FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 3 No. 3, September, 2019, pp 198 –201

PREVALENCE OF AVIAN INFLUENZA VIRUS (AIV) (SUBTYPE A/H_5N_1) IN COMMERCIAL POULTRY FARMS IN JOS SOUTH LOCAL GOVERNMENT AREA OF PLATEAU STATE, NIGERIA FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT
An investigation to determine the prevalence rate of Avian Influenza virus (AIV) sub type A/H_5N_1 among birds in five selected commercial poultry farms located in Jos south Local Government Area of Plateau State was conducted. A total of 200 swab samples (comprising of 40 from each site) collected from the trachea and cochlea of the birds were analyzed using standardIsolation/serology methods for the isolation and identification of the virus. Out of the 200 samples analyzed, 68 were found to be positive with Avian Influenza virus subtype A/H_5N_1 representing 34% overall prevalence rate. Samples analyzed from Rantya had the highest prevalence rate as 34 out of the 40 had Avian Influenza virus (AIV) sub type A/H_5N_1 representing 85% prevalent rate. This was closely followed by samples from Federal Low coast with 19 cases representing 47 %. Samples from Ray field had the lowest cases of the viruses as only 3 out of the 40 had the Influenza virus representing 7.5%. A failed biosafety measure has been identified as a major contributing factor in the spread of Avian Influenza virus among poultry birds. To this end, the adoption of biosafety measures among others could curtail the spread of the virus among poultry farms.

Keywords: Avian Influenza Virus, Poultry Farms, Prevalence, Biosecurity

INTRODUCTION

The livestock sector is vital to the socio – economic development of Nigeria because it contributes about 9- 10% of Agricultural gross domestic product (GDP)(FAO, 2006).Moreover, the Nigeria's Poultry population is about 140 million of which 25% are semi-commercial and 60% in backyards (UNDP, 2006).Consequently, livestock represents an important source of high quality animal protein. Until the AIV H_5H_1 outbreaks began, Nigeria's poultry sector had potential to enter export markets (FAO, 2006). The highly pathogenic Avian Influenza (HPAI) outbreak in Nigeria has resulted in a loss of about one million deaths of birds annually resulting in an additional 45% drop in the flock size for the now- affected farms (Balami, 2014). These have further worsened the gap between supply and demand of poultry products, with potential implications for nutritional well- being of the people.

Avian influenza virus (also known as bird flu) are segmented negative strand RNA viruses that are placed in the family *Orthomyxoviridae* in 3 genera A, B and C. In humans, type A and B are responsible for epidemics while type C is of little epidemiological significance. Influenza A viruses are the only type reported to cause natural infections of birds and are further divided into subtypes according to antigenic characteristics of the surface glycoprotein, 16 hemagglutinin (H) and neuraminidase (N) (Monne *et al*., 2008; OIE, 2004).

The diseases in birds have an incubation period ranging from few hours to a few days, and could be highly contagious. A/H_5N_1 has been found to infect other species such as cats, dogs, pigs and humans leading to disease with high fatality rate (Bellow *et al.*, 2008).

Avian influenza was first reported in Italy in 1898. The disease originally known as fowl plaque continuously caused massive outbreaks in poultry in the United States (1928 and 1929). In 1955 it was discovered that the virus causing fowl plaque was an influenza virus (WHO, 2007).

Nigeria was the first country in Africa to be affected by the Avian influenza virus (AIV) subtype H_5H_1 virus. With the highly pathogenic Avian influenza (HPAI) outbreaks initially reported at a commercial farm in Kaduna State in January, 2006 (Adene*et al.*, 2008, Saidu*et al.*, 2008), it was also reported that the circulating Avian influenza H_5H_1virus during the AI epidemics in Nigeria was a potential candidate for pandemic influenza which may severely affect human and animal population worldwide especially in resource poor countries (Joannis*et al.*, 2006).

In humans, AIV H_5H_1 has affected victims of both sexes and all ages depending largely on their contact with poultry and wild birds (CDC, 2014). Apart from birds, the influenza viruses are found in a variety of animals, including pigs, Whales, horse, Seals and humans (Cardona *et al.*, 2006).

Doran (2006) noted that the current (HPA 1) strain subtype H_5H_1 is believed to have emerged in 2002 with a fatality rate of over 2 million domesticated birds. For this reasons, there is widespread apprehension among public and animal health experts that the current H_5N_1 avian influenza virus, which is prevalent in Asia and some parts of Europe and Africa, may acquire some human influenza virus genes resulting in easy spread between people and a potentially devastating pandemic (Beato*et al.*, 2011).

Populations emphasize the potential importance of wild birds as a primary source of zoonotic introduction of influenza into human populations (Heeney, 2006; Baigentand Oluwayelu*et al*., 2011,Alexander, 2000).Therefore, the Avian influenza disease is of both economic and public health significance and have greatly impaired the poultry business in Nigeria as well as the health and economic status of many.

MATERIALS AND METHOD

Study Area

This study was carried out in four selected commercial poultry farms namely Rantya, Federal low coast, Dadin kowa, Ray field and Bukuru in Jos South, Local Government Area (latitude 9^0 46^0N, 8^0 48^0E, longitude 9.760^0 N, 8.800^0E) of Plateau State.

A total of 200 swab samples were collected from clinically sick and healthy birds consisting of 100 tracheal and 100 cloaca swabs respectively.

Sterile swab was inserted through the oropharyngeal (Trachea) and cloacal region of the birds and transferred into 1ml viral transport medium in a cryovial and placed in plastic flask containing ice packs to maintain the cold chain and further stored at -20^0c until analysed within 24 hours.

Isolation / Serology

The test was performed following the procedure described by OIE (2006). Briefly, the swab samples were inoculated directly into three set of 10 days old pathogen free incubated embryonated eggs labelled$T_1 - T_{100}$and$C_1 - C_{100}$for tracheal and cloacal swab samples respectively. The eggs were then incubated at 37^0c and candled daily to check for mortality after every 24 hours.

Serological Test

The dead eggs were disinfected with 70%alcohol and the air space opened and the allantois fluid obtained and tested against a prepared 10% chicken red blood cell on a clean grease free white ceramic tile and observed for agglutination, any degree of agglutination was regarded as positive.

Bacteriological Test

All positive samples were further subjected to bacteriological screening by plating on Blood agar to rule out bacterial contamination and ascertain the positivity of the samples.

Rapid Kit Test

To further confirm the positive samples, 2- 3 drops of the harvested allantoids fluid were diluted with provided diluents in the Rapid kit test. Using a Pasteur pipette, 2 drops were placed on the test kit and result read within 5 minutes. The presence of red line in both control and test indicates a positive Avian influenza sample; but if only in the control line it indicates negative Avian influenza for the sample, while no line indication in both control and test samples indicates an invalid test.

RESULTS AND DISCUSSIONS

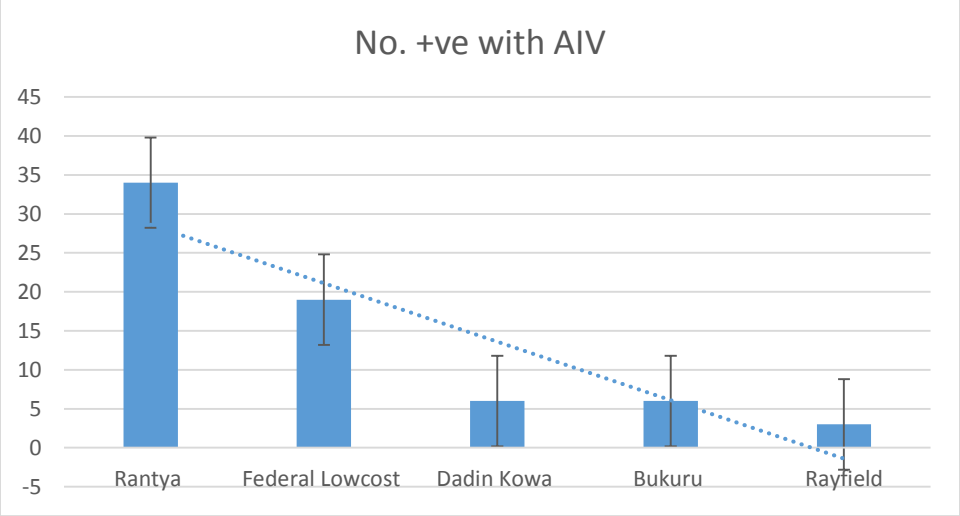

Fig. 1: Standard bar chart with error bars showing prevalence of avian influenza virus infections in Jos South. Trend line showing linear relationship.

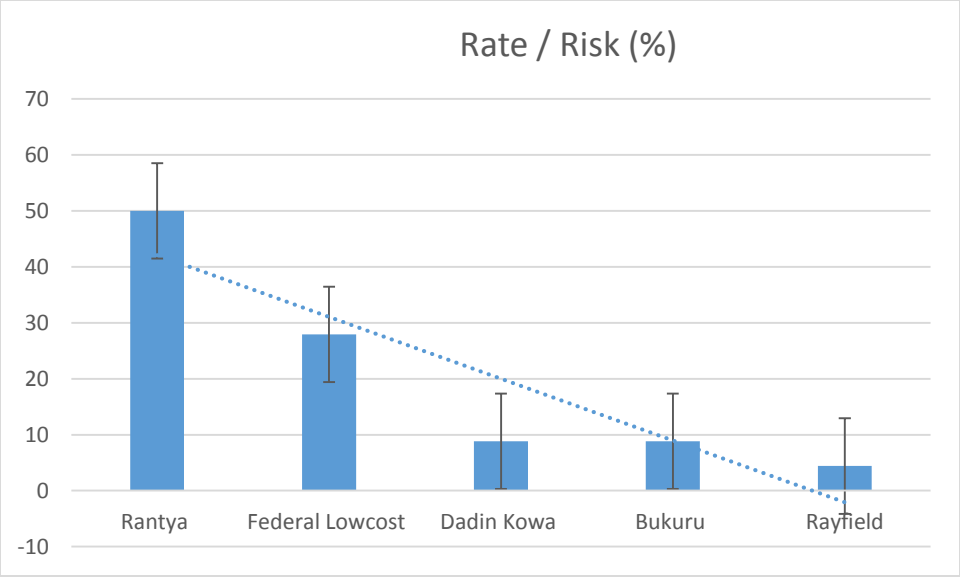

Fig. 2: The Prevalence rate/ risk for each of the Isolation in the area with trend line showing linear relationship

It therefore implies the disease is dependent on the location with Rantya having the high chances of prevalence / Risk rates of reported cases.

DISCUSSION

Results obtained fromthese investigations revealedthat samples from Rantya had the highest prevalent rate of the avian influenza virus with 34 out of the 40 (85%) samples testing positive as indicated in Figure1. Infection rates in Federal low cost were next with 19 out of 40 (47.5%) testing positive. Dadinkowa and Bukuru sites has same number of infection rates of 6 each out of the 40 samples analyzed representing 15% as observed in Figure 1. Ray field had the lowest rate of infection as only 3 out of the 40 (7.5%) samples analyzed were found to be infected with avian influenza virus (Figure 1).

The prevalent rate, and possible sources of infection, the prevalence rate risk for each of the location was sought (Figure 2) with Rantya having the highest numbers of infection with a rate risk at 50% followed by federal low cost with a rate risk of 27.94%, Bukuru and Dadinkowa having the same rate risk of 8.82% and the lowest is Rayfield 4.41%.

Rantya and Federal low cost are neighbouring settlements we therefore speculate that the disease probably spread easily to the other location hence the similarity in the number of birds infected. Furthermore, Rantya could be the major source from which the infection spreads to the Federal Low coast area, possibly due to a failed biosecurity system within Rantya and environs. Samples that were positive withAvian influenza where traced to the corresponding farms and depopulation were done thereafter and farmers advised not to stock their farms until after 6 mouths (AICP, 2011). These could be the reason for detecting virus in some previously affected farms ten years after the epidemic. Similarly, in other to avoid their farms being depopulated with little or no compensation, there were reports of sick and apparently healthy birds being sold from previously affected and non- affected farms during the 2006 HPAI epidemic (*Balami et al*., 2014).

Wakawa*et al*., (2012) and Durosinlorun*et al*., (2012) reported a 12.9% and 18.1% prevalence rates of AIV in similar studies conducted in Kaduna and Kano states.

The prevalence rate of 34 % obtained in this study is higher compared to findings of Tombari*et al*., (2013) who recorded an overall prevalence of 28.7% in a study conducted in commercial poultry farms in Tunisia. The prevalence recorded in Jos South Local Government is in agreement with the works ofBalami*et al*., (2014) but lower than that recorded in a similar study by Tombari*et al*., (2013) in Tunisia where they reported a prevalence of 47.7% in Tanis, 45.7% in Beveul and 41.3% for Sfax.

CONCLUSION

Outcome from this investigation suggests that Avian Influenza virus subtype A/H_5N_1 which causes natural infection in birds is prevalent in the study area. It is the highly pathogenic Avian Influenza (HPAI) that is responsible for the high mortality rates (50-100 %) in most commercial poultry farms in the study area. Failed biosecurity system contributed to the spread of the disease to other parts of the state, this could pose a serious health challenge to both humans and animals alike.

It is therefore recommended that biosecurity should be the main concern of commercial poultry farmers and prompt report of any sign of abnormality in the birds to relevant authorities.

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