Case report

A Case of Newcastle Disease and Avian Colibacillosis Co-infection in 4-week-old Broilern Flock in Maiduguri, Nigeria

Abstract

Newcastle disease (ND) and Avian colibacillosis (AC) outbreak occurred in a 200-bird commercial broiler flock in Maiduguri, Nigeria. Despite vaccinations, the flock experienced a 60% morbidity and 45% mortality rate. Symptoms observed in the bird's included weakness, inappetence, diarrhea, nervous signs, and emaciation. Laboratory tests confirmed ND and AC infections. The outbreak highlights the economic impact of these diseases on the poultry industry in Nigeria. Recommendations include improved biosecurity measures, regular vaccination, and timely treatment of secondary bacterial infections. Public health concerns also arise due to the zoonotic potential of ND. Further research is needed to investigate vaccine failures and develop more effective prevention strategies.

Keywords: Newcastle disease; Broilers; *Escherichia coli*; economic losses; Poultry; Zoonosis

Introduction

Newcastle disease (ND) and avian colibacillosis are common infections in poultry. The disease combinationis implicated in high cost of treatment, mortality and production cost in the poultry industry (Landman *et al*., 2017; Yehia *et al*., 2023). Newcastle; caused by avirus of the family paramyxoviridae. The virus is divided into five different pathotypes; neurotropic velogenic which causes hemorrhagic lesions in the gastrointestinal tract (GIT) of chicken; neurotropic velogenic strain that is responsible for respiratory and nervous signs is the leading cause of high mortality in birds. Mesogenic strain causes mild respiratory illness and low mortality. Others include lentogenic and asymptomatic enteric strains (Malik *et al*., 2021). Newcastle disease is highly contagious and is transmitted via aerosol, water, feeds and contact with infected birds. The disease is endemic in Nigeriaand the economic losses due to ND in Nigeria was estimated at 1.4 billion Naira (estimate, 10 million Dollars). Representing major economic losses in the poultry industry (Salihu *et al*., 2013).

On the other hand, Colibacillosis is a disease syndrome caused by *Escherichiacoli* (*E. coli*). It is the most commonbacteria disease of birds. Colibacillosis is often associated with viral coinfection (Nolan *et al*., 2013; Shehata *et al*., 2024). Colibacillosis and viral coinfectionsare difficult to diagnose and treat or manage (Shehata *et al*., 2024). *E. coli* infection is one of the common causes of high economic bacterial disease of poultry Worldwide, young birds and immuno-compromised birds are the most susceptible (Shehata *et al*., 2024). The occurrence of Newcastle diseases and colibacillosis coinfection are limited. Moreover, the ND and AC bear significant economic losses (Solomon *etal*., 2012). This reportdiscusses the clinical and microbiological characteristics of ND and AC in a four-week-oldbroiler flock in Maiduguri, Nigeria.

Case Presentation

Case History:

The study was carried out in a 200 commercial broilers poultry flock. The birds were reported to have been vaccinated against ND using ND LaSota vaccine, Infectious Bursal disease (IBD) using IBD (Gumboro) vaccine and Marek'sdiseases at day 1 week 2, and 3 respectively.The case was reported to the University of Maiduguri Veterinary Teaching Hospital on 27thMay 2023. The

birds were reared under all-in, all-out system. The birds were transferred from one pen to another to create room for space because of the increase in the size of the birds and for new arrivals. The old pen was slightly larger than the current pen.

About three days after the birds were transferred, the flock attendants noticed that the birds had become weak. Inappetence, some had greenish/whitish diarrhea (Figure 1) with nervous signs. At day 2, 60 out of the 200 birds had died. At the 3rdday 100 of the 200 birds had died. All the birds showed sign of sickness, the farmer administered some antibiotics combinations, but the mortality continued.

Upon physical examination, it was noticed that the birds hadsoilvents, emaciation, some had torticollis with diarrhea while others had diarrhea only. The feathers were roughed with signs of severe dehydration (panting, Lethargy, Pale wattle and combs).Postmortem lesion observed include congested lungs and trachea (Figure 2), pinpoint hemorrhages at the caeca tonsil and small intestine (Figure 3). The case was tentatively diagnosed as Newcastle based on clinical investigation, postmortem examination, history and farm visit.

Figure 1: Greenish Diarrhea (A) with Soiled Vent (B) in a Broiler Chicken

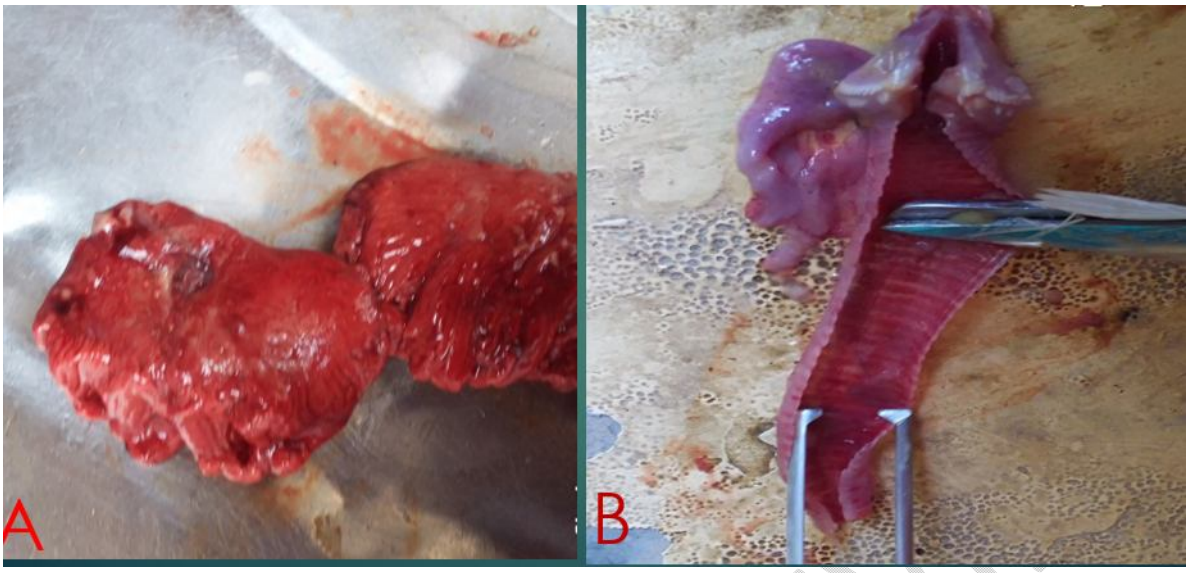

Figure 2: Post-mortem lesions showing congested lungs, and trachea of the affected broiler chicken

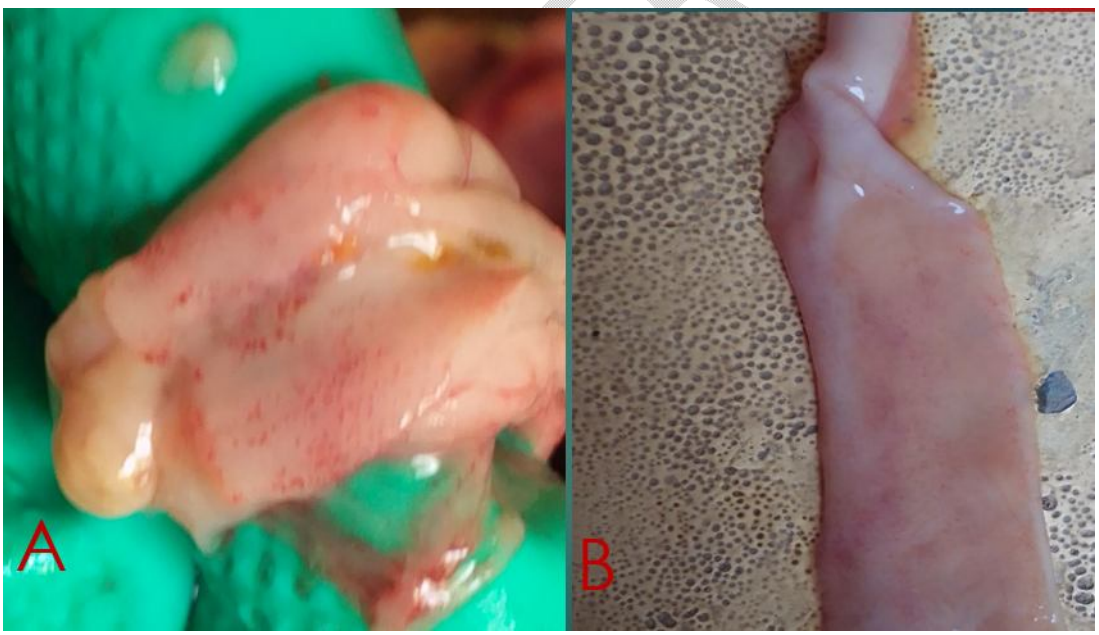

Figure 3: Pinpoint hemorrhages at the caeca tonsil (A) and intestine (B) in the affected Broilers

Laboratory investigation

Pulled trachea, cloacalswab and blood samples were collected from affected chickens. Virus transport media (VTM) was used to stock the sample for about 12 hours before processing. The samples were divided into two, one part was transported to the Veterinary microbiology laboratory for bacteriological investigation while the remaining partswere transported to virology laboratory, University of Maiduguri for serological test. Bacteriological teststhat were conducted included Gram's staining, culture, biochemical identification and antimicrobial susceptibility testing (AST).Virology tests include hemagglutination incubation (HI) and Hemagglutination (HA) tests (Figure 4).

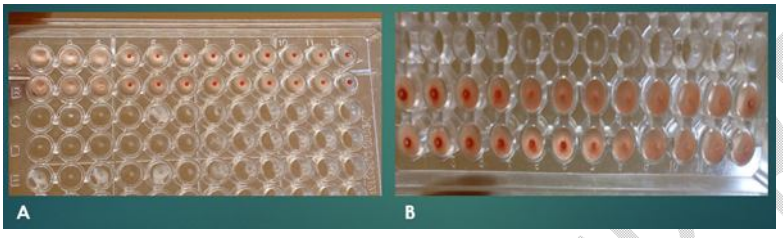

Figure 4: Haemagglutination (A) and haemagglutination inhibition (B) titre plates

Results and Discussion

Based on epidemiological investigation, the morbidity rate at the farm was 120/200 (60%), the mortality rate was 90/200 (45.0%). The results showed that the epidemiology of Newcastle disease (ND) in this case was comparable to the average rate in commercial poultry breeds in Nigeria (Lawal *et al*., 2015) previous report in unvaccinated chicken could reach 100% mortality (Abdul *et al.*, 2006). In Nigeria, the mortality among exotic breeds could range from 40-80% (Saidu *et al* 2006).Newcastle disease in among the diseases listed as a notifiable disease in the OE list (Stear, 2005;Ashraf & Shah, 2014). In this report, we identified ND by Hemagglutinations and, Hem inhibition (HA, HI)test and isolation of *E coli*from six weeks old broilers presented with diarrhea and nervous signs.

The birds were kept in residential areas. This may present serious public health concerns. NDV can cause mild conjunctivitis because of zoonotic transmission through aerosols, contact with mucous membrane and other routes from an infected birds to susceptible or immune-compromised humans (Fadiga *et al*., 2013).

Newcastle coinfection with pathogenic *E. coli* may present severe outcome. Hence, we recommend prompt action against secondary bacterial infection. Also, antimicrobial susceptibility testing is recommended to achieve effective treatment and minimize emergence of resistant strains (Ejeh *et al*., 2017).

The identification of NDV antigen in a vaccinated flock present serious economic and veterinary challenge. The possible explanations for this observation may be because of break in cold chain, antigenic variation, and reversion to virulence (Solomon *et al*., 2012). therefore, we recommend further study to identify the cause of vaccine failure or the non-protection by vaccine observed in this report.

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