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Full Length Research Paper

Postmortem incidence and trends of Newcastle disease lesions among chicken presented for diagnosis at Makerere University Central Veterinary Laboratory: A retrospective study

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In Uganda, endemic poultry diseases especially Newcastle disease (ND) presents an important limiting factor in the development of commercial poultry production and establishment of trade links. However, there was limited information about its incidence and trends. A retrospective study was conducted to determine incidence and trends of ND among chicken presented for post mortem diagnosis at Makerere University Central Veterinary Laboratory over a period of ten years (2002 to 2011). A total of 1,548 necropsy records were reviewed. Data was analyzed using statistical package for social sciences (SPSS-16) and Epi-info statistical packages. The total annual ND necropsy cases analysed generally increased from 2002 to 2011 with peaks in 2006 and 2011. Of the 1,548 birds presented, 362 were diagnosed with ND lesions representing an overall incidence of 23.4% over the study period. The frequency of ND was lowest (14%) in 2003 and highest in 2011 (32%). The total monthly cases peaked in the months of May and October. The wet season was possibly the most favourable for the transmission of viruses. However more studies are required to understand epidemiology of ND in Uganda.

Key words: Newcastle disease, postmortem prevalence, lesions, trends.

INTRODUCTION

Rural households in Uganda have kept poultry for many years basically on scavenging system of management. About 40% of the rural households keep chicken or other poultry in Uganda and rely on this for a significant portion of the dietary proteins in form of eggs and meat. On average, households keep flocks of between 6 and 20

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Table 1. Yearly incidence of ND.

Year	Samples analysed	ND (Incidence, %)
2002	159	24 (15)
2003	140	20 (14)
2004	160	25 (16)
2005	167	41 (25)
2006	156	44 (28)
2007	218	44 (20)
2008	172	50 (29)
2009	101	30 (30)
2010	114	33 (30)
2011	161	51 (32)
Total	1548	362 (23.4)

chickens excluding chicks and growers, with very few keeping over 50 birds. The total poultry population in Uganda was projected to be about 32.6 million birds in 2007 (Byarugaba, 2007). However, rearing losses are very severe. It is estimated that mortality of indigenous poultry under scavenging conditions is 70% and above in chicks up to 8 weeks of age (Kirunda and Mukiibi-Muka, 1992). In Uganda, endemic poultry diseases especially Newcastle disease (ND) presents an important limiting factor in the development of commercial poultry production and establishment of trade links (Ojok, 1993; Mukiibi-Muka, 1992; Byarugaba, 2007; Kugonza et al., 2008).

Newcastle disease is a viral poultry disease with perhaps the greatest economic impact world over (Hassanzadeh and Bozorgmeri, 2004). The ND viruses are in genus Avulavirus of family Paramixoviridae (Saiif et al., 2003). It is a zoonosis of domestic and wild avian species (Goff et al., 2012). Transmission can be incipient or through contaminated feeds, hatcheries, vectors and even humans (Katunguka, 2008). Viruses shed from chicken readily aerosolize to favour air borne transmission as well (Li et al., 2009). ND virus is highly transmissible in poultry with low antibody titer; herd immunity requires 85% coverage with a high antibody titre after vaccination (Van Boven et al., 2008). In most areas of Uganda, vaccination is haphazard, power supply is unreliable and yet the market has thermal unstable vaccines which depend on a cold chain. Newcastle disease, now endemic in most parts of Uganda, wipes out 60 to 100% of the birds when it strikes. Outbreaks continue even in vaccinated areas possibly because coverage is too low or the vaccination does not provide perfect immunity which could arise due to antigenic divergence between the vaccine strains and the circulating field strains (Van Boven et al., 2008; Dortmans et al., 2012). Farmers therefore sell many of the birds prior to such disease occurrence in order to avoid losses from the outbreaks. However, there is limited information about their prevalence and trends of ND in Uganda.

The aim of this study was to determine incidence and trends of ND among chicken presented for post mortem diagnosis at Makerere University Central Veterinary Laboratory over a period of ten years (2002 to 2011).

MATERIALS AND METHODS

Data on necropsy cases of diseases of poultry presented to the Makerere University Central Veterinary Laboratory for ten years (2002 to 2011) were considered for this study. ND was diagnosed based on flock history, clinical signs and post-mortem findings and histopathology. Figures recorded in the study period were obtained from 1,548 case files/registers and post-mortem reports of diagnosis of ND. The following clinical signs, based on history and observation, were considered: Greenish-dark diarrhea, edema of the head, especially around the eyes usually not involving the comb, a dark ring appearance around the eye ("black eye") especially in white chickens, drooping wings, torticollis, ataxia and sudden death. These postmortem findings were considered diagnostic of ND: Edema of the interstitial tissue of the neck, especially near the thoracic inlet; straw colored fluid in the trachea and esophagus; congestion and occasional hemorrhage in the trachea generally corresponding to the rings of cartilage; petechial and small ecchymotic hemorrhages on the mucosa of the proventriculus, usually at the base of the papillae and concentrated around the posterior and anterior orifices; edema, hemorrhage, necrosis and ulceration of peyers patches; edema, hemorrhage and degeneration of ovaries; severe atrophy of the bursa, spleen and thymus. Histopathological sections of lymphoid organs that showed necrosis and depletion of lymphocytes were diagnostic of ND. All the ND cases recorded exhibited lesions of the velogenic viscerotropic pathotype, the only pathotype reported in Uganda. The data was entered in Excel spread sheets awaiting further analysis. The distribution pattern of ND in those ten years was analyzed using descriptive statistics and statistical package for social sciences (SPSS-16) and Epi-info.

RESULTS

The total annual chicken necropsy cases analysed generally increased from 2002 to 2011, with peaks in 2006 and 2011 (Table 1). Of the 1,548 birds presented, 362 were diagnosed with ND lesions representing an overall incidence of 23.4% over the study period. The frequency of ND was lowest (14%) in 2003 and highest in 2011 (32%). The total monthly cases peaked in the months of May and October (Table 2).

DISCUSSION

The results indicated a gradual rise in total annual necropsy cases from 2002 to 2011 (Figure 1). This could most probably be attributed to the increasing trends of chicken production in Uganda (Byarugaba, 2007). In Uganda, there has been a rapid rise in poultry population

Table 2. Number of ND cases per month.

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2002	01	00	03	01	00	01	00	05	04	06	03	00	24
2003	01	01	00	04	02	02	04	00	01	01	02	02	20
2004	05	01	01	03	02	01	00	03	03	03	03	00	25
2005	01	02	04	03	03	02	02	04	05	05	06	04	41
2006	05	07	03	02	06	04	02	04	01	07	01	01	43
2007	00	06	01	03	05	03	06	01	05	04	05	05	44
2008	01	04	04	06	05	01	02	04	06	10	06	01	50
2009	00	02	03	05	04	03	02	01	03	03	01	03	30
2010	02	00	02	01	03	03	00	04	03	04	06	05	33
2011	10	03	08	04	06	02	04	03	01	04	03	03	51
Total	26	26	29	32	36	22	22	29	32	47	36	24	361

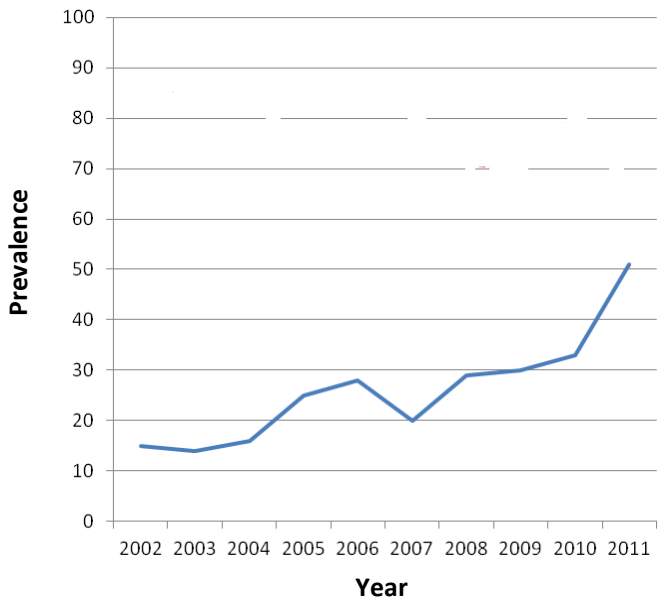

Figure 1. Trends in prevalence of Newcastle disease lesions among chicken presented for diagnosis in Makerere Veterinary diagnostic laboratory.

density which could have led to the increase in disease spread. This agrees with (Tarwater, 1999) who showed that the number of new infections is strongly related to the distribution of susceptible contacts. It is possible for the many apparently healthy birds to be carrying and spreading the various virus strains of ND (Iroegbu and Amadi, 2004). Mixed poultry keeping involving ducks and pigeons which are potential reservoirs of ND, free movement of birds by subsistence farmers and dealers without permits, lack of biosecurity measures in hatcheries, poor scheduling of vaccination programmes or even vaccine failure could be playing a significant role in epidemiology of ND in Uganda (Capua et al., 2002; Otim et al., 2006). It has been noted that the scheduling of vaccination determines the grade of protection against ND (Sheela and Rao, 2002). Worse still, even successful vaccinations may not guarantee protection against ND infection (Zhao et al., 2001). Birds may show high antibody titres and still succumb to infection for unknown reasons. Liberalization of drug import and use in Uganda could have resulted in haphazard handling of vaccines resulting in vaccine failure. Increased ND could also arise from vaccination against other diseases. Presence of antibodies against infectious bronchitis virus has been shown to reduce the immune response to Newcastle disease vaccine (Bunaciu et al., 1986; Sadrzadeh et al., 2007).

There was a rapid increase in ND cases observed from 2005 to 2006 and from 2010 to 2011. The signifi-cance of this finding is probably uncertain. However, the isolation of NDV from wild and migratory birds elsewhere (Alexander et al., 1989; Thomazelli et al., 2010) could point to introduction of the virus into the poultry popula-tion. This is particularly so because the necropsy cases were mainly from Kampala, Wakiso and Mokono which are located at the shores of L. Victoria, known for multiple species of wild and migratory birds. Recently, Kasozi et al., (2014) found a positive though not significant associa-tion between presence of migratory wild birds and risk for ND. These peaks also coincide with the period when presidential, parliamentary and local council national elections were held. Alesina et al. (1996) showed that political interferences increase the prevalence of poultry diseases. Therefore, it is plausible to argue that there could have been laxity in the vaccination programs due to political excitation.

Generally, ND vaccination levels are very low in Uganda. Despite the fact that 93.3% of smallholder poultry

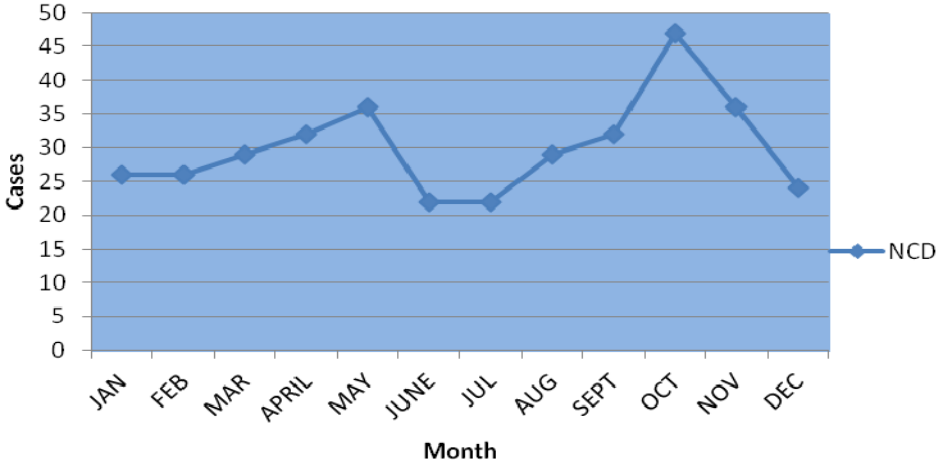

Figure 2. A graph showing total number of NCD cases per month.

poultry producers still keep their chicken under the free-range system, Amoki et al. (2009) revealed that only 28.2% of households vaccinated against ND.

Results showed that ND cases generally peaked up twice in the year in the months of May and October (Figure 2). It should be noted that Uganda experiences a climate pattern with two peaks of the wet season, the first from March to June and the second from August to November (RoU, 2007). Both ND peaks occurred in the wet season with high humidity and this could have been the cause of high cases observed. ND occurrence is reported to be higher during the rainy season (Yunus et al., 2009). Higher prevalence in the wet season could be associated with increased fly populations since flies can also transmit ND (Barin et al., 2010). However this result contradicts with Adamu et al. (2009) who reported highest disease occurrence in the dry season, this was possibly because of the longer survival time in the dry season (Otim et al., 2007). The results also contradict with Otim et al. (2007) who found no significant differences between the incidences in the rainy and dry seasons.

In conclusion, ND remains endemic in areas of Uganda with the incidence in an increasing trend. There is therefore need to do more study on the factors that could be influencing this observed pattern.

Conflict of interest

Authors do not have any conflict of interest.

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