

## Colibacillosis in a 5- week-old broiler flock – case report

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### ABSTRACT

Avian colibacillosis caused by avian pathogenic *Escherichia coli* (APEC), is a localized or systemic infection manifesting in several ways including acute fatal septicemia, hemorrhagic septicemia, swollen head syndrome, coli granuloma, salpingitis, peritonitis, omphalitis and enteritis. A farmer with one hundred, five-week old broilers complained of reduced feed and water intake and dullness of some of the broilers. He also reported that the broilers had earlier been administered both LaSota and Infectious bursal disease vaccinations. On a visit to the farm some of the birds were examined and post mortem examination carried out on one dead bird and one sick bird. Cloacal swabs were collected from 10 broilers selected randomly in the pen for microbiological examination. The samples were cultured, incubated aerobically, then were sub-cultured on Eosin-methylene blue (EMB) agar and incubated again at 37°C for 24 hours. The colonies were gram - stained following standard procedures. Preliminary identification of the isolate was done using morphological (colonial and microscopic) characteristics, while further identification was done by conducting biochemical tests such as Triple sugar iron fermentation, Indole and Simons citrate test following standard methods. Antimicrobial sensitivity test (AST) was conducted to help in the choice of drug for treatment. Results revealed that some of the broilers were anorexic, dull and depressed. Post mortem examination revealed hemorrhagic septicemia, air sacculitis and enteritis while the culture and biochemical results identified the isolates as *Escherichia coli* (*E. coli*). The AST results showed that the isolates were susceptible to cefotaxime, Amoxicillin-clavulanic acid and resistant to ceftazidime, aztreonam and meropenem. Based on these results, amoxicillin-clavulanate was recommended to be administered at the dose of 0.5 g/L in drinking water for 5 - 7days. The farmer was advised to maintain strict biosecurity measures in and around the farm and to get a better source of drinking water for the birds.

**Keywords:** Avian colibacillosis, avian pathogenic *Escherichia coli* (APEC), broilers.

### INTRODUCTION

Avian colibacillosis caused by avian pathogenic *Escherichia coli* (APEC), is a localized or systemic infection manifesting in several ways including acute fatal septicemia, hemorrhagic septicemia, swollen head syndrome, coligranuloma, salpingitis, peritonitis, omphalitis and enteritis (Panth, 2019; Nolan & Logue, 2024). It has been reported that avian colibacillosis is a major bacterial infectious disease of poultry of all ages, worldwide, constituting a significant economic impact on poultry production. It has also been reported that clinical APEC results due to stress caused by infections such as *Newcastle disease virus*, *Infectious bursal disease virus*, *Infectious bronchitis virus*, *Mycoplasma* infection and environmental influences like ammonia, dust on farms, temperature and humidity (Kabir, 2010). Most strains of *E.coli* do not cause diseases. When disease occurs, clinical findings observed include colisepticaemia and yolk sac

infection in young chicks; peritonitis and coligranuloma in adults (Vegad, 2015). Potential risk factors for APEC include rodents, flies, insects, and contaminated water (Vandekerchove *et al.*, 2004). Avian colibacillosis is often resistant to many antibacterial agents which is a major concern in poultry production. Furthermore, Nawaz *et al.* (2024) reported that new investigations have implicated APEC as a possible foodborne zoonotic potential.

### CASE REPORT

#### HISTORY

A farmer with one hundred, five-week old broilers visited Blossom Veterinary Clinic, Ahieke, Umuahia with the complaints of reduced feed and water intake, and dullness of some of the broilers. The farmer reported that the broilers had earlier been administered with both LaSota and Infectious bursal disease vaccinations.

On the visit to the backyard-farm in Umuhute, in Umuahia North Local Government Area, the following clinical signs were observed; in-appetence, dullness, depression and mortality.

### MANAGEMENT

Cloacal swabs for microbiological examination were taken from 10 broilers selected randomly from the pen. The cloacal swabs were kept in a cool box and taken to the Laboratory of Department of Veterinary Microbiology, Michael Okpara University of Agriculture, Umudike (MOUUAU) for analysis. The samples were cultured on MacConkey (MCA) agar and incubated at 37°C for 24 hours, aerobically. They were sub-cultured on Eosin-methylene blue (EMB) agar and incubated at 37°C for 24 hours. Then colonies were gram - stained following standard procedures. Preliminary identification of the isolate was done using morphological (colonial and microscopic) characteristics, while further identification was by conducting biochemical tests (Triple sugar iron fermentation, Indole and Simons citrate tests: Quinn and Markey, 2003).

Post mortem examination was conducted on 1 dead and 1 sick bird.

### ANTIMICROBIAL SENSITIVITY TEST

Antimicrobial sensitivity test (AST) was conducted following disc diffusion procedure (Bauer *et al.*, 1966). Five antibiotic discs (MAST) consisting of 4 antibiotic classes were used: Amoxicillin/Clavulanic acid ( $\mu\text{g}$ ), Meropenem ( $\mu\text{g}$ ), Cefotaxime ( $\mu\text{g}$ ), Ceftazidime ( $\mu\text{g}$ ), Aztreonam ( $\mu\text{g}$ ). For each antibiotic disc and for each isolate, the test was performed in triplicates and means of the inhibitory zone-diameters (IZD) calculated. The isolates were classified as Susceptible, Intermediate and Resistant, to each of the tested antibiotics following the Clinical Standard Laboratory Institute (CLSI) (2020) criteria for aerobic isolates. The antibiotic eventually prescribed for treatment was based on results of the AST.

### RESULTS

#### PHYSICAL EXAMINATION

The following clinical signs were observed- inappetence, dullness, depression and mortality (1%).

#### POST MORTEM EXAMINATIONS

Post mortem examination revealed haemorrhagic septicaemia., air sacculitis and enteritis.

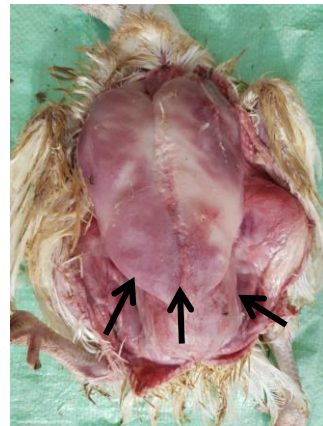
#### DIAGNOSES

Tentative diagnosis was Colibacillosis

Differential diagnoses were Newcastle disease and Salmonellosis



**Figure I: Depression due to Avian colibacillosis**



**Figure II: Haemorrhagic Septicaemia in a case of Avian colibacillosis (black arrow)**



**Figure III: Air Sacculitis in a case of Avian colibacillosis**

#### LABORATORY FINDINGS

From all the cultured samples, growth on MCA were pure cultures of discrete, circular, smooth pinkish colonies, indicating a lactose fermenting organism. On EMB, colonies showed a greenish metallic sheen appearance, inculcating *E.coli*. Microscopically, the isolates from MCA and EMB were gram-negative rods arranged singly or in pairs.

Biochemical tests revealed that all isolates fermented lactose and glucose, produced gas and indole but did not utilize citrate. Based on these characteristics, the isolates were identified as *E.coli* (Quinn and Markey, 2003).

The AST result showed that isolates were susceptible to cefotaxime, amoxicillin-clavulanic acid and resistant to ceftazidime, aztreonam and meropenem.

Colibacillosis was confirmed.

### TREATMENT

Based on these result, amoxicillin-clavulanate was recommended to be administered at the dose of 0.5 g/L in drinking water for 5 - 7days. The farmer was advised to maintain strict biosecurity measures in and around the farm and to get a better source of drinking water for the birds.

### DISCUSSION

The fact that pure cultures of *E.coli* were isolated from all samples is confirmation of colibacillosis in the farm (Nolan, 2013). The clinical signs observed in this case have also been reported in Newcastle disease and salmonellosis. Therefore Salmonellosis and Newcastle disease are differential diagnoses to Colibacillosis (Hassan et al., 2010 and Miller, 2014). Though *Salmonella* also grows on MCA it produces colourless (non-lactose fermenting) colonies while Newcastle disease is a viral disease and does not yeild any growth on artificial media. Resistance of the isolate to three classes of antibiotics tested (ceftazidime – cephalosporins, aztreonam – monobactam, meropenem –carbapenem) is a proof that the infection is multidrug resistant. This may be due to exposure of the birds to various antibiotics during brooding. The birds could have contracted the organism through ammonia build up in the pens, or inhaled dust. Ammonia induces immunosuppression leading to infections by opportunistic organisms such as *E. coli* (Charlton, 2006). Based on this result, amoxicillin-clavulanate was recommended to be administered at the dose of 500 mg/L in drinking water for 5 -7 days. Broad spectrum antibiotics such as sulfa drugs, gentamicin and Ciprofloxacin are commonly used for the treatment of colibacillosis (Singh et al., 2011) but because of several reports of multi drug resistant nature of colibacillosis, Antibiotic sensitivity test was conducted and the most sensitive (amoxicillin- clavulanate - based) drug was chosen for the treatment of the flock. To avoid ammonia build up in the farm premises, there is need for constant change of litter and good ventilation. The pens in this case were unkempt and the litter due to have been packed and replaced as a strong stench was perceived on visit to the farm.

The farmer was advised to maintain strict biosecurity measures especially in the area of supply of clean drinking water and to avoid ammonia build up by regular cleaning and change of litter.

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