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## Epizootic Newcastle Disease in Local Chickens Reared in South East Savannah Zone of Nigeria

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**Abstract:** A study on the outbreaks and prevalence of Newcastle Disease (ND) in village chickens in the savannah derived Eastern part of Nigeria was conducted based on cases submitted in two strategically located veterinary clinics. ND was diagnosed and confirmed by clinical signs, post mortem lesions and virus isolations in 11 day old embryonated chickens eggs. The study was carried out for a period of 3 years. Results showed similar distribution of outbreaks within the 3 year study period. Prevalence or outbreak of ND in village chickens was observed only during one period of the year, November-February period. This period coincides with the cold and harsh harmathan period usually seen from November to March in the Eastern part of Nigeria. The cold and harsh stress associated with this period is thought to worsen ND infected leading to spread and outbreaks. Veterinary awareness among the village farmers was also observed to be low in the control of ND in village chickens. Extension services involving education of the rural farmers, strategic vaccination prior to the period of outbreaks and biosecurity measures are recommended to help in the control of ND in village chickens.

**Key words:** Newcastle disease, village chickens, veterinary awareness

### INTRODUCTION

Newcastle Disease Virus (NDV), the etiological agent of Newcastle Disease (ND) infects many avian species (Spradbrow, 1999). In most developing countries around the world, the disease is a major constraint in rural chicken production (Chabeuf, 1990). It can cause mortalities reaching 100% in susceptible populations during devastating outbreaks and sporadic losses throughout the year where the disease is endemic (Alexander, 1991).

The poultry population of Nigeria stands at 150 million chickens and out of this 102.8 million are indigenous (Saidu *et al.*, 2006a; Ezema *et al.*, 2008). In many developing countries of the world, including Nigeria, chicken stands out as the most common livestock owned by many rural families. These village chickens play many vital roles in the life of these poor families. They provide meat and eggs, food for special festivals, offerings for traditional ceremonies, pest control and petty cash for the purchase of medicines and payment of school fees (Alders and Spradbrow, 2001). According to Ogundipe (1998), close to 75% of Nigerian population live in rural areas where most households keep small number of local or village chickens which scavenge on free range and usually taken care of by women and children. Therefore, increasing the productivity of these chickens will make significant contribution towards increasing their food security and secure their livelihood. The number of malnourished children in developing countries is very high had the protein intake fall far below that recommended by WHO, hence the need to improve

on the production of village chickens as they provide good meat and eggs.

Control of ND in village chickens can be possible through rigorous biosecurity measures and efficient application of vaccines (Spradbrow, 1999). This is particularly useful where ND is endemic. ND is endemic in Nigeria and it involves both village and commercial chickens causing annual epidemics in highly susceptible flocks (Halle *et al.*, 1999; Saidu and Abdu, 2008). Pockets of outbreaks are frequently seen in between these annual epidemics. Spradbrow (1999) has described both epizootic and enzootic ND in village chickens. He observed that epizootic occurs when virus is introduced into a susceptible population resulting in spectacular outbreaks with high mortality. This can cover a whole village and beyond within a short time. This form easily presents with high mortalities involving may household flocks. Enzootic occurs when the virus transmits slowly in a partially immune population with few susceptible birds to manifest an outbreak and the occasional birds that die do not come to attention, even among the villagers that own the birds.

These two forms of ND probably occur in Nigeria. This work therefore investigated the outbreaks or prevalence of ND in village chickens in southeast Nigeria over a three year period.

### MATERIALS AND METHODS

**Experimental design:** The study was carried out for a period of 3 years (January-December). Two veterinary clinics were used for the study. One clinic is located in

Nsukka urban, Nsukka Local Government Area while the other is located in Obollo Afor, Udenu Local Government Area. Both towns are in Enugu state, located in south East savannah derived zone of Nigeria. Cases in village chickens reported or received in these clinics were examined and those that were diagnosed to the ND were recorded. Cases were received for the Local Government Areas and beyond. The cases that were recorded were put together and classified on a monthly basis. Diagnosis was based on clinical findings, Post Mortem (PM) lesions, virus isolation and serology.

**Clinical signs and PM lesions:** Clinical signs were observed in the birds that were presented live in the clinic. The observations were recorded. PM examinations were carried out on the birds that were presented dead and sick ones that were sacrificed. The PM findings were recorded.

**Serology:** Antibodies to NDV in the infected birds were assayed using Haemagglutination Inhibition (HI) test as described by Allan and Gough (1974). About 2 mls of blood was collected from the live birds and allowed to clot. It was then kept overnight in a refrigerator and the serum formed was collected and used for the HI test. Live attenuated ND vaccine La Sota collected from the National Veterinary Research Institute, Vom, Nigeria was used as the antigen and 4HA units of this antigen was calculated and used in the HI.

**Virus isolation:** Isolation of NDV was carried out in 11 day-old embryonated chicken eggs. Cloacal swabs were taken from the cases, processed in the laboratory and used as the inoculum. After inoculations, the eggs were incubated for 48 h. They were then chilled in the refrigerator and the allantoic fluids harvested. The allantoic fluids were tested for Haemagglutination (HA) activity. ND hyperimmune serum was used to test the allantoic fluids harvest for specificity.

## RESULTS

**Clinical signs and lesions:** The clinical signs and PM lesions were used in the preliminary diagnosis of ND in the village chickens. Most of the cases in the local chickens presented were sick and moribund birds. The common signs that were observed in these birds were loss of appetite, weakness, soiled vent, yellowish to yellowish green diarrhea, torticollis, sneezing coughing and dyspnea. PM lesions were inflammatory and hemorrhagic in nature involving the respiratory and digestive organs.

**Serology:** Antibodies to ND were detected in suspected cases.

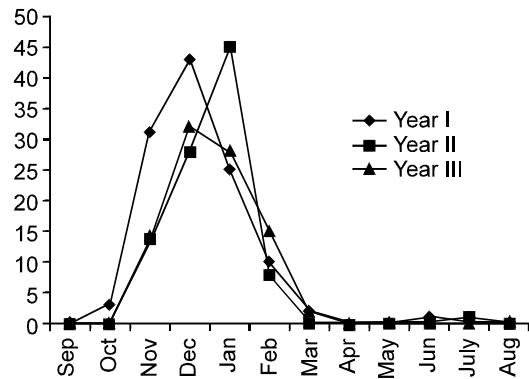


Fig. 1: Annual Prevalence of Newcastle disease outbreaks in local chickens

**Virus isolation:** NDV was isolated and confirmed in the allantoic fluids of embryonated chicken eggs from inoculated samples from cloacal swabs taken from birds that were recorded as positive.

**Outbreaks:** The outbreaks in village chickens as were recorded on monthly basis for a period of 3 years as shown in Fig. 1. The distribution or prevalence was the same for the 3 years period under study. It showed a single low peak occurring from November to February throughout the period of study.

## DISCUSSION

The result of this investigation in village chickens was uniform for the 3 year period of study. It showed a high prevalence of ND in there chickens occurring only at one period of the year (November- February). This period fall within the harmathan period in Nigeria. This period in characterized by dryness wind and cold weather conditions. A similar study carried out in commercial chickens in the same area by Okwor and Eze (2010) showed two peaks or two prevalence periods. A high prevalence was observed in the commercial chickens during the November-February period which falls within the cold harmathan period in Nigeria. This observation was similar to what was observed in village chickens. However, the authors observed another low prevalence occurring during the June-July period which is a rainy period also characterized by cold and high humidity in Nigeria. This particular observation was not seen in village chickens.

The periods of November-February and June-July are particularly important because both periods are characterized by harsh weather of extreme cold and this can be very stressful to the birds especially when they are poorly housed. Stress has been shown to lower the resistance of animals to viral infections (Gallili and Ben-Nathan, 1998). It has been described to be non-specific and cause humoral changes leading to depression of

the immune system (Shendan *et al.*, 1994). Human and animal studies have shown stress to be most commonly suppressive with changing production and activity of a wide range of immune components particularly the activation of the pituitary adrenocortical axis, inducing the production of glucocorticoids with resultant immune suppression (Cohen and Williamson, 1991; Ben-Nathan, 1994). The November- March period in Nigeria is associated with cold as a result of the harmattan seen at this period. The harmattan also comes with wind, dust and dryness and all these contribute in making the environment harsh. These harsh environmental conditions are significant stress factors that encourage the spread of infections. According to Halle *et al.* (1999) and Saidu *et al.* (2006a) stress associated with the harmattan of November-March period worsens the outcome of ND in chickens. Musa *et al.* (2009) in their work on village chickens in some Local Government Areas of Plateau State, Northern Nigeria, detected antibodies to ND throughout the year but with high prevalence or epizootics only during the harmattan period of November-March.

Veterinary awareness in the South Eastern part of the country is more among the commercial farmers than it is among the village poultry farmers or keepers. Good number of cases in commercial poultry are reported and treated when compared with village chickens where few cases are reported. Okwor and Eze (2010) reported two prevalence periods in commercial birds with the number of cases reported in the clinics being comparatively high. We observed one prevalence period in local chicken within the November-February period. Moreover the number of cases as recorded in these clinics was low. Most of the reported cases were only during the epizootic periods when village poultry farmer were able to detect or notice infection in the birds. Many of the rural poultry farmers believe that it is not labour and cost effective treating sick birds as many of the infected birds may eventually die. Moreover, since they do not spend reasonable amount in the production as most of the birds scavenge for food, the loss of the birds do not amount to serious economic loss and as such they do not take the birds for treatment when they are sick. The sporadic cases of ND occurring in village chicken outside the epizootic are not reported.

Village poultry presents a different epidemiological problem from commercial poultry (Spradbrow, 1999). The flocks are small, scattered and of different age. They move freely and scavenge for food and one flock is in direct or indirect contact with the other. This aids the spread of infection through direct contact with one another or indirectly by the contamination of the environment. No biosecurity measures are applied and the activities of these chickens facilitate or contribute to the spread of

infection to commercial birds. During these outbreaks, infections spread rapidly within the community and to neighbouring communities. Movement of infected chickens during these periods of outbreaks may also be responsible for the epizootics seen in the Eastern part of the country. The Christmas and New Year festivals occur within the harmattan period and it is accompanied by massive movement of birds. They congregate in the live bird markets and infected birds spread infection to healthy ones. When they get home, the live birds will mix for sometime with the home chickens thereby spreading the infection. The same observations were made by Saidu *et al.* (2006b) and Nwanta *et al.* (2006) in the Northern part of Nigeria where they reported increased movement of sick and healthy chickens in anticipation of various festivals like Sallah, Christmas and New Year. Most village chickens in the Eastern part of Nigeria are not vaccinated against ND. This makes them highly susceptible to infection whenever there is an outbreak. Those that have antibodies to ND may have acquired it after survival from an active viral infection or after being infected by mild lentogenic strains. Lack of awareness, small size of the flock, relative cost of vaccines, lack of cold chain system in the rural areas and unavailability of thermostable vaccines are limiting factors in the control of ND in village chickens.

**Conclusion/Recommendations:** We recognize one period of outbreak or prevalence of ND in village chickens in the Savannah derived Eastern part of Nigeria. This period falls within November and February which in the period of harmattan characterized by harsh environmental conditions. This epizootic in village chicken is easily noticed by the rural farmers while cases outside this period are not easily noticed. We also recognized lack of Veterinary awareness by rural poultry farmers as the cases reported fall far below the cases frequently witnessed in the field. We therefore recommend improved extension services to rural poultry farmers. We also recommend that this extension services should embrace vaccination programmes for rural poultry especially prior to outbreak periods. The importance of biosecurity should be explained to them and the need to quarantine any bird purchased before mixing with home chickens should be emphasized.

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