academicJournals

Vol. 11(37), pp. 1431-1433, 7 October, 2017
DOI: 10.5897/AJMR2016.8383
Article Number: 5F07FE666301
ISSN 1996-0808

http://www.academicjournals.org/AJMR

African Journal of Microbiology Research

Short Communication

Screening of rural scavenging birds for the presence of detectible protective Newcastle disease antibodies in some selected rural communities of Plateau State

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Received 16 November 2016; Accepted 11 January, 2017

A sero-prevalence study was conducted to determine the level of detectible protective antibody titre using the haemagglutination (HA) and haemagglutination inhibition (HI) tests. Serum samples were collected from four hundred and eighty seven unvaccinated rural scavenging chickens from five selected rural communities, including Du, Chaha, Chakarum, Chele and Ngo'hong in Jos South Local Government Area of Plateau state. The result revealed a very low mean titre ≤2 log_2, which explained the unusually high morbidity and mortality rate experienced during seasonal outbreaks. There is an urgent need to initiate control measures in rural areas through the establishment of a strategic vaccination programme against new castle disease outbreaks. This will reduce the incidence of the disease to a large extent.

Key word: Newcastle disease, detectible protective antibody, rural scavenging birds.

INTRODUCTION

Newcastle disease(ND) caused by a virus of genus Avulovirus, subfamily Paramyxovirinae of the family Paramyxoviridae, is an acute, highly contagious rapidly spreading viral disease of domestic poultry and other wild species of birds of all ages (Seal et al., 2003; Aldous, 2003, Haque et al., 2010; Iran et al., 2013). Since ND was first reported in Nigeria in 1953 at Ibadan, the disease has become the most important viral disease of chickens and widely spread throughout the country with annual epidemics being recorded in highly susceptible poultry flocks (Aliyu et al., 2015). The high genetic diversity of the virus could have contributed to the increasing rate of the disease (Aliyu et al., 2015). In Nigeria, ND is generally well-recognised by farmers in both local and exotic breed (Lawal et al., 2015).

Village poultry products have ensured household

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Table 1. Sero-prevalence of Newcastle disease antibody in free range domesticated chicken in Du, Ngohong, Chaha, Chakarum and Chele in Jos south local government area, Plateau State.

Village	Number of birds screened	Vaccination record/history	Mean HI titres
Chaha	130	Nil	≤2 $\log_2$
Ngohong	72	Nil	≤2 $\log_2$
Du	57	Nil	≤2 $\log_2$
Chakarum	155	Nil	≤2 $\log_2$
Chele	73	Nil	≤2 $\log_2$
Total	487		

food security as it supplies high quality animal protein (meat and egg) which where used as food, petty cash derived from sales of poultry products, poverty alleviation and create jobs for rural dwellers (ILRI, 2014; Mulugeta et al., 2013).

Village poultry species could play a significant role in the epidemiology and transmission of the infection to the more susceptible commercial exotic chickens or immune deficient village poultry species especially when reared together or in close proximity.

The disease may therefore be considered a threat to successful village poultry production system (Lawal et al., 2016). Nigeria has an estimated poultry population of 140 million with backyard poultry production accounting for more than 60% of the total flock with an asset value of > 5.75 billion US Dollars (Nnadi et al., 2010).However, annual loss due seasonal outbreak of ND discourages the rural dwellers from investing in scavenging backyard poultry farming.

Though, it is source of cheap animal protein and a profitable means of income generation for rural dwellers, seasonal outbreak of ND challenge in rural scavenging poultry farming, limits derivable profitability and productivity of rural scavenging poultry farming. Morbidity and mortality rate of up to 100% is highly probable in ND immune deficient flock, especially, if challenged by wild virulent strain. Thus, a strategic vaccination control programme against Newcastle disease is imperative in rural scavenging poultry population especially in countries where ND is endemic and application of ND bioexclusion and biocotainment measures is impossible.

MATERIALS AND METHODS

Blood sample

Blood sample was aseptically collected from the wing vein; usually 0.5 to 1 ml was collected per bird with needle and syringe. The collected blood sample was kept in syringes and allowed to clot. The clotted blood was left overnight at room temperature for complete serum separation. The separated serum was harvested and frozen at -20°C for subsequent antibody immune profiling using HI test.

Haemagglutination and haemagglutination inhibition

Haemagglutination and haemagglutination inhibition tests were carried out on the collected sera samples. A 1% suspension of chicken red blood cells (RBCs) was prepared for use in haemagglutination (HA) and haemagglutination inhibition (HI) tests according to Office International des Epizootics (OIE, 2010). The HA titres of standard NDV antigen was determined as described by Allan and Gough (1974) and diluted to contain 4HA units. The reconstituted antigen containing the 4HA units was used in the determination of test sera titres in a HI test. The HI titre for each screened sera was determined and expressed in $\log_2$, and the geometric mean titre calculated for each village that was sampled. Any HI titre of ≥2 $\log_2$ was considered positive.

RESULTS

The results in Table 1 show that protective ND antibody was completely absent in all the screened sera samples collected from the five villages that was sampled (all the screened sera samples were negative). This result is in agreement with the flock history, as none of the sampled birds had history of ND vaccination.

DISCUSSION

Economic analysis estimates that the current annual financial loss as a result of New Castle Disease outbreak in rural chicken in Nigeria amounts to $38,695,652.2 million dollars annually (International Livestock Research Institute (ILRI) 2013). ND control by vaccination is widely practiced world over, but in developing countries, vaccination of rural scavenging flock is rarely practiced and most commercially available vaccine are geared towards the control of ND for large commercial flock.

The result in Table 1 shows that the screened free range chickens all lacked protective antibody against ND virus. Though, the $NDVI_2$ vaccine is available and at an affordable price, rarely do rural farmer vaccinate their chickens. These birds are usually allowed to roam free and fend for themselves, by scavenging around, thus, allowing them to come in close contact with wild feral unvaccinated birds, infected birds and contaminated formites.

A common practice amongst the rural scavenging poultry farmers is the introduction of birds from other flock without history of previous contact with infected birds. These birds are usually given as gift from ceremonies or are sometimes purchased by the farmer to increase his or her stock. The farmers expect maximum output from these birds in terms of income generation, increased egg production and meat yield, but persistent annual outbreak of the disease and consequent losses minimizes this expected yield.

Current vaccines come mainly in large doses and are targeted towards large commercial flocks with little relevance in village flocks which are often small, scattered, multi-aged, and free-roaming with minimal control. However, in most rural settings, the lack of a strategic control measures against this devastating poultry disease outbreak has constantly impeded the development, of rural scavenging poultry farming, though its economic benefit is enormous.

However, ND I-2 vaccine has undergone laboratory tests in several countries and has proved to be protective against local virulent strains of the ND virus (Alders and Spradbrow, 2001b). In Vietnam, after extensive laboratory and village trials, it has been officially recognized as the ND vaccine for village chickens (Tu et al., 1998). In Tanzania, it has given protection for at least two months after vaccination (Wambura et al., 2000).

A mean titre of ≤2 $\log_2$ in the screened flock implies that in the event of an outbreak and depending on the virulence of the virus, flock morbidity and mortality could be up to 100%.

Conclusion

Vaccination has been reported as the only safeguard against endemic ND (Usman, 2002), thus a strategic mandatory vaccination of rural poultry flock against ND will mitigate against seasonal outbreak of ND in rural scavenging flock. The result from this shows that the essence of vaccination of rural scavenging poultry flock cannot be over emphasized since it remains the only option especially in countries where ND is endemic.

CONFLICT OF INTERESTS

There is no conflict of interests in preparation of the manuscript.

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