

Outbreak investigation



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Outbreak investigation of African swine fever in Ebonyi State Nigeria, 30th April to 6th July, 2021

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Abstract

Sporadic outbreak of African swine fever (ASF) is still been reported in Nigeria. There is a paucity of information on the lessons learnt in the control of ASF in Ebonyi State, Nigeria. The purpose of this study was to describe the outbreak response to ASF, identify possible risk factors for the outbreak of ASF, and describe strategies for control of ASF in Ebonyi State, with a view to provide information necessary for public health action. We carried out a retrospective/prospective disease investigation by reviewing case reports of outbreaks of ASF in Ebonyi State between 1st January-30th June 2021, from the Department of Veterinary Services, Federal Ministry of Agriculture and Rural Development (FDVS), Ebonyi State, Nigeria. We defined the case definition for a suspected case of ASF, constituted a Rapid Response Team (RRT). Prospective outbreak investigation was conducted

by reviewing farm records on sales of pigs to other pig farms. Sample collected include tissue section (spleen, lungs, liver), whole blood (without anticoagulant) at 4-5°C stored in Giostyle, for onward transport to the National Veterinary Research Institute, (NVRI) Jos for Laboratory diagnosis. On the 28th through 30th of April 2021 suspected outbreak of ASF was reported at Izzi Local Government Area (LGA) of Ebonyi State, herd size of 400 pigs. Affected pigs showed marked erythema, Ataxia, acute mortality, respiratory distress. On the 14th of May 2021, the Laboratory sample was confirmed as positive for African swine fever virus (ASFV). Risk factors identified during outbreak investigation were; poor drainages within and between pens, feed sources were mainly agricultural waste products sourced from (poultry, market, livestock), poor biosecurity measures; foot deep, appear not to be in use and poor choice of disinfectants. The need to maintain biosecurity measures within the farm can never be overemphasized. A sporadic outbreak of ASF may occur when there is a breach in the biosafety protocol of a pig production system. Consequently, we discourage feeding poultry waste to pigs, ensure proper drainages within and between pens, use recommended disinfectants. Furthermore, the State Ministry of Agriculture should develop a minimum operating standard for would be pig farmers in the state to ensure biosecurity standards, and supervised compliance before permission is granted for the operation of a pig farms within the state.

Introduction

African swine fever (ASF) is a contagious, haemorrhagic viral disease enzootic in pigs [1]. It is a transboundary animal disease (TAD), responsible for major economic losses, and a threat to food security estimated at over USD 2.9 billion per annum in sub-Saharan Africa [2,3]. African swine fever is caused by the African swine fever virus (ASFV) of the family *Asfvirinidae*, genus *Asfivirus* [4]. The soft tick (*Ornithodoros spp*) are its only known natural reservoir, and may also act

as its biological vector [4,5]. *Sus scrofa* (domestic pigs) are susceptible to ASFV [6], however, infected African wild pigs; warthogs (*Phacochoerus spp.*), bush pigs (*Potamochoerus spp.*) and the giant forest hog (*Hylochoerus meinertzhageni*), develops subclinical infections and may act as a carrier of ASFVs [5,6]. In affected pig's symptoms of ASF are dependent on its virulence or forms of the virus, per acute form are characterised by sudden death [4], in the acute form, symptoms includes pyrexia, anorexia, lethargy, erythema, abortion and death within 6-13 days, or up to 20 days [4,5].

The sub-acute form is characterised by slight fever, anorexia of 5-30 days, abortion, and mortality in 15-45 days with a range of 30-70% [4,6,7]. The chronic form of ASF is characterised by non-specific symptoms: diphasic fever, anorexia, chronic skin ulcer, arthritis, cough, diarrhoea, and emesis [1,5]. Other means of spread of ASFV are by direct contact with an infected animal (nasal oral, body fluid, and tissue) or indirect contact with contaminated (vehicle, equipment, clothing) [5,8]. Similarly, biting flies swine lice (*Haematopinus suis*), stable flies (*Stomoxys calcitrans*) has been shown to act as a mechanical vector of ASFV under experimental condition [9]. The outbreak of ASF was first reported in Kenya in 1909 when apparently healthy domestic pigs were imported from Europe, then Lisbon, Portugal in 1957 [10]. The disease became enzootic in Portugal and Spain after its resurgence in 1960 [9], then in the Netherlands, Italy, France, Belgium and the Americas [2,11,12]. African swine fever was reported in Senegal West Africa in 1978, Nigeria in 1998 [7,13]. The sylvatic cycles of ASFV maintain the virus in nature in sub-Saharan Africa [2,11,13,14]. In 2020, Nigeria reported 50 confirmed outbreaks of ASF in 12 states (Figure 1). As of 30th May 2021, an outbreak of ASF has been reported in 6 states with 9 confirmed cases (Figure 2). Ebonyi State reported 3 outbreaks of ASF with over 400 pigs affected [15], (Figure 3). The purpose of this study was to describe the outbreak response to ASF in Ebonyi State, Nigeria,

identify factors responsible for the outbreak of ASF, control strategies for ASF and describe the burden of ASF within the study area with a view to provide information necessary for public health action.

Methods

Case definition of a suspected case of ASF: pig of any age with high fever, anorexia, inappetence, erythema, haemorrhages on the skin, (ears, abdomen, legs), diphasic fever, mortality in 6-13 days (or up to 20 days) of the onset of the clinical sign.

Differential diagnosis of ASF: classical swine fever (CSF), Warfarin poisoning, erysipelas, trypanosomosis.

Study area: Ebonyi State is located in the southeast of Nigeria on Latitude. 6°15'N, Longitude. 8°05'E, bordered by Enugu State to the west, Cross River State to the east, Benue and Abia State to the North and South [16]. Farming is the primary occupation of the people of Ebonyi State [17]. The population of pigs in Nigeria was estimated at over 8 million [18]. Ebonyi State accounts for over 50,000 of this population estimated at USD 20 million [15]. Pig farming in Ebonyi State is practised under intensive and semi-intensive system.

Study design: we carried out retrospective and prospective outbreak investigations. Sample collected includes tissue section (Kidney, sera, intestine, liver), whole blood (without anticoagulant) at 4-5°C stored in giostyle, for onward transport to the National Veterinary Research Institute, (NVRI) Jos for laboratory diagnosis. We reviewed case reports of outbreaks of ASF in Ebonyi State between 1st January to 30th June 2021, obtained from the Federal Department of Veterinary Services (FDVS), Ebonyi State, Nigeria. Then constituted a rapid response team (RRT), which comprised the Federal epidemiology officer, REDISSE veterinary officers, and the ASF desk officer.

Laboratory diagnosis: sample collected laboratory no (VPD574-P/21) tested positive to African swine fever (ASF), by reverse transcriptase polymerase chain reaction (RT-PCR).

Results

Descriptive findings: on the 28th through 30th of April, 2021 suspected outbreak of ASF was reported in (farm A) located at Izzi Local government area (LGA) of Ebonyi State, flock size of over 400 pigs. Affected pigs showed marked erythema, Ataxia, acute mortality, respiratory distress (Figure 4). Samples were collected. On the 14th of May 2021, the laboratory samples were confirmed to be positive for ASFV. Retrospective disease investigation identified the following gaps; poor drainages within and between pens (Figure 5). Feed sources; are mainly agricultural waste products from (poultry, market, livestock) waste sourced from agro-dealers.

Poor biosecurity measures: pen within the farm had foot deep, however, they appear not to be in use. Poor choice of disinfectants: use of IZAL® (Lysol, Phenol) (Ineffective against ASFV). Consequent to these findings, the moribund animals were isolated, placed in a holding pen and treated based on clinical symptoms. The farmers were sensitized to the need to maintain biosecurity measures on the farm, and biocontainment equipment provided for them by the REDISSE project. Feeding agricultural waste to pigs was discouraged. Subsequently, the pen was disinfected with CID20, (Alkyldimethylbenzyl ammonium chloride; 61.5G/Glutaraldehyde 58g/Formaldehyde 84g/L, Isopropanol 40g/L), by spraying 2.5ml/L-10.0ml/L of CID 20.

Discussion

African swine fever continues to exert severe economic losses on the pork subsector. The major concerns of affected countries are the reduction in the burden of ASF [19]. The trade implications of ASF may be severe with substantial losses on the

pork subsector [9] worldwide. In 2019, the republic of China reported an economic loss of over 141 billion dollars following the outbreak of ASF, Vietnam culled over 6 million pigs which accounted for about 20% of its population of pigs valued at 4.03 billion dollars representing 10% of its agricultural sector [19]. In sub-Saharan Africa swine production is estimated at over 2.9 billion dollars per annum [2,3]. The livestock subsector in Nigeria grew by 2.26% in the (2nd quarter) Q2 of 2020, from 0.63% Q1 in 2020 [20], the pig subsector in Ebonyi State accounted for 20 million dollars in capital [18]. However, sporadic outbreaks of ASF, the COVID-19 pandemic in the Q3 of 2020, resulted in the shutdown of the economy, job losses, and a drop in government revenues. As of the 1st quarter of 2021, Ebonyi State has reported 3 confirmed outbreaks of ASF with over 400 mortalities. Trace back investigation of these outbreaks identified a trend in risk factors to ASF in Ebonyi State; poor drainages between and within pens are responsible for the outbreak, spread of ASF between contiguous farms, regardless of husbandry type. Intensively managed pigs should have a distinct area for feeding bedding and defecating with at least 20 square feet between each animal [21] and proper drainages with waste directed away from individual pens. Pig fed on poultry waste may be at risk of ASF more so these agricultural wastes are sourced from mixed (Pig, poultry) farms, may contribute to the outbreak of highly pathogenic avian influenza (HPAI) vis-à-vis emergence of reassortants avian influenza strains [22-24], such management practice may stunt the current drive to stamp out HPAI from the livestock subsector in Nigeria.

Poor choice of disinfectants are major drivers for the spread or persistence of ASFV, especially in farms with a history of outbreaks, use of izal® a disinfectant with antiseptic properties active against bacteria and envelope viruses suitable for smooth surfaces are of common use in affected farms. This has a sub-optimal effect when applied to surfaces with straw and animal manure,

consequently, virucidal antimicrobial such as CID 20 [25] containing quaternary Ammonium chloride was recommended to farmers. We recommend that the State Ministry of Agriculture should develop a minimum operating standard for would be pig farmers in the state to ensure biosecurity standard, and supervised compliance before permission is granted for the operation of a pig farm or its value chain.

Conclusion

A sporadic outbreak of ASF may occur when there is a breach in the biosafety protocol of a pig production system. Consequently, we discourage feeding poultry waste to pigs, ensure proper drainages within and between pens, vis-à-vis use of recommended disinfectants. Furthermore, the State Ministry of Agriculture should develop a minimum operating standard for would be pig farmers in the state to ensure improved biosecurity practices, and supervised compliance before permission is granted for the operation of a pig farms within the state.

Competing interests

The authors declare no competing interests.

Authors' contributions

Dr Mogaji Oiza Gloria participated in the outbreak response and made available data relating ASF control in Ebonyi State. All the authors have read and agreed to the final manuscript.

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Figures

Figure 1: map of Nigeria showing states with confirmed cases African swine fever in 2020

Figure 2: map of Nigeria showing states with confirmed cases African swine fever in 2021

Figure 3: a spot map of Ebonyi State showing the burden of African swine fever by local government area, between 1st January-30th June, 2021

Figure 4: recumbent piglets with symptoms of African swine fever

Figure 5: a pig pen with a poor drainage system

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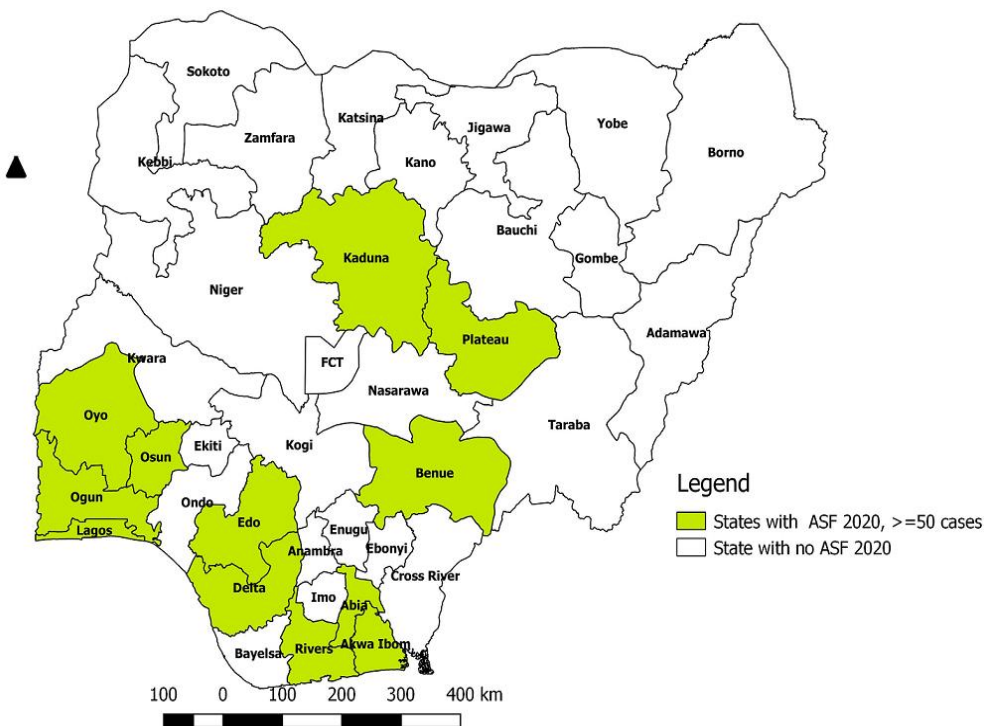


Figure 1: map of Nigeria showing states with confirmed cases African swine fever in 2020

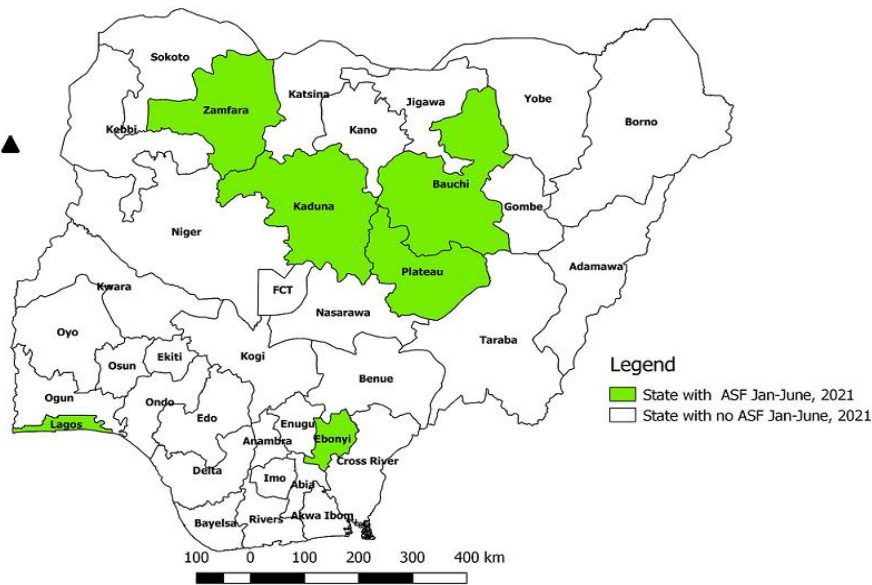


Figure 2: map of Nigeria showing states with confirmed cases African swine fever in 2021

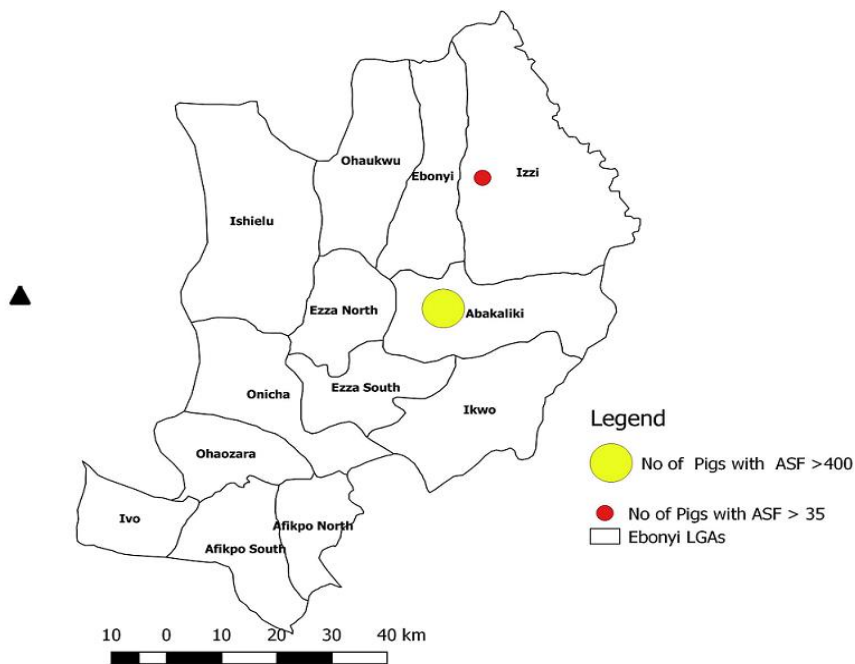


Figure 3: a spot map of Ebonyi State showing the burden of African swine fever by local government area, between 1st January-30th June, 2021



Figure 4: recumbent piglets with symptoms of African swine fever



Figure 5: a pig pen with a poor drainage system