

NEWCASTLE DISEASE OUTBREAK IN POULTRY FARM IN ZARIA, KADUNA STATE, NIGERIA: A CASE REPORT

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ABSTRACT

Newcastle Disease (ND) is an endemic viral disease that affects poultry production. Although, there is vaccine for the prevention of the disease, outbreaks of the disease are recorded in both vaccinated and unvaccinated flocks. This case report investigated the cause of high mortality in a flock of 17 weeks old pullets vaccinated against ND. The client presented history of high mortality, diarrhea and respiratory distress with poor feed intake in a flock of 20,000 pullets. The history of the case was obtained from the farmer. The farm was visited to observe the birds and the poultry house. The disease was diagnosed based on clinical signs, post mortem findings and haemagglutination inhibition (HI) test using known Newcastle Disease Virus (LaSota vaccine). The clinical signs observed in this case study were mortalities, depression, nasal discharge, respiratory rales, weakness, and diarrhea (perineum matted with greenish feces). Post-mortem findings were: mucus and hemorrhages on the trachea mucosa, petechial hemorrhages on tips of the glands of proventriculus, the heart was enlarged; heart muscle was congested with petechial hemorrhages on the epicardium, and haemorrhagic caecal tonsils, distended gall bladder, petechial haemorrhages in the duodenum, jejunum and ileum, congested kidney, liver and lungs. HI tests showed low NDV antibody titres suggesting that the birds were not protected against ND. The flock was managed by flushing and decontaminating the drinking line, administration of Gentylo and Amin'total, followed by re-vaccination using NDV LaSota vaccine. This treatment yielded favourable therapeutic results. The farmer was advised to flush his water pipes regularly and apply strict biosecurity measures in the farm.

Keywords: Haemagglutination inhibition test, Newcastle disease, Poultry, Vaccination,

INTRODUCTION

Globally, Newcastle disease (ND) is one of the most important viral diseases of poultry (Oladele *et al.*, 2008; Khorajija *et al.*, 2015). It is caused by an avian paramyxovirus type-1 (APMV-1), which belongs to the genus Avian Orthoavulavirus 1 (AOAV-1), subfamily Avulavirinae and family Paramyxoviridae (Walker *et al.*, 2019; Omeke *et al.*, 2024). The disease is associated with lesions in the respiratory, gastrointestinal and nervous

system of birds, affecting over 250 species of birds of all ages (Al-Habeeb *et al.*, 2013). Newcastle disease causes high morbidity and mortality rate, reduced egg production and excessive weight loss leading to high economic losses in poultry production (Owoade *et al.*, 2006; Van Boven *et al.*, 2008). The economic impact is not limited to loss of birds but also due to trade restrictions and embargoes placed on areas and countries where the outbreaks have occurred and

also due to immune suppressive effects (Ezema *et al.*, 2016). The World Organization of Animal Health (2023) classified Newcastle disease as a list A reportable disease because it is highly contagious and associated with high mortalities in susceptible birds. Many countries where poultry are raised commercially rely on vaccination to keep the disease under control (Okwor *et al.*, 2016). However, in spite of the significant advances in poultry vaccine production, outbreaks of ND have continued to occur in many farms in both vaccinated and unvaccinated flocks (Ezema *et al.*, 2009; Okpe *et al.*, 2015).

CASE HISTORY AND PHYSICAL EXAMINATION

Fifteen moribund pullets of 17 weeks old from the flock of 20,000 birds were presented to the Avian and Aquatic Unit of the Veterinary Teaching Hospital, Ahmadu Bello University Zaria, Kaduna State, Nigeria with the complaint of diarrhoea, weakness and breathing through the mouth. History of the flock revealed that the birds are in battery cage under intensive management and are fed grower mash (Chikun® Grower Mash).

The flock has received the required vaccinations and was up to date. At 16 weeks of age, the birds received LaSota vaccine (Newcastle disease vaccine) booster dose. One week later, the farmer observed respiratory distress and greenish diarrhea in about 75% of the flock. He administered Doxytyl® (Doxycycline) and multivitamin for three days. This had no positive effect as he had a total of 0.2% (40 birds) and 0.5% (100 birds) mortality rates on two consecutive days, respectively (Recast). And the day the case was reported, there was 0.6% (120) mortality rate. On arrival at the farm, the birds and their environment was examined. The clinical signs were: whitish and greenish diarrhea, somnolence, recumbency, depression, weakness, ruffled feathers, fever, and mouth breathing with respiratory rales. In the poultry house, there was no foot dip at the entrance of the pens, the inside of the water pipes was dirty with greenish coloration and some nipple drinkers were blocked and unable to dispense water.

DIAGNOSIS

Tentative Diagnosis was Newcastle disease, while Infectious bronchitis, Avian influenza and Colibacillosis were Differential Diagnoses.

CONFIRMATION OF DIAGNOSIS: Twenty birds were randomly selected from different section of the pen for blood sample collection. Three ml of blood sample was taken from the wing vein of each bird. The samples were taken to the Department of Veterinary Medicine, Avian Medicine laboratory, Ahmadu Bello University, Zaria for

Haemagglutination Inhibition (HI) test to detect antibody levels against Newcastle Disease (Orajaka *et al.*, 1999). This was repeated after one week (paired serum test) to compare the antibody titre level between the first and second sampling. Post-mortem investigation was also carried out on the moribund birds and freshly dead birds found in the farm on arrival.

MANAGEMENT

Following the confirmation of Newcastle disease, antibiotics and re-vaccination were recommended. Before the treatment commenced, the drinking pipeline was first decontaminated with HydroCare® (hydrogen peroxide solution), to flush the pipe and kill the micro-organisms in the pipeline. Thereafter, Gentylo® (Gentamicin 20% and Tylosin) was administered to the pullets at 100 g to 200 L of drinking water to treat opportunistic bacterial infection in the birds during the course of the disease. Amin'total® (Vitamins, Amino acid, electrolytes and minerals) was administered in drinking water at 50 g per 200 L of drinking water for 5 days. The birds were re-vaccinated using NDV (LaSota) while a few very weak ones were culled.

TABLE I: RESULT OF THE FIRST HAEMAGGLUTINATION INHIBITION ANTIBODY TITERS TO NEWCASTLE DISEASE VIRUS IN PULLETS RANDOMLY SELECTED FROM THE FLOCK

Sample Number	Identification	Haemagglutination Inhibition (HI) titre
	1	16
	2	32
	3	16
	4	16
	5	16
	6	16
	7	32
	8	32
	9	8
	10	32
	11	16
	12	8
	13	8
	14	32
	15	16
	16	32
	17	16
	18	32
	19	8
	20	16

RESULTS

The post mortem examination revealed mucus and hemorrhages on the trachea mucosa (Figure I). Petechial haemorrhages on tips of the glands of proventriculus (Figure II). The heart was enlarged, congested, with petechial hemorrhages on the epicardium (Figure III). The duodenum, jejunum, ileum and cecal tonsil are haemorrhagic. The gall bladder distended; while the kidney, liver and lungs were congested. For the HI test, in the first sampling, the antibody titre levels of 13 samples out of the 20 samples were below 1:16, while 7 samples have their value at 1:32 (Table I). The result of the second HI test showed a higher antibody level in all the samples collected (Table II). All the samples had a HI titre above 1:64 (Table II).

DISCUSSIONS

The findings from the post mortem examination are highly suggestive of Newcastle disease which corresponds with the findings of Dhaygude *et al.*, (2017) and Omeke *et al.* (2024). The results of low NDV antibody-levels by HI test suggest immunosuppression of the flock to Newcastle disease (Lera, 2021). Although the birds were vaccinated a week before the onset of the clinical signs, it could be assumed that the vaccination was not successful due to the low HI titres indicating low level of antibodies making the birds prone to infection (Table I). However, a second serum HI test conducted after one week showed a heightened antibody titre level (Table II) confirming Newcastle Disease.

The nipple drinkers were clogged with dirt which may have led to vaccine failure. Study by Raghul *et al.* (2006), reported that HI antibody titre 32 to 64 were protective when derived through secondary vaccination only. Therefore, to prevent mortality against NDV, vaccination should produce titer of at least 16 (OIE, 2004). Most birds in the flock had lower antibody titers. This could probably explain the mortalities observed in this flock. For adequate immune-competence, higher HI titre above 1:256 is greatly encouraged to prevent mortalities of the birds (Raghul *et al.* 2006).

There is no treatment for Newcastle Disease, although vaccination has been reported to be a treatment in cases of disease outbreak (Ezeasor *et al.*, 2024). This leads to the development of stronger immune response to fortify the animals, while the very weak ones may die due to the overwhelming immune response. This strategy is very therapeutic and saves the cost of heavy medication and continuous mortality of the weak birds. Also treatment with antibiotic is recommended to control secondary bacterial infections (Siddique *et al.*, 2012; Ezeasor *et al.*, 2024). Amin'total® contains multivitamins, minerals, trace

elements and amino acids, which serves as nutrient supplement and immune boosters.

Studies have reported that use of multivitamins as immune boosters enhances immune response against ND in immunosuppressed birds (Muhammadamin and Qubih, 2010).

TABLE II: RESULT OF THE SECOND HAEMAGGLUTINATION INHIBITION ANTIBODY TITERS TO NEWCASTLE DISEASE VIRUS IN PULLETS RANDOMLY SELECTED FROM THE FLOCK

Sample Identification Number	Haemagglutination Inhibition (HI) titre
1	64
2	128
3	128
4	64
5	256
6	512
7	128
8	1024
9	256
10	64
11	512
12	512
13	256
14	1024
15	128
16	64
17	512
18	256
19	128
20	256

CONCLUSION

Newcastle disease was diagnosed and confirmed using the HI test. The cause of the outbreak could be due to inadequate vaccination of the pullets due to blocked nipple drinkers from the water pipeline.

The outbreak was managed with antibiotics (Gentylo), multivitamin (Amin'total) and La Sota re-vaccination. There was great improvement after the treatment as the mortality stopped and the vigor, feed intake and weight of the birds improved greatly within 5 days of intervention.

The farmer was advised to maintain regular cleaning of drinking lines and apply strict biosafety measures.



Figure I: Trachea showing presence of mucus (yellow arrow) and hemorrhages (blue arrow) on the trachea mucosa



Figure II: Proventriculus showing petechial hemorrhages (purple arrows) on tips of the proventricular glands

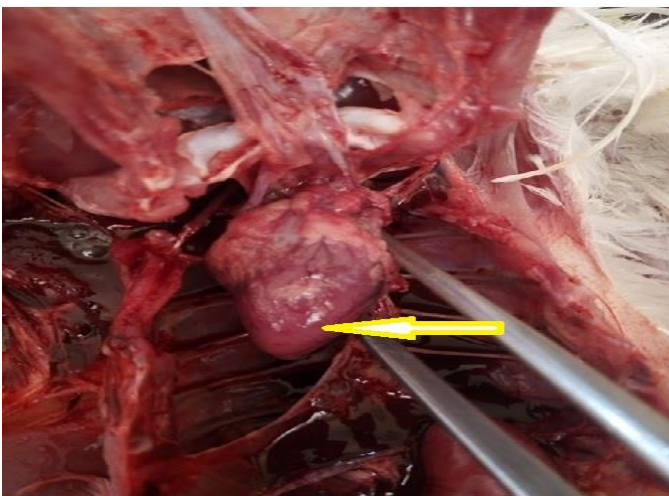


Figure III: Picture of the heart is swollen apex with petechial hemorrhages on the epicardium (yellow arrow) and heart muscle is congested

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