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## *Pasteurella* spp. infection in a flock of layer chickens in Osun State

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### Abstract

Pasteurellosis, also known as fowl cholera, is a highly contagious and economically significant bacterial disease of poultry, particularly chickens. This report presents a case of *Pasteurella* spp. infection in a commercial layer chicken farm in Osun State, Nigeria. A flock of 7,500 ISA Brown pullets bought at 14 weeks developed acute mortality (73 dead within a week) and reduced egg production approximately ten weeks (24 weeks old) after being introduced to the farm. Post-mortem examinations, bacteriological analyses, and antibiotic sensitivity tests identified *Pasteurella* spp. as the primary pathogen. Abnormalities in the birds included a congested liver, cloudy air sacs, pale combs with dry shanks, peritonitis, haemorrhage at the proventriculo-gizzard junction, and egg retention. Bacteriological analysis showed heavy growth of *Pasteurella* spp. from pooled organ samples (liver, heart, spleen, lungs, and tracheal swabs). Antibiotic sensitivity test revealed that the organism was very sensitive to streptomycin, neomycin, intermediate sensitivity to enrofloxacin, gentamicin and colistin and resistant to tylosin, ciprofloxacin, and amoxicillin. The outbreak was successfully managed through antibiotic therapy based on antibiotic sensitivity test (Penprovit, a combination of penicillin, streptomycin and vitamins by Kepro, Holland) was administered at 100 g/150 L of drinking water for 7 days, combined with improved and enforced farm biosecurity, with full recovery of flock productivity three weeks after the treatment. This case highlighted the importance of incorporating fowl cholera into the flock's health program as a preventative measure, routine antimicrobial susceptibility testing (AST) to inform rational antibiotic use and biosecurity protocols on farms to be regularly reviewed and strictly enforced.

**Keywords:** Antibiotic resistance, Biosecurity, ISA Brown, Layers, Nigeria, *Pasteurella* spp., Poultry health

### Introduction

Pasteurellosis, also known as fowl cholera, is a highly contagious and economically significant bacterial disease of poultry, particularly chickens. The disease

occurs in both acute and chronic forms, with the acute form often resulting in sudden death without any prior clinical signs, while the chronic form may

present with localized infections such as swollen wattles, respiratory distress, lameness, and conjunctivitis (Khair *et al.*, 2023). It affects birds of all ages but is more severe in adult birds. Studies in Nigeria have reported varying prevalence rates for pasteurellosis in different animal species. For example, Yakubu *et al.* (2015) in a study in Jos found a 6.4% prevalence of avian pasteurellosis. Another study reported a 4.7% overall prevalence in Zaria from 2001 to 2005 (Raji *et al.*, 2010). The primary *Pasteurella* organism found in pasteurellosis in chickens in Nigeria is *Pasteurella multocida*, specifically serotypes A: 1, 3 and 4 (Raji *et al.*, 2010; Yakubu *et al.*, 2015). *Pasteurella multocida* is a small, gram-negative, facultative anaerobic coccobacillus commonly implicated in pasteurellosis, a significant disease affecting poultry and other livestock. The bacterium may also persist in the environment under favourable conditions, further complicating control efforts. Risk factors such as poor sanitation, inadequate ventilation, high stocking density, and compromised immunity (due to other infections or stress) can predispose birds to infection (OIE, 2021). Diagnosis of pasteurellosis is based on clinical signs, gross lesions at necropsy such as hepatomegaly with necrotic foci, pericarditis, and peritonitis and confirmation through bacteriological culture and molecular techniques (Ghaly *et al.*, 2017). The rise in antimicrobial resistance (AMR) among poultry pathogens has made routine sensitivity testing an indispensable part of modern veterinary practice. *Pasteurella* spp. has shown variable sensitivity to commonly used antimicrobials, including tetracyclines, sulfonamides, and fluoroquinolones (Shivachandra *et al.*, 2004). Without proper sensitivity testing, empirical treatment may fail, leading to prolonged outbreaks, economic losses, and selection for resistant strains. This underscores the importance of conducting antimicrobial susceptibility testing (AST) before initiating treatment, as it ensures the use of the most effective antibiotics, reduces treatment costs, and helps in preserving the efficacy of existing drugs.

## Case Presentation

### Case history

A commercial poultry farm in Osun State acquired 7,500 14-week-old ISA Brown pullets. According to the vendor's history, the birds had been vaccinated against Marek's disease (HVT FC-126 strain), infectious bursal disease (Gumboro disease), Lasota Newcastle disease, and fowl pox (Izovac). The birds were housed in a battery cage and were provided

with water from a borehole and fed with commercial layer feed (Topfeed by Premier Feeds Ltd. Nigeria, No 1, Eagle Flour Road, Ibadan). Approximately ten weeks post-introduction, the farm began experiencing increased mortality, ultimately losing 73 birds within a week. Clinically, the sick birds within flock exhibited signs including sudden death, a noticeable drop in egg production, pale combs, and lethargy. These observations prompted the submission of samples (4 birds, 2 morbid, 2 dead) to a veterinary diagnostic laboratory under the code ACSKNL/IFE/2024/118. The laboratory performed postmortem examination, bacterial culture and isolation as well as antimicrobial sensitivity test. The antimicrobial sensitivity testing is important to determine the specific drug to be administered which would be efficient for treating the disease.

### Laboratory examination

The necropsy findings revealed congested liver, cloudy air sacs, pale combs with dry shanks, peritonitis, haemorrhage at the proventriculo-gizzard junction, and egg retention. These findings were indicative of a systemic infection, with evidence pointing to involvement of the reproductive tract. The differential diagnoses were subclinical Newcastle disease, salmonellosis, and pasteurellosis.

**Laboratory findings:** Microbial culture on blood agar showed a heavy growth of *Pasteurella* spp. from pooled organ samples (liver, heart, spleen, lungs, and tracheal swabs) confirmed the diagnosis by the commercial Laboratory.

**Antibiotics sensitivity test:** The organism was sensitive to streptomycin, neomycin, intermediate sensitivity to enrofloxacin, gentamicin and colistin and resistant to tylosin, ciprofloxacin, and amoxicillin (Table 1).

## Management

### Therapeutics

Streptomycin-based preparations (Penprovit, a combination of penicillin, streptomycin and vitamins by Kepro, Holland) were administered at 100 g/150 L of drinking water for 5–7 days. Livertonic (Superliv a herbal supplement by Zenex, India) was added at 100 ml/100 L for hepatic support.

**Biosecurity:** Tanks were washed and water lines were desludged using Isochlor tablets (1 tab/20 L, Animal Care, Nigeria). Strict biosecurity was reinforced across the farm. A footbath containing freshly prepared disinfectant was placed at the entrance of each pen, and movement of personnel from other sections of the farm into the pens was strictly restricted.

**Table 1:** Antibiotic Sensitivity Testing (AST)

Antibiotic	Sensitivity	Zone of Inhibition (mm)	Interpretation
Streptomycin	Sensitive	22	Effective
Neomycin	Sensitive	20	Effective
Enrofloxacin	Intermediate	20	Moderately effective
Gentamicin	Intermediate	13	Limited effect
Colistin	Intermediate	13	Limited effect
Tylosin	Resistant	<14	Ineffective
Ciprofloxacin	Resistant	—	Ineffective
Amoxicillin	Resistant	—	Ineffective

### Outcome

Mortality ceased from 73 birds that died within a week during the outbreak. During the treatment, mortality reduced to 25, a week after the treatment no mortality was recorded. The egg production started two weeks before the outbreak and was at 10%, it went down to 6% and a week after the treatment, egg production went back to normal before outbreak and went up after.

### Discussion

This case illustrates the pathogenic potential of *Pasteurella* spp. in commercial layer operations, particularly in the absence of targeted vaccination against fowl cholera. While routine vaccinations were administered, the omission of pasteurellosis vaccination may have predisposed the flock to infection. The clinical signs and necropsy findings in this study are in consonance with those reported by Mbuthia *et al.* (2011) in pasteurellosis cases in poultry. Necropsy findings in the affected chickens were consistent with the clinical signs observed in the sick birds. Congestion of the liver was prominent, indicating septicemia and systemic spread of the infection, which correlates with clinical signs such as sudden death, anorexia, and lethargy. The presence of cloudy air sacs suggested air sacculitis, supporting the observed respiratory signs including sneezing, coughing, and labored breathing. Pale combs and dry shanks were indicative of poor perfusion and dehydration, reflecting the birds' depressed state and reduced activity. Peritonitis observed during necropsy is consistent with systemic infection and may explain signs such as ruffled feathers and abdominal discomfort. Haemorrhages at the proventriculo-gizzard junction point to vascular compromise and gastrointestinal involvement, which align with clinical signs such as diarrhoea and

anorexia. Additionally, egg retention noted in laying birds could account for the reported decline in egg production as reported by El-Demerdash *et al.* (2023) and Sood & Verma (2025). These gross pathological lesions provide further evidence of the acute and systemic nature of pasteurellosis in chickens and reinforce the clinical diagnosis. The successful resolution following antibiotic therapy and enhanced farm hygiene practices reaffirms the importance of early detection, laboratory confirmation, and evidence-based treatment. It also supports evidence-based decision-making in both therapeutic and preventive veterinary care.

The antibiotic sensitivity test (AST) results also highlighted the presence of multidrug resistance in *Pasteurella* spp., emphasizing the necessity for judicious antimicrobial use and periodic sensitivity testing. Notably, the isolate showed resistance to commonly used antibiotics like amoxicillin and ciprofloxacin, which agrees with global trends in bacterial resistance as reported by Shariati *et al.* (2022).

In conclusion, proactive health monitoring, prompt diagnostics, and appropriate therapy are essential for managing bacterial outbreaks in poultry systems, and these helped to check the outbreak in this case and minimized economic loss. It is strongly recommended that pasteurellosis vaccination be incorporated into the flock's health program, farms conduct routine AST to inform rational antibiotic use and biosecurity protocols be regularly reviewed and strictly enforced.

### Conflict of Interest

The authors declare that there is no conflict of interest.

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