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Case Report: Coccidiosis in Layer Farm, Sumedang

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ABSTRACT

Coccidiosis is a parasitic disease that causes economic losses on chicken farms. A case was found on a farm in Rancaekek, Bandung Regency, where there was a one-year-old laying hen that stopped producing eggs, experienced decreased pectoral muscle mass, and had mild ataxia. The diagnosis was made by necropsy procedure and fecal examination. There were lesions in the small intestine, these lesions manifested as ballooning filled with orange mucus and the presence of petechial hemorrhages on the luminal wall and decreased pectoral muscle mass was found. A Fecal examination was performed using the floating method and the McMaster calculation. The results of the fecal examination revealed *Eimeria sp.* oocysts and *Trichostongylus tenuis* eggs. The diagnosis of this case is coccidiosis infection caused by two species of *Eimeria sp.*, namely *Eimeria maxima* and *Eimeria tenella*. This infection has resulted in a nutritional deficiency, manifested by a decrease in pectoral muscle mass.

Keyword: Coccidiosis, *Eimeria maxima*, *Eimeria tenella,* layer chicken, coccidiosis in chicken.

INTRODUCTION

Coccidiosis poses a significant threat to the poultry industry, specifically in chicken farming, resulting in substantial economic losses (Fatoba and Adeleke, 2018; Oljira *et al.,* 2012). This parasitic disease, caused by various Eimeria species from the phylum apicomplexa, has been extensively studied due to its detrimental impact on poultry production. Among the seven prevalent species that infect chickens, *Eimeria tenella*, *Eimeria maxima*, *Eimeria imitis, Eimeria acervulina, Eimeria brunetti, Eimeria praecox,* and *Eimeria necatrix* are the most commonly identified culprits (Hafez, 2008; Fatoba and Adeleke 2018).

The life cycle of Eimeria within the chicken's intestinal tract triggers a

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potent inflammatory response, leading to severe tissue damage. This damage, in turn, can result in subclinical enteric infections or even subacute fatalities. Numerous factors contribute to the prevalence of coccidiosis in chicken flocks. These factors include the specific Eimeria species involved, their strain, and the infective dose, as well as the genetic makeup of the host, the population size within a flock, environmental conditions, stress, and repeated infections (Nahed *et al*., 2022). One of the critical consequences of coccidiosis is the disruption of the intestinal environment. This disruption often leads to a pH imbalance and morphological changes in the intestinal villi, crucial components for nutrient absorption (Patra, 2021). Consequently, impaired absorption negatively impacts the bird's health, hindering growth and productivity. In laying hens, this impairment manifests as reduced egg production, a concerning issue for farmers aiming to maintain a steady supply of eggs. Coccidiosis exhibits high host specificity, making disease transmission rare from one host to another of different animal species. It commonly affects young chickens aged between 3 to 6 weeks and rarely occurs in chickens younger than 3 weeks old. Chickens below three weeks old do not produce sufficient chymotrypsin and bile salts, preventing the sporozoites from emerging out of the oocysts. The body's immune response can be rapidly generated upon exposure to this disease, although the immunity developed is specific and does not apply to infections caused by other Eimeria species. Generally, this disease is endemic.

In light of these challenges, veterinarians and poultry researchers conduct thorough investigations to understand the disease's impact and devise effective strategies for diagnosis and prevention. Necropsy, a post-mortem examination of an animal, plays a pivotal role in diagnosing coccidiosis. By carefully examining the bird's organs and tissues post-mortem, veterinarians can identify specific pathological findings indicative of coccidiosis infection. Furthermore, fecal examinations are conducted to detect the presence of coccidian oocysts, shedding light on the extent of infection within a flock. This case report focuses on a particular instance involving laying hens.

The objective is to diagnose a suspected case of coccidiosis. The examination, including necropsy and fecal analysis, aims to provide detailed insights into the pathological findings, shedding light on the disease's progression within the affected birds. Through such meticulous analysis, veterinarians and poultry professionals can gain a deeper understanding of the disease's impact, enabling them to implement targeted interventions and preventive measures.

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MATERIALS AND METHODS

One laying hen was obtained from a layer farm in Bandung Regency. The hen was one year old and was reported by the owner to have a condition where egg production had stopped. The hen was fully vaccinated and had been given anthelmintics at 8 months of age. Physical examination revealed cachexia and dark green feces. Based on the clinical symptoms and physical examination results, supporting examinations, namely fecal examination and necropsy, were carried out. Necropsy is conducted as a procedure from the farm to support diagnosis and examine the anatomy of pathological organs by opening the animal cadaver. A fecal examination was performed using the floating method and the McMaster calculation.

The flotation method was conducted by preparing a fecal suspension in a 1:10 ratio of feces to water, where the collected feces consisted of a combination of direct sampling during necropsy and natural excretion. The fecal suspension was then filtered, and the filtrate was collected in a beaker. The filtrate was subsequently centrifuged for 5 minutes at a speed of 1500 RPM, with repetitions until a clear supernatant was obtained. The formed supernatant was discarded, and an 80% glucose solution was added, followed by centrifugation using the same method. Afterward, a cover glass was placed on the surface of the centrifuge tube, and it was left for 10 minutes. The examination was carried out by taking the cover glass for observation under a microscope at 100x magnification (Oktaviana *et al*., 2019). The McMaster calculation was performed using a solution from the flotation method, where the solution was placed in the McMaster counting chamber, and after waiting for 30 seconds, observations could be

made (Zhang *et al*., 2016).

RESULT AND DISCUSSION

During necropsy, lesions were found in the cauda of the duodenum, extending partially into the cranial jejunum. These lesions manifested as ballooning filled with orange mucus and the presence of petechial hemorrhages on the luminal wall (Figure 1). Additional lesions were discovered in the cecum, characterized by a solid caecal consistency with ballooning (Figure 2). The cecum contained greenish feces with a soft, paste-like consistency. Apart from the digestive tract, there was also a noticeable decrease in muscle mass, characterized by a prominent sternum (Figure 1).

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Figure 1. Petechial hemorrhage (arrow) in the duodenum.

Figure 2. The cecum that exhibits ballooning (arrow) contains green-colored contents.

Examination of feces using the floatation method revealed two types of parasitic eggs and protozoan oocysts, in sequential order: *Trichostrongylus tenuis* and *Eimeria sp.* (Figure 3). Identification of *Eimeria sp.* oocysts was based on the microscopic characteristics observed, which included an ovoid shape, smooth surface, colorless appearance, absence of micropyle or residue, but with the presence of polar granules (Figure 4) (Taylor *et al.*, 2016). In the McMaster method examination, oocysts of *Eimeria sp.* were found, while no worm eggs were detected in ten fields of view in two McMaster chambers. Calculations were performed to determine the quantity of *Eimeria sp.* oocysts, and the result indicated a count of 1300 OPG (oocysts per gram).

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Figure 3. Oocyst of *Eimeria sp*. arrow: *polar granule.*

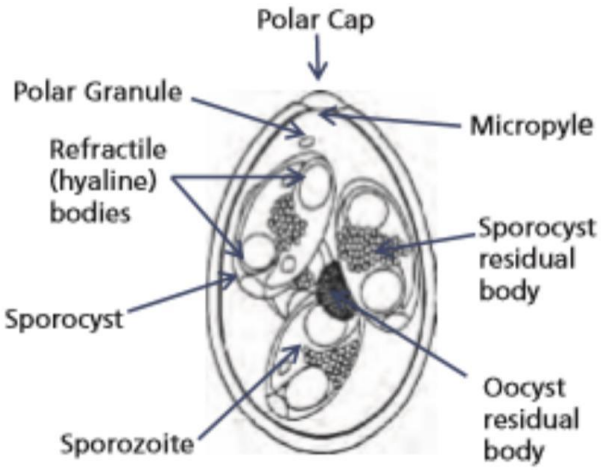

Figure 4. Morphology of *Eimeria sp. oocyst* (Taylor *et al.,* 2016)

The quantity of these oocysts can serve as an indicator of the severity of the infection. In this case, the count remains below 20,000 oocysts per gram, classifying it as a mild infection. Infections are categorized as mild (less than 20,000 oocysts per gram), moderate (between 20,000 and 60,000 oocysts per gram), and severe (more than 60,000 oocysts per gram) (Arsyitahlia *et al.,* 2019). Based on the diagnostic findings, it can be concluded that the floatation method examination identified the presence of *Eimeria sp.*

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oocysts with a mild level of infection, along with worm eggs.

The determination of *Eimeria sp.* species is partially based on the discovery of lesions in the digestive tract. *Eimeria sp.* exhibits specific predilection sites (Taylor *et al.*, 2016). Therefore, based on the necropsy findings, it can be concluded that there are two types of *Eimeria sp.* present, namely *Eimeria maxima* (in the cranial duodenum, score 1) and *Eimeria tenella* (in the cecum, score 1). The necropsy findings in the digestive tract revealed petechial hemorrhagic lesions and the presence of orange exudate on these lesions. These lesions were located from the cauda of the duodenum to the cranial jejunum. Considering the lesion morphology and their predilection sites in the small intestine, it can be inferred that the infecting Eimeria species is *Eimeria maxima*. The lesion score in this finding is 1, indicating the presence of petechial hemorrhages, the presence of orange mucus exudate, and no thickening of the intestinal wall (Raman *et al.*, 2011). Meanwhile, the lesions in the cecum are indicative of *Eimeria tenella* infection, with a score of 1, where ballooning has occurred, and the cecal contents have a paste-like consistency.

The manifestation of *Eimeria sp.* infection in this case has resulted in clinical symptoms of muscle dystrophy (Figure 5) and the cessation of egg production, influenced by absorption disturbances due to *Eimeria sp.* infection. Muscle dystrophy in these chickens is attributed to damage to the small intestine epithelium, leading to decreased nutrient absorption from the feed. Rahadi (2012) states that losses due to coccidiosis in both meat and egg-producing chickens can vary significantly, including reduced chicken lifespan, delayed egg-laying period, decreased egg production, and diminished feed efficiency. Coccidiosis caused by *Eimeria spp.* is highly infectious and fatal in chickens.

Figure 5. Decreased of breast muscle mass.

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Infection with *Eimeria tenella* is commonly found in chickens, while *Eimeria maxima* falls into the category of infections that are less pathogenic compared to *Eimeria tenella* (Hamid *et al*., 2018). The pathogenicity of *Eimeria sp*. depends on several factors, such as the host's age, host immunity, and the dose of ingested oocysts. The higher the dose of oocysts ingested, the more schizonts are formed in the intestinal epithelium, resulting in increased disease severity. This is also reflected in the lesions caused by the infection, where severe infections can lead to clinical symptoms such as bloody diarrhea (Jamil *et al*., 2016). Other factors influencing the occurrence of coccidiosis include management practices, air humidity, nutritional status, and the level of host stress.

Management that can be undertaken involves the administration of anticoccidial agents, such as coccidiostats and coccidiocidal, in addition to providing multivitamins. The administration of coccidiostatic drugs is usually done by incorporating them into the feed or drinking water (as feed additives). There are numerous preparations available for treating Coccidiosis in poultry, including amprolium, clopidol, folate antagonists, halofuginone hydrobromide, ionophores, nicarbazin, nitrobenzamide, sulfaquinoxaline, and robenidine. Furthermore, it is essential to isolate sick animals and improve the management of the housing facilities (Pudjiatmoko *et al*., 2014).

Post-infection management of chickens with coccidiosis can also involve the administration of probiotics like *Lactobacillus* spp., which act as probiotic agents capable of inhibiting the growth of pathogenic bacteria. Lactobacillus prevents the growth of pathogenic bacteria in the digestive tract through the production of lactic acid, thereby enhancing physiological digestive functions, improving nutrient absorption, and enhancing immune responses (Cahyanti, 2011; Gao *et al*., 2017). Increased nutrient absorption in the digestive tract leads to more optimal feed conversion to meat, resulting in improved poultry performance (Ouwehand, 2016).

CONCLUSION

The diagnosis of the case, based on the results of anatomical pathology examination and fecal analysis, indicates that the laying hens in this case have experienced coccidiosis infection caused by two species of *Eimeria sp*., namely *Eimeria maxima* and *Eimeria tenella*. This infection has resulted in a nutritional deficiency, manifested by a decrease in pectoral muscle mass.

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