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Research Article

An Investigation of Factors other than Climate Variables that Influences the Outbreak and Spread of Newcastle Disease

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Abstract: The study examined the factors other than climate that influence the outbreak and the spread of Newcastle disease in Suneka Division of Kisii County. The study used a descriptive design with both qualitative and quantitative approaches. The sample size was 200 households and respondents were poultry farmers. Veterinary officers were key informants. Primary data was collected using questionnaires and interview schedules. Secondary data on rainfall, temperature and relative humidity was collected from the Kisii meteorological station for 2007 and 2011. Data was analysed using measures of central tendency such as means and mode. They were presented using frequency tables. Other than climate, the research found other factors such as infected live birds and poultry products, contaminated poultry feeds and drinking water can influence the outbreak of ND disease. The research concludes that there is a relationship between climate variables and Newcastle Disease. The study recommended that Establish quarantine system to curb the spread of the disease and also establish a slaughter house to allow inspection. This will ensure that only healthy chicken are sold to consumers.
Keywords: Free range, Indigenous chicken, Newcastle Disease.

Introduction

According to Okwor and Eze (2011) Newcastle disease (ND), is one of the most significant diseases for poultry producers around the world. They argue that ND is influenced directly or indirectly by weather and climate. These may be spatial with climate affecting distribution or temporal with weather affecting timing of an outbreak and both relate to the intensity of an outbreak. Outbreaks are often associated with alternating heavy rainfall, drought and high temperatures (Perry *et al.*, 2002). According to Harvel *et al.*, (2002) the higher the temperatures, the higher the increase in the rate of development of certain pathogens or parasites that have one or more life cycle outside the animal host. This may shorten generation times and possibly increase the total number of generations per year leading to higher pathogen or parasite population sizes. ND is widely distributed throughout the world; in 2008, 73 countries reported presence of the disease to the Office of International des Epizooties (OIE, 2009). Additionally, numerous nations in Asia, Africa, Central America, and South America have endemic or frequent outbreaks caused by virulent Newcastle Disease Virus (NDV) and there are sporadic outbreaks of the virus worldwide (OIE, 2009). ND is the most serious epizootic poultry disease in the most low income food-deficit countries (LIFDCs). It occurs every year and kills on average 70% to 80% of the unvaccinated FRIC (Gueye, 2002). ND was enzootic in much of Africa and caused mortalities of all age groups from chicks to adults. Outbreaks of ND reported to World Animal Health information Database showed higher cases of ND outbreak in Ghana as compared to Kenya from 2005-2008 (Robyn, 2009).

In Suneka division, Kisii County poultry industry is the second in priority ranking in the livestock enterprise. Local birds are the most dominant (Ministry of Livestock Development, MOLD, 2008). This enterprise is always affected by seasonal outbreaks of ND which is commonly known as "*Omosando*" leading to greater economic losses to farmers due to its high rates of mortalities (MOA, 2010).

Diseased birds and in some cases dead birds are eaten and some farmers bury the remains after eating and non-eaten chicken in pits. In addition to this, farmers sell their birds as quickly as possible when the signs of ND appear. In Uganda, birds usually die during the dry season due to disease outbreak. Therefore, most farmers start selling off their stocks just before the dry season, often when the birds are in the incubated phase of ND (George, 1992). Farmers also take hygiene measures such as cleaning and disinfecting of poultry houses, observing personal hygiene when handling chicken such as removing shoes when entering poultry houses and washing hands before handling chicken. Other farmers also control parasites by deworming using traditional herbs such as garlic and administering drugs such as Ascarex D (Moreki, 2006). Some farmers also vaccinate their chicken using vaccines that are available at district and divisional veterinary offices and from local agro vets (Ondwassy *et al.,* 1999).

Other factors influencing the outbreak and spread of Newcastle Disease

Studies have revealed that the level of performance of poultry does not only depend on inherited capacity but also to a greater extent upon the environment (Campell and Lasley, 1975). Among the factors contributing to the endemicity of Newcastle Disease (ND) in free range indigenous chicken include the age structure and immunity, concurrent infections, environmental factors which facilitate the spreading of the virus and affect the susceptibility of birds. According to Byarugaba *et al.,* (2012), epidemiological factors that maintain the spread of the disease include: uncontrolled contact between birds from different background, frequent introduction of birds from the market, contact with wild birds and selling of sick birds during outbreaks.

Outbreaks of ND may also occur as a result of movement of infected live (caged) birds (Clavijo *et al.,* 2000), transmission from infected water fowl (Takakuwa, *et al.,* 1998), contaminated people or equipment, infected poultry products (meat, feathers, blood, faeces, bones and poultry scraps), contaminated poultry feeds, drinking water and vaccines (Alexander, 1997). However, the greatest risk of the spread of NDV comes from the movement of people and equipment. Due to the centralization of many processes in the poultry industry there is intensive traffic of personnel and vehicles (feed and chicken trucks, egg collectors, advisors, helpers, veterinarians and neighbours) moving from one flock to another (Kouwenhoven, 1993). Further, wild birds can be the source of ND in FRIC. In Nigeria *Velogenic*, *Mesogenic* and *Lentogenic* strains of NDV have been found in wild birds and these were considered reservoirs and a source of dissemination of the virus to susceptible village poultry (Olabode *et al.,* 1992). Also Hanson, cited by Higgins and Shortridge (1988), identified two wildlife reservoirs of NDV, chicken virulent NDV among migratory water fowl of temperate zones and chicken virulent NDV among tropical jungle birds. Other poultry species can also be infected with NDV and may play a role in the spread of NDV in intensively managed poultry. These birds include ducks, geese, turkeys, doves, guinea fowl and peacocks (Higgins and shortridge, 1988; Warner, 1989, Martin, 1992). In addition to this, animals such as dogs, cats, foxes and rodents shed their faeces 72 hours after having eaten infected fowl carcasses, thus they act as transient reservoirs of NDV due to their contact with village poultry and the village environment (White and Jordan, 1963).

Movement of people and equipment, movement of poultry products, contaminated feeds and water are probably the major source of infecting poultry. Farmers in Kenya try to sell their hens as soon as they show signs of disease (Musiime, 1992). This favours the introduction of NDV to other susceptible populations. The role of infected carcasses and poultry products are well recognised in the spread of disease in commercial poultry (Alexander, 1988).

In rural areas, sick birds are normally eaten by farmers and the viscera from birds fed to poultry, dogs and cats (Martin, 1992). The usual practice is to throw the viscera into the field where they are eaten by poultry and other animals, resulting in the spread of infection.

Methods

The study adopted a descriptive research design that aimed at determining the seasonal occurrence of ND in relation to the elements of climate. It incorporated both primary and secondary methods in gathering information on the effect of climate variables and other factors on ND in free range chicken in Suneka Division, Kisii County. The target population was small scale poultry farmers in Suneka Division. The area has a population of 66,303 people in 13,911 households found in three locations of Suneka Division (KNBS, 2010).

The research used simple random and purposive sampling methods. The randomly chosen locations were: Bomorenda, Iyabe and Riana locations of Kisii South. Further, the study divided the location into sub locations. Farmers were chosen using snow balling sampling technique with a sample of 200 farmers selected and shared among the respective locations in the sub county.

Primary data was collected from poultry farmers using questionnaires. Interview schedules were used for veterinary officers. Data was analyzed using measures of central tendency such as mean and mode. They were presented using frequency tables.

Findings and Discussions

Other factors that influence the outbreaks of Newcastle Disease

Other than climate, findings showed that there were other factors influenced the outbreak of ND. These included infected live birds, infected poultry products (meat, feathers, blood and faeces), contaminated poultry feeds and drinking water as the findings revealed (Table 1).

Table 1. Other factors that cause the outbreak and spread of ND

Other causes of ND	Frequency	Percent
Infected poultry products	26	13.0
Other animals	4	2.0
Infected live birds	167	83.5
All	3	1.5
Total	**200**	**100**

Thirteen percent of the respondents reported that ND was spread by infected poultry products; 83.5 percent by infected live chicken. This finding agrees with Byrarugaba *et al.*, (2012) who found that outbreaks of ND occur as a result of uncontrolled movement of live birds from different background. Two percent of the respondents reported that ND was spread by other animals such as dogs and cats and 1.5 percent all the above factors. It was found out that ND spreads throughout the flock through contact with the sick live birds when taking feeds and also staying together in the same room. The study revealed that ND spreads

faster when there are larger numbers of chicken because the contact rate with each other is very high than when they are fewer.

Chickens roam in the yard, around the boxes in the garbage in search of grain, greenery, crickets, termites, ants, insects and others. In the course of doing this, they can feed on feces put by dogs that had fed on dead chicken or on remains of sick chicken, which enhanced the quick spread of the disease. The research found out that sick birds were normally eaten by farmers and the viscera from birds were often fed to poultry, dogs and cats. The usual practice was to throw the viscera into the field for this purpose where they were eaten by poultry and other animals, resulting in the spread of infection. ND can spread very fast within the flock if fed with contaminated feeds. This ranges from food remains as these chickens scavenge for food freely in the environments. People on the other hand, can aid in the spread of the disease through visiting sick chicken houses and then visiting health chicken. Their shoes and clothes can aid in the spread of this disease. The introduction of new flocks without inspection to the existing flocks can also aid in the spread of the disease. Further, transportation of sick live chicken near healthy flock can also lead to spread of the disease since the disease is viral and can be spread via the inhalation of contaminated air.

Conclusion

The study concluded that, other than climate, other factors such as infected live birds and poultry products, contaminated poultry feeds and drinking water can influence the outbreak of ND disease. The research concludes that there is a relationship between climate variables and ND.

Recommendations

The government should employ more extension officers and decentralize veterinary offices to the sub-location levels so as to bring services to the farmer. This will enable farmers to get technical assistance without travelling long distances. The government also should Establish quarantine system to curb the spread of the disease and also establish a slaughter house to allow inspection. This will ensure that only healthy chicken are sold to consumers. Finally, the governments to provide frees drugs for vaccination and reduce the cost of feeds in order to reduce the cost of production for the poultry farmers.

Conflicts of interest

The authors declare no conflicts of interest.

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