	NEG	POS	POS	POS
Piglets	ELISA	NEG	NEG	NEG	NEG	NEG
	IBT	NEG	NEG	NEG	NEG	NEG

ELISA and IBT results of serum samples obtained from ASFV-exposed pigs. POS and NEG indicate positive and negative results

Results

Application of disinfectants at the concentration recommended by the manufacturer halted mortality, allowing the flock to grow to 38 pigs. Additional control measures were implemented (forbidding panic sales, movement of pigs and pig products in and out of the farm, disinfecting the pens and premises, etc.) according to the regional strategy for controlling African swine fever in Africa (FAO, AU-IBAR & ILRI, 2017). The farmer was advised to observed strict biosecurity and to continue to monitor and screen pigs on the farm. Blood samples were randomly collected at a 14-day interval for two months, and no antigen was detected by ELISA, but antibodies were detected at 75 days post-infection (Table 1).

Discussion

This outbreak did not fall into the conventional description of an ASF outbreak with mild clinical signs, where mortalities are mostly 100%, especially in Nigeria (Sanchez-Vizcaino *et al.,* 2015; Salguero, 2020). This clinical outcome can be associated with several factors or pathogens; however, due to this undefined description of low mortality, ASF was considered a priority disease of pigs to be investigated. Our pathological findings, although nonspecific, showed some relationship to the acute and subacute forms of the disease, characterised by hyperemic splenomegaly and enlarged lymph nodes (Sanchez-Vizcaino *et al.,* 2015; Salguero, 2020). One of our key findings was the absence of skin erythema or cyanosis, observed mainly in animals that tested positive in Nigeria (Salguero, 2020). Although this test result was positive, we hypothesise that it is caused by a low-virulence virus strain or a recombination of the recently reported genotype II with the previously circulating genotype I. A few swine diseases, such as CSF, PED, TGE and bacterial septicemia, produce high mortality and clinical outcomes similar to ASF; therefore, the need to carry out differential diagnoses is essential for any possible role in disease causality. However, in the absence of a viable vaccine, biosecurity remains the most viable method for ASF disease prevention and control.

In conclusion, this report provides evidence of a case of ASF with vague clinical symptoms and mortality patterns caused by ASF. Based on the findings, it confirmed that it was a case of ASF, and we recommend always screening for ASF, even when mild symptoms are present. We suggest that every swine sample submitted to the laboratory should be subjected to ASF diagnosis as a baseline diagnostic requirement. The application of appropriate biosecurity measures and disinfectants should be a significant priority for farmers to reduce the risk of infection and spread.

Conflict of Interest

The authors declare that there is no conflict of interest.

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