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INTESTINAL COCCIDIOSIS IN 32-WEEK-OLD ISA BROWN LAYERS – A CASE REPORT

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ABSTRACT

A clinical outbreak of coccidiosis was investigated in a flock of 32-week-old Isa Brown layers on a commercial poultry farm in Jos, Plateau State, Nigeria. The birds exhibited a sudden increase in mortality, bloody droppings, lethargy, ruffled feathers, reduced feed consumption, and a significant decline in egg production, falling from an average of 12–13 crates per day to as low as three crates. Five carcasses were submitted for post-mortem examination. Gross pathological findings included pallor of the combs, wattles, shanks, and musculature; ballooning of the intestines with haemorrhagic and necrotic mucosa; and severe haemorrhages in the caecal tonsils. Differential diagnoses considered were coccidiosis, mycoplasmosis, and aflatoxicosis. Based on the clinical history, gross lesions, and therapeutic response, a presumptive diagnosis of clinical coccidiosis was made. A sulphonamide-based anticoccidial agent was administered orally for five days, followed by supportive therapy containing vitamins and electrolytes. Following initiation of treatment, mortality declined sharply from over 80 deaths on day 0 to none by day 4. Egg production also improved progressively, with partial recovery observed by day 7. Histopathological evaluation of intestinal tissues confirmed the presence of schizonts, degenerated crypts, and mucosal destruction which are characteristic of Eimeria spp. infection. This case highlights the critical importance of timely diagnosis, targeted chemotherapeutic intervention, and appropriate supportive care in mitigating production losses during severe coccidiosis outbreaks in layer flocks. It also reinforces the need for improved farm-level biosecurity, routine monitoring, and strategic anticoccidial use as part of sustainable poultry health management

Keywords: Coccidiosis, Isa Brown layers, *Eimeria*, histopathology, sulphonamide

INTRODUCTION

Coccidiosis continues to be a major constraint to poultry production globally. It is one of the most frequently reported diseases and is present wherever poultry are raised (Price, 2012; Zhang *et al*., 2013). The global economic impact of coccidiosis is estimated at approximately USD 2.4 billion annually, reflecting losses from mortality, impaired performance, the cost of prophylactic and therapeutic control, and increased susceptibility to secondary infections (Zhang *et al*., 2013). Coccidiosis is a parasitic disease caused by protozoa of the genera Eimeria and Isospora, both members of the phylum Apicomplexa (Aubert & Favennec, 2017). These parasites possess a complex life cycle and primarily infect the intestinal tract of various avian and mammalian species. The parasites are globally distributed and remain a major constraint on poultry health and productivity. When Eimeria species disrupt the gut environment, they disturb the balance of the microbiota and weaken the gut barrier, thereby enabling pathogens such as Clostridium perfringens, Salmonella, and Campylobacter to proliferate more easily (Lu *et al.,* 2021). In chickens, at least seven *Eimeria* species have been identified, each with a predilection for distinct regions of the intestine and capable of inducing specific pathological lesions (Shirley *et al*., 1986). The disease often presents with clinical signs such as depression, ruffled feathers, reduced feed intake, and bloody or watery diarrhoea (Ali *et al*, 2014). The control of coccidiosis primarily relies on the strategic use of anticoccidial drugs and vaccines. However, the emergence of drug resistance, management failures, and environmental factors such as litter moisture and stocking density contribute to recurrent outbreaks (Chapman, 2018). Early diagnosis, timely intervention, and supportive management are essential to curtail mortality and restore productivity. Histopathology, in combination with gross pathology and clinical history, remains a valuable tool for definitive diagnosis, especially when multiple *Eimeria* species or mixed infections are suspected (Chapman, 2018). This report presents a field case of clinical coccidiosis in a 32-week-old flock of Isa Brown layers in Nigeria, managed under deep-litter housing. The case was characterized by significant drop in egg production and increased mortality. The prompt use of sulphonamide-based anticoccidials and supportive therapy resulted in remarkable clinical recovery. This case underscores the importance of effective disease surveillance, prompt therapeutic decision-making, and integrative management strategies in mitigating economic losses from coccidiosis in commercial layer operations.

Case Presentation

On the 9th May, 2025, a report was made from a commercial poultry farm in, Jos, Plateau State, Nigeria. The flock consists of 500 Isa Brown layer hens aged 32 weeks, kept on a deep-litter system. The farmer reported a sudden mortality over four days, with daily deaths peaking at more than 80 birds, alongside a sharp decline in egg production from 12–13 crates/day to only three crates/day. Clinical signs included lethargy, somnolence, ruffled feathers, reduced feed intake, progressive emaciation, and frequent passage of bloody droppings. The farm's medication and vaccination history revealed that birds had received a combined Newcastle Disease (ND), Infectious Bronchitis (IB), and Egg Drop Syndrome (EDS) inactivated vaccine at week 16. Prior treatments included Diclosol® (2.5% Diclazuril) and an antibiotic, the type and indication of which were not specified by the farmer. It is possible that the antibiotic was administered empirically to mitigate potential secondary bacterial infections commonly associated with intestinal coccidiosis . Five freshly dead carcasses were submitted to the Avian and Fish Clinic, University of Jos Veterinary Teaching Hospital, for necropsy. Gross lesions included pale combs and wattles, ballooned intestines with diffuse petechial haemorrhages on intestinal serosa (Figure 1), ballooned intestines and bloody content. (Figure 2). Intestinal tissue samples fixed in 10% neutral buffered formalin were processed for histopathology. Hematoxylin and eosin (H&E) stained sections revealed villous desquamation and necrosis with numerous Eimeria schizonts (Figure 3), and crypt degeneration obliterated by gamonts (Figure 4). Treatment involved Sulphadimidine (33.3%) injection at 0.3 mL/bird for three consecutive days, followed by oral Cocciclear® (Amprolium + Sulphaquinoxaline) at 1 g/L for 5 days, along with 2.5% Diclazuril at 1 mL/L for 3 days. Supportive therapy with Animal Tonic (multivitamins + minerals) at 1 mL/L was administered for 5 days following anticoccidial therapy. Mortality declined sharply, with no deaths recorded by day 4 post-treatment.

Figure 1. Ballooned intestines showing diffuse petechial haemorrhage on intestinal serosa in a 32-week-old Isa Brown

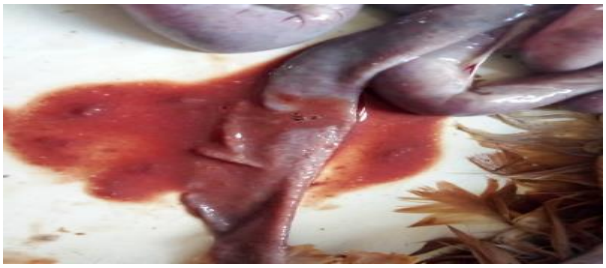

Figure 2: Showing ballooned intestines and bloody content

a

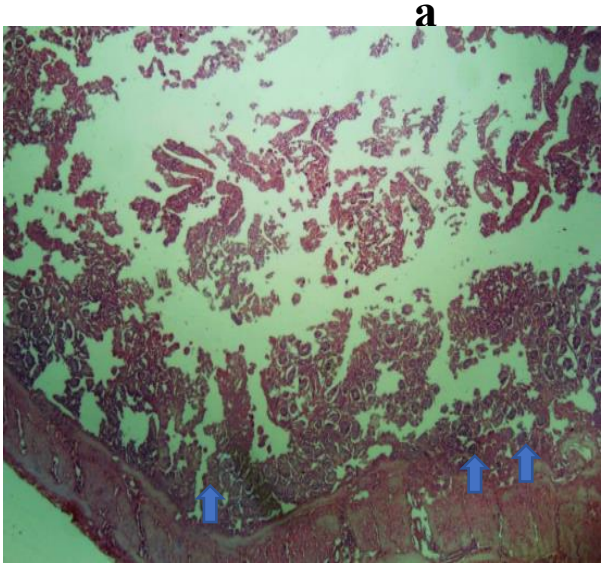

Figure 4: Photomicrograph of Chicken Intestinal Section: Villi desquamation and necrosis (a) and presence of schizonts (arrows). H&E ×4 Obi Lens

M

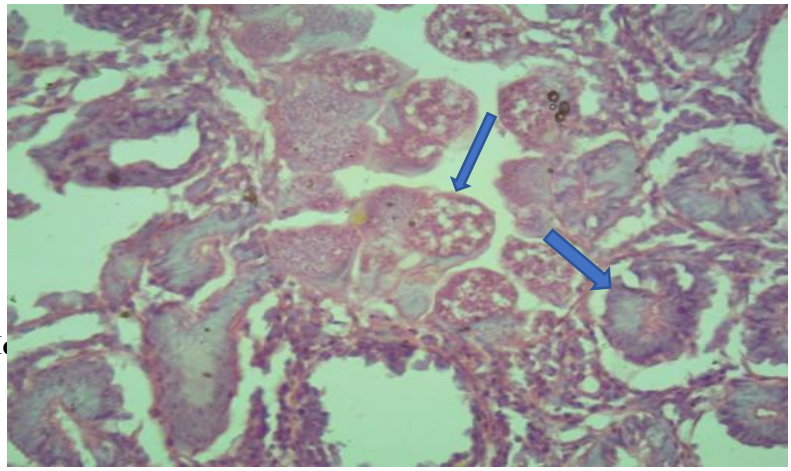

Figure 5: Photomicrograph of Chicken Intestinal Section: Presence of degenerated crypts obliterated by gamonts (blue arrows). H&E ×40 Obi Lens

A marked reduction in daily mortality was observed following treatment initiation. The initial flock consisted of approximately 500 Isa Brown layers, with over 150 mortalities recorded before presentation, leaving about 350 birds at the onset of therapy. Peak mortality occurred on day 0 with 80 deaths (22.9%), which dropped to 50 birds (14.3%) on day 1, 17 birds (4.9%) on day 2, and 3 birds (0.9%) on day 3. No mortalities were recorded from day 4 onwards (Table 1).

Table 1. Daily mortality pattern during treatment for coccidiosis in 32-week-old Isa Brown layers.

Days	Mortality pattern	Percentage mortality (%)
0	80	22.9
1	50	14.3
2	17	4.9
3	3	0.9
4	0	0
5	0	0
6	0	0
7	0	0

Percentage mortality was calculated based on an estimated flock size of 500 birds.

Egg Production Pattern

The initial flock consisted of approximately 500 Isa Brown layers, with more than 150 mortalities recorded before the case was presented at the clinic. Egg production dropped sharply during the peak of the outbreak, reaching as low as 3–5 eggs/day on days 2–4. Gradual improvement was recorded from day 7 onwards, and by day 14, production had returned to about 2.5 crates/day, the highest level achieved after treatment (Table 2).

Table 2. **Egg production during and after treatment in 32-week-old Isa Brown layers**

Days	Egg production	Estimated percentage production (%)
0	3 crates	24
1	<2 crates	<16
2	5 pieces	1
3	3 pieces	<1
4	<3 pieces	<1
5	<3 pieces	<1
6	<3 pieces (on multivitamins)	<1
7	>5 pieces	<1
8	>15 pieces	4
9	About 30 pieces	8
10	About 1.5 crate (on polidine)	12
11	1 crate 24 pieces	14
12	2 crates 8 pieces	18
13	1 crate 28 pieces	15
14	2 crates 25 pieces	23

DISCUSSION

The outbreak reported here presented as an acute episode of high-mortality coccidiosis in a flock of 32-week-old Isa Brown layers, accompanied by a marked decline in egg production. The clinical signs, bloody droppings, pallor of combs and wattles, lethargy, and a sudden fall in egg yield, were consistent with earlier observations by Conway and McKenzie (2007), who highlighted the capacity of Eimeria *tenella* and E. *necatrix* to induce severe enteric pathology and rapid economic losses. Based on the gross and histopathological findings, a tentative diagnosis of intestinal coccidiosis due to mixed infection *with Eimeria tenella* and *E. necatrix* was made, later confirmed by the characteristic lesions and the demonstration of developmental stages of *Eimeria spp*. Microscopically. The broader economic impact of coccidiosis has been well established, with studies demonstrating significant costs arising from mortality, reduced feed efficiency, impaired production, and treatment expenses, underscoring its role as a major constraint to poultry production worldwide (Williams, 1999; Dalloul & Lillehoj, 2006; Gilbert *et al*., 2020). Gross lesions in this case, including ballooned intestines, diffuse mucosal haemorrhage with bloody content in the intestinal lumen and haemorrhagic caecal tonsils reflected the extensive enteric and systemic impact of the infection. Gross lesions in this case, such as ballooned intestines, diffuse mucosal hemorrhage with blood-filled intestinal contents, haemorrhagic cecal tonsils, and distorted ovarian follicles, highlight the extensive enteric and systemic impact of coccidiosis. Similar descriptions have been reported in experimental and diagnostic studies, including ballooned and haemorrhagic intestines with epithelial erosion and severe mucosal edema (Singh *et al*., 2024). The characteristic “salt-and-

pepper" serosal pattern and thickened, dilated intestinal walls are well recognized as indicators of *Eimeria necatrix* and *E. tenella* infection (MSD Veterinary Manual, 2019; Kemin, 2022; RP Diagnostic Labs, 2022). These macroscopic features were supported by histopathological findings of villous desquamation, crypt degeneration, and the presence of schizonts and gamonts, confirming active Eimeria replication. The recurrence of coccidiosis in this flock despite prior Diclosol® (2.5% diclazuril) administration may reflect the emergence of Eimeria strains resistant to anticoccidial drugs. As highlighted by Abbas et al. (2011), the extensive and prolonged use of anticoccidials has led to widespread resistance, necessitating improved management practices and strategic rotation to preserve drug efficacy.

Therapeutically, the combination regimen employed, Sulphadimidine injection, Cocciclear® (amprolium + sulphaquinoxaline), and diclazuril, proved highly effective in reducing mortality. The favorable outcome can be explained by the pharmacological mechanisms of the drugs used. Sulfonamides, such as sulfadimethoxine and sulfaquinoxaline, inhibit dihydropteroate synthetase, thereby blocking folic acid synthesis and disrupting nucleic acid metabolism in protozoa, with primary action against developing schizonts and sexual stages (McCullough & Maren, 1974). Amprolium, a structural analogue of thiamine, competitively inhibits thiamine uptake by second-generation schizonts of E. *tenella,* preventing the formation of thiamine pyrophosphate and halting essential metabolic processes (James, 1980; Kart & Bilgili, 2008). Despite its narrow spectrum, amprolium is often combined with sulfaquinoxaline or ethopabate to broaden efficacy (Rychen *et al*., 2018). Notably, it is the only anticoccidial licensed for both prevention and treatment in laying hens, with a wide safety margin that supports its flock-level use. The subsequent use of multivitamin and mineral supplementation likely facilitated recovery by mitigating anaemia and supporting intestinal repair, consistent with nutritional strategies such as the inclusion of amino acids, vitamins, fatty acids, prebiotics, and enzymes that reduce infection severity, alleviate clinical signs, and enhance compensatory growth following coccidial challenges (Gómez-Osorio *et al*., 2021). The marked reduction in mortality within 48 hours of treatment and gradual improvement in egg production by day 7 highlight the importance of timely, targeted interventions. Nevertheless, incomplete recovery of egg production indicates that mucosal repair and restoration of nutrient absorption require longer periods post-infection (Shirley *et al*., 2005).

Predisposing factors in this flock likely included high stocking density, deep-litter housing with potential for oocyst build-up, and the absence of routine prophylaxis. These management gaps are well-recognized drivers of Eimeria outbreaks in tropical poultry systems (Williams, 2005). Long-term control in such settings requires an integrated approach combining good litter management, strict biosecurity, judicious use of anticoccidial programs, and regular monitoring for subclinical infections. Importantly, this case also demonstrates the diagnostic value of histopathology, which, when used alongside lesion scoring and clinical evaluation, remains the gold standard for confirming Eimeria species in field outbreaks.

CONCLUSION

This case demonstrates that clinical coccidiosis can cause severe mortality and production losses even in mature Isa Brown layers. Rapid diagnosis and timely sulphonamide treatment, followed with vitamins and electrolytes, were effective in reducing mortality and restoring egg production. However, poor litter management, high stocking density, absence of prophylaxis, and possible immunosuppression exacerbated the outbreak. The findings highlight the importance of integrated control strategies, combining prophylaxis, vaccination, strict hygiene, biosecurity, and routine monitoring, along with farmer education and veterinary oversight to prevent future outbreaks in tropical poultry systems.

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