



Seroprevalence of African Swine Fever in Free Range Pigs In Taraba State, Nigeria

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SUMMARY

A cross-sectional survey was carried out in two Local Government Areas of Taraba State between the months of March to June, 2007, to assess the serological evidence of African Swine fever (ASF) virus antibodies in free range pig population. Extensive herds of pigs were targeted for this study, and a convenient sampling technique was employed based on the availability of pigs population as well as farmer's willingness to allow their animals to be bled. A total of 304 blood samples were collected from apparently healthy pigs. Sera were tested using Blocking Enzyme linked Immuno Assay (B-ELISA). There was an overall seroprevalence of 48.7% (95% CI: 43.09- 54.3). Seroprevalence based on different locations showed a significantly ($p < 0.05$) higher prevalence of ASF 61% (95% CI: 54.9-66.9) in Wukari LGA than 26% (95% CI: 15.3-39.4) in Karin Lamido LGA. Seropositivity based on sex revealed a higher seroprevalence in females 50.4% (95% CI: 44.3-56.5), than in males 40% (95% CI: 27.2-54.0). This study has shown that ASF is enzootic in free-range pig population in Taraba State which entails a potential danger to pig production with its attendant negative impact on food security and means of livelihood. We recommend an ASFV ecological study to unravel the factors responsible for continued circulation and maintenance of the virus in Nigerian pig population.

Key words: African swine fever, ELISA, free range pig, antibodies, Seroprevalence

INTRODUCTION

Pig production contributes significantly to the source of income for the rural populace as well as large established swine farms in Nigeria. It also plays an important cultural role that cannot be measured in monetary value. Religious beliefs in certain parts of the country limit swine production in those areas, however, pork are commonly eaten in areas where this belief does not exist (Fasina *et al.*, 2010). The occurrence of diseases especially African swine fever (ASF) has impacted negatively on the productivity of swine in Nigeria. As a result of the devastating effects of ASF, animal protein output, especially pork, has been grossly affected (Luther *et al.*, 2007).

African swine fever is a highly contagious, per acute hemorrhagic viral disease of all domestic pigs caused by a tick-borne DNA virus of the genus *Asfivirus*; family *Asfarviridae*. The disease affect all age, breeds and sex of pigs. It usually characterized by fever, depression, difficulty in breathing, anorexia, reddening of the skin especially around the abdomen, flanks and snout; (Maijiyagbe *et al.*, 2004).

ASF first made its appearance in an unconfirmed outbreak in south western states in 1973 which recorded 100% mortality in the affected swine farm (Babalobi *et al.*, 2007). Subsequently, the disease disappeared and re-surfaced in September 1997 where it decimated greatly the swine population in Nigeria with it attendance socio-economic impacts on means of livelihood and food security (Luther *et al.*, 2007).

Ever since, the disease appears to become enzootic in all the swine producing areas of Nigeria, with a regular wave of outbreaks throughout the year.

Three types of epizootiological cycles of maintenance for ASF virus (ASFV) have been well described, however, only the cycle of maintenance that happens between domestic pigs without the known, involvement of other vectors and hosts is known to be responsible for ASF enzootic in Nigeria (Fasina *et al.*, 2010).

Although, mortalities seems to have decreased significantly probably as a result of strict adherence to bio-security measures being practiced by most of the large scale farmers, however, high prevalence of the disease is still being observed in both small holders and large scale apparently healthy swine farms across the swine producing areas of Nigeria (Fasina *et al.*, 2010; Owolodun *et al.*, 2010).

As a result of the effect of ASF on the economy of the pig farmers and the role pork plays in food security as a supplement for beef and poultry in Nigeria, it becomes important to update the scanty information available on the prevalence and the economic aspects of ASF amongst the free-range domestic pigs in Taraba State.

This study was aimed at determining the seroprevalence of ASFV antibodies in free range pig population in two Local Government Areas (LGA) of Taraba State, north eastern of Nigeria.

MATERIALS AND METHODS

Study Area

The study was conducted in Wukari and Karim Lamido LGAs of Taraba State. Taraba State is situated in the north-eastern geopolitical zone of Nigeria. It is bounded by Bauchi and Gombe state in the north, Plateau and Nassarawa state in the west and Adamawa state on the east, and shares an international boundary to the east with the Republic of Cameroun. The state has an estimated land area of about 59,365.2sq.km and lies between latitudes 60 ° 25'N and 90 ° 30'N and between longitudes 90 °30'E and 110 ° 45'E(GSN, 1994). The state is within the tropical zone and has a vegetation of low forest in the southern part and grassland in the northern parts. Fishing, farming, pastoralism, and mining are the predominant occupations of the people.

Study Design and Samples Collection

Minimum sample size of 156 was estimated using Thrusfield method for sample size calculation (Thrusfield, 2005), assuming an expected prevalence of 88% (Saka *et al.*,2010), desire precision of 0.05 and confidence level of 0.95.

Extensive herds of pigs were targeted for this study. The pigs were sampled between the months of March to June, 2007. Convenient sampling technique was employed based on the availability of pigs population as well as farmer's willingness to allow their animals to be bled. A total of 304 apparently healthy pigs were bled by venipuncture through the ear vein using 18G

syringe and 5ml needle. The sera were separated from the blood by allowing the blood to clot for 24 hours in the syringe after which they were decanted into sterile cryovials and stored at -20°C until used. The samples were analysed at Viral Research Division, National Veterinary Research Institute (NVRI), Vom, Plateau.

Laboratory Procedures

This kit is based on a blocking enzymatic immunoassay (Blocking Elisa). The kit was used as per the instruction of the manufacturers (INGEZIN PPA COMPAC). Briefly, all the reagents (except conjugate) were allowed at room temperature before used. 50µl of supplied diluents buffer was added to all the wells after which 50µl of positive control sera was added to two wells A1 and B1, and 50µl of negative control sera was added to two wells A2 and B2. 50µl of the test samples were added to the remaining wells, the plate was sealed and incubated for 1 hour at 37°C. Following the incubation, the plate was emptied and washed four times with Sodium hydroxide (NaOH) solution. 100µl of specific conjugate was added to all wells, sealed and incubated for another 30 minutes at 37°C. The plate was washed as described above and 100µl of substrate solution was added and kept for 15 minutes in the dark. Lastly 100 µl of the stop solution was added, the OD values were read on a MultiSkan® spectrophotometer ELISA plate reader (Thermo Scientific, USA) at 450 nm wavelength. Serum samples with OD lower than positive cut off were considered positive to ASFV antibodies. Serum samples

with OD higher than negative cut off were considered negative to ASFV antibodies. Serum samples with OD values between both cuts off were considered as doubtful.

Data Analysis

The data were stored in Microsoft Excel® spreadsheet. Descriptive statistics was carried out using Microsoft Excel spreadsheet and proportion was obtained using Open Epi. Version 2.3.1 (Open Source Epidemiological Statistics for Public Health calculator), Dean *et al.* (2013).

RESULT

An overall seroprevalence of 48.7 % (95% CI: 43.09- 54.3) was recorded. Seroprevalence based on different locations in the study revealed a higher prevalence in Wukari LGA 53.1% (95%: CI 46.99-59.23) than 26% (95%: CI 15.29-39.42) in Karmin Lamido LGA. The difference in prevalence between these different locations in the study was significantly associated with seropositivity of ASF ($p < 0.05$) (Table I). Seroprevalence based on sex indicated a higher seroprevalence in females 50.3 (95%: CI 44.3-56.5) than in males 40% (95%: CI 27.17-53.96); however, the difference in prevalence is not significant $p > 0.05$ (Table II).

Table I. **Prevalence of antibodies to ASFV based on location**

Locations (LGA)	Number of Sera	Number of sera positive	Prevalence (%)	95 CI
Wukari	254	155	61.0	(54.9-66.9)
Karin Lamido	50	13	26	(15.3-39.4)
Total	304	148	48.7	

P-value 0.0002089

Table II. **Prevalence of antibodies to ASFV based on sex**

Sex	Number of animal	Number positive	Number negative	Percentage	95% CI
Females	254	128	126	50.4	(44.3-56.5)
Males	50	20	30	40.0	(27.17-54.0)
Total	304	148	156	48.7	

P-value 0.117

DISCUSSION

The result revealed an overall seroprevalence of 48.7%. This seroprevalence was higher than the seroprevalence of 13.2% reported by Abwage *et al.* (2015) in pigs farms in Taraba State and 33.3% reported by Luther *et al.* (2008) from middle belt central states of Nigeria. However, the result represents a lower seroprevalence when compared with 65.2% reported by Olugasa, 2007 and 88% reported by Saka *et al.* (2010) in south west Nigeria commercial pig herds and in Lagos State, respectively. The observed high antibodies titre against ASFV in apparently healthy pig population may be due to a circulation of low virulent strain of ASFV as well as resistance been developed by pig population and their progeny due to repeated exposure to the only circulating ASFV genotype (Genotype I). Decreased in mortality rates in enzootic settings due to a chronic or sub-clinical ASFV infections in

Nigeria have been observed which is attributed to the circulation of low virulent strain or repeated exposure to the wild virus (Fasina *et al.*, 2010; Owolodun *et al.*, 2010). Virus adaptation of the pig population and the evolution of ASF virus strain with low virulence due to persistence circulation in the swine population over time might lead to decrease mortality (Penrith *et al.*, 2009). The seroprevalence of ASF in Wukuri LGA (53.1%) is higher than the 26% prevalence recorded in Karin Lamido LGA and the difference in prevalence was statistically significant $P < 0.05$. This is probably as a result of the proximity of Wukuri to Shandam LGA of Plateau State where there is high concentration of pig population and market for pigs. The lack of association with ASFV seropositivity due to sex in this study corroborated a study conducted by Asambe *et al.* (2019) in Benue State where they similarly reported lack of statistical significance in ASF seropositivity due to sex.

This study has revealed that ASF is enzootic in free range pig population in Taraba State which is a potential danger to the pig population, which serves as a means of livelihood to quite a number of resource poor farmers in these localities.

We advocate an ASFV ecological study involving the free range kept pig population as well as other methods of pig production systems to understand the natural history of ASFV in Nigeria

Conflict of Interest

The authors have no conflict of interest to declare

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