

## The Annual Prevalence of Newcastle Disease in Commercial Chickens Reared in South Eastern Savannah Zone of Nigeria

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**Abstract:** The prevalence of Newcastle disease, a viral disease of birds in commercial birds reared in South-Eastern derived savannah zone of Nigeria was studied for a period of 3 years. Two Veterinary establishments located within the zone were used in the study. Cases in commercial chickens that were reported, examined clinically and through Post mortem findings and confirmed through laboratory examinations to be Newcastle disease were recorded. Field visits to farms that were reported to have outbreaks of infection was done and after clinical, Post mortem and laboratory examination, cases that were confirmed to be Newcastle disease were also recorded. Results showed a high prevalence during the dry harmattan period of November to February and fairly high prevalence during the peak rainy period of June and July. The stress from environmental conditions associated with these periods of the year in Nigeria was suggested to be the major factor that initiates and worsens the disease condition at these periods of the year. The stress condition is thought to lower the immune systems of the chickens thereby making them succumb early to infection and therefore, leading to an outbreak. The use of antistress and rugged vaccinations just was recommended prior to these periods of the year in order to protect birds from infections.

**Key words:** Newcastle disease, chickens, examine, atmosphere, migratory birds, Nigeria

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### INTRODUCTION

Newcastle Disease (ND) is a viral disease of birds caused by a filterable virus Newcastle Disease Virus (NDV) which belongs to the family Paramyxoviridae (Alexander, 1997). It is a peracute, acute and sometimes subclinical contagious disease of poultry (Health *et al.*, 1991). ND is considered among the most important disease of poultry and outbreaks with mortality up to 100% are common (Alders and Spreadbrow, 2001; Saidu and Abdu, 2008). ND infection takes place through virus inhalation or ingestion and its spread from one bird to another depends on the availability of the virus in its virulent infectious form (Whiteman and Bickford, 1983) and its short incubation period of 5-6 days (Chansiripornchai and Sasipreeyajan, 2006). The disease usually affects the respiratory, gastrointestinal and nervous systems with common signs of listlessness increased respiratory rate, yellowish to greenish diarrhea and weakness followed later by prostration and death (Chansiripornchai and Sasipreeyajan, 2006).

The first documented outbreak of ND in Nigeria occurred between December, 1952 and February 1953 in and around Ibadan (Hill *et al.*, 1953). The disease has

since this time remained a notable problem in the country (Oladele *et al.*, 2002). Spreadbrow (1999) described Epizootic and Enzootic ND in village chickens as non self limiting event that can smoulder for several months, even years in a typical village housing one or two thousand birds. The same event also occurs in commercial chickens in Nigeria (Ezeokoli *et al.*, 1984). Spradbrow (1999) noted that epizootics occur when virus is introduced into a susceptible population with spectacular outbreaks and high mortalities which many cover whole villages or whole area within a short time. This form comes most readily to notice.

Enzootic ND occurs when the virus transmits slowly in a partially immune population such that there are few susceptible birds to maintain an outbreak and the occasional birds that die do not come to Veterinary and public attention. ND has become endemic in Nigeria in both, local and commercial poultry with annual epidemics recorded in highly susceptible flocks (Halle *et al.*, 1999; Saidu and Abdu, 2008) with pockets of outbreaks occurring in between the annual epidemic periods. Commercial chickens in Nigeria are exclusively exotic chickens which are reared intensively or semi-intensively.

The intensive system combines both battery cages and deep litter. In most parts of the country, the disease is seen and diagnosed throughout the year in those commercial flocks and the incidence varied with season. This research therefore investigated the seasonal prevalence of ND in commercial chickens in the South Eastern derived Savannah zone of Nigeria.

## MATERIALS AND METHODS

**Experimental design:** Two Veterinary establishments, one located in Nsukka Urban, Nsukka Local Government Area and the other in Obollo-Afor, Udenu Local Government Area were used for the study. Both towns are located in South East Savannah derived zone of Nigeria. The study was carried out for a period of 3 years starting from January, 2007-December, 2009. Two methods were used for recording cases: cases in commercial birds that were brought to both clinics examined and diagnosed to be ND were recorded and cases in farms observed during ambulatory visits to farms that were examined and diagnosed as ND were recorded. Cases were received from both local Government areas and its environs. Disease diagnosed in a flock or a farm was taken as a case outbreak. The cases recorded in the clinics and those captured during field visits were put together and classified on monthly basis. Diagnosis was based on clinical findings, Post Mortem (PM) lesions, virus isolation and serology.

**Clinical signs and PM lesions:** Birds that were presented life both in the clinic and in the field were examined for clinical signs of ND. Those that were presented dead and those that were sick which were sacrificed were examined for PM lesions of ND. The findings were recorded.

**Serology:** Haemagglutination Inhibition (HI) test was used to detect antibodies to ND in suspected birds. A live attenuated ND vaccine La Sota strain obtained from the National Veterinary Research Institute, Vom, Nigeria was the antigen used for the test. The antigen was titrated to obtain 4 HA units. About 3 mL of blood was collected aseptically from the wing veins of the suspected cases, put in a bijoux bottle and allowed to clot. The clotted samples were kept overnight in the refrigerator for the clot to retract and the serum harvested. The serum was used in the HI test as described by Allan and Gough (1974). For cases that were recorded in the farms, paired serum samples were used to detect active viral infection.

**Virus isolation:** Cloacal swabs were taken from the suspected cases into sterile bottles containing buffered saline and antibiotics. The samples were centrifuged at 3,000 rpm for 5 min and the supernatants were used to

inoculate 9-11 days old embryonated chicken eggs through the allantoic cavity route. The eggs were incubated for 48 h after which they were chilled and the allantoic fluid harvested. The allantoic fluids were test for Haemagglutination (HA) activity. The specificity was confirmed through (HI) test using ND hyper immune serum.

## RESULTS

**Clinical signs and PM lesion:** The clinical signs and PM lesions were valuable in preliminary diagnosis and were generally respiratory, circulatory, gastrointestinal and nervous in nature. These varied among the outbreaks with one or a combination of these signs and lesions. Common signs were loss of appetite, listlessness, weakness, huddling, cyanosis of the combs and wattles, swollen head and periorbital areas, soiled vent, yellowish-green diarrhea, paralysis of the wings and legs torticollis, sneezing, coughing and dyspnoea. Laying birds experience sharp and significant drop in egg production with birds laying aberrant misshaped and soft shelled eggs. PM lesions were predominantly inflammatory and haemorrhagic.

**Serology:** Medium to high antibody levels were detected in suspected cases and they were confirmed by virus isolation.

**Virus isolation:** NDV was isolated from birds that were recorded as positive cases.

**Outbreak:** The outbreaks in commercial flocks as were recorded on monthly basis for a period of 3 years in as shown in Fig. 1. The pattern was the same for the 3 years of the study.

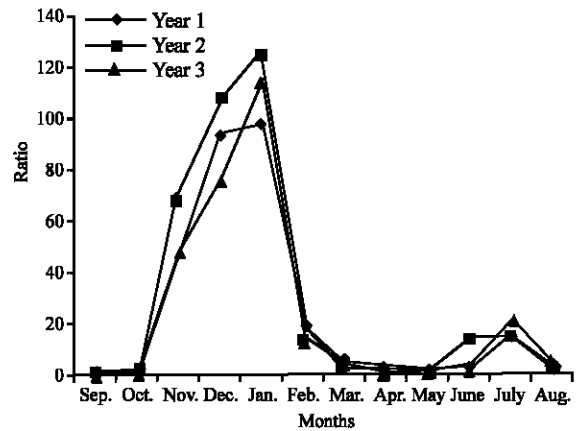


Fig. 1: The outbreak in commercial flocks for a period of 3 years

## **DISCUSSION**

The results of the above studies showed a high prevalence during the November-February period. Another relatively increased prevalence was seen during June-July period. We recorded low prevalence at periods outside the months mentioned above throughout the duration of the study. ND has been reported to be seasonal in many countries of the world with many reasons suggested to be responsible for this seasonality (Chabauf, 1990; Alders and Spreadbrow, 2001). In Nigeria the disease has been noted to be more common during the cold harmattan periods (Abdu *et al.*, 1992; Saidu *et al.*, 1994) and this is in agreement with the observations of high prevalence from November-February.

However, it was noted another period of low epizootic in commercial birds during peak rainy period of June and July in the South-East tropical savanna region of Nigeria. The epidemiology of ND in commercial chickens is fairly well understood with infected chickens being the usual source of virus transported mechanically either by fomites or by people (Alexander, 1988). Unlike local chickens which scavenge freely in a contaminated environment, most commercial chickens reared in Nigeria are kept in farms or backyard poultry either in cages or on deep litter. This makes contaminated food and water and contact between infected chickens the commonest modes of infection and spread. Stress associated with the harsh weather condition of the harmattan period has been suggested to worsen the outcome of the disease (Abdu *et al.*, 1992). Selye (1976) described stress as a non-specific response to internal and external stimuli that induce humoral changes resulting in depression of the immune system. The interaction between the immune system and the brain has been shown to play a significant role in the outcome of infectious disease especially viral disease (Ben-Nathan *et al.*, 1991). Human and animal studies have shown stress to commonly cause immuno suppression with changing production and activity of a wide range of immune system components (Cohen and Williamson, 1991; Peterson *et al.*, 1991).

The harmattan period of November-February in Nigeria is characterized by wind drop in ambient temperature, dryness and other harsh weather conditions and this is believed to lower the immune status of the birds making it possible for ND to manifest in commercial birds that have ordinary or lowered herd immunity to ND. This leads to outbreaks and spread of infection. Some strains of NDV cause respiratory lesion and signs and the cold weather may not only favour this but also help in the proliferation of respiratory pathogens; this consequently confidante the infection.

The dry and windy nature of the harmattan period facilitates the dispersion of infections particles in the environment and litter into the atmosphere in the form of dust. This may lead to increased infection of chickens through the aerosol route. Alexander (1997) noted the inhalation of infections viral particles suspended in the atmosphere as a major source of infection of birds. Chickens are highly susceptible to virus reaching the respiratory tract, though this may not be true for all the strains since strains vary in their tropism to different tissues and organs. Airborne viruses have been noted to travel long distances and airborne spread of 8-40 km has been reported (Hugh-Jones *et al.*, 1973; Kouwenhoven, 1993). Aerosol transmission is easier where there are large concentrations of chickens within an area such as commercial farms. Some migratory birds and birds of prey are more common during this period of harmattan and their role in the epidemiology of ND may be very important.

## **CONCLUSION**

The study revealed increased outbreaks during the peak rainy periods of June and July in commercial birds. We suggest that the reason for this may be that the active immunity acquired during the Nov-Feb, outbreak may have declined appreciably in these birds. The cold stress and high humidity of this period act as stress factors in the initiation of infection to ND; these lead to the increased pockets of outbreak observed in commercial birds at this period. Commercial birds that were revaccinated with potent vaccines prior to this period may not experience this outbreak. The frequent power outages coupled with poor information on the part of the farmers on vaccine procurement and handling makes vaccine failure a common phenomenon in Nigeria (Okwor *et al.*, 2009). The outbreaks are present on a yearly basis and depend on the season and factors as observed above play vital roles in the prevalence of ND in Nigeria.

## **RECOMMENDATIONS**

Researchers recommend that farmers should source and vaccinate their flocks with the help of Veterinarians prior to these periods. Movements in and around the farms should be restricted and biosecurity measures applied. Anti stress agents such as vitamins and minerals should be incorporated in poultry rations and drinking water as supplements during this period. Birds should not be exposed unnecessarily to cold.

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