



Concurrent Disease of Clinical Coccidiosis and Enteric Colibacillosis in a Doe and its Treatment Outcome with the Aid of EDDIE Smart Phone-based App: A Case Report

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ABSTRACT

Coccidiosis and Colibacillosis are debilitating diseases of young animals by causing loss of body condition, diarrhea and death worldwide. An adult local breed doe was presented at VTH on April 23/2021 with primary complaint of inappetence, weakness and diarrhea for three days. The owner stated that the doe is kept in semi-intensive management and he also reported that three kids and a lamb had previously died of similar symptoms in the flock. Physical examination findings indicate value of vital signs in the normal range but increased temperature, delayed capillary refill time and skin tent, pale and dry mucus membrane. Clinical examination revealed that the doe was dull and depressed, showed fever and dehydration, has soiled perineum region with feces and greenish mucoid watery diarrhea. The EEDiE App-based smart phone diagnosis revealed this case as Coccidiosis (51.6%) and Colibacillosis (46.3%). During laboratory analysis, *E. coli* was grown on XLD agar with large, flat and yellowish colonies, biochemical and latex agglutination testes also show *E. coli* and oocysts were observed from fecal floatation. Therefore, based on history, clinical findings, EDDiE and laboratory result, the case was diagnosed as clinical Coccidiosis and enteric Colibacillosis concurrently. The doe was treated promptly and vigorously with antibiotic, anticoccidial, fluids, anti-inflammatory drug and supplement by multivitamins. Coccidiosis and Colibacillosis are wasting and most economically important diseases of ruminants in Ethiopia. However, early diagnosis and prompt therapy with proper hygiene with good husbandry practices are the key to control and prevent these disease and their associated losses.

Keywords: Coccidiosis; Colibacillosis; Diarrhea; Eimeria; Husbandry practices

INTRODUCTION

Clinical Coccidiosis and enteric Colibacillosis, which are caused by protozoan parasite (*Eimeria*) and *Escherichia coli* bacteria respectively are economically important diseases and serious health problems that affect a wide range of farm animals and commonly cause death in young ones worldwide. They cause gastrointestinal disorders characterized by destruction of many intestinal cells, diarrhea, reduced condition, high morbidities and significant mortalities. These diseases can occur more often in intensive management conditions when animals are housed in confinement and overcrowding with poor sanitation due to the concentrating effects of both the host and organism, extreme weather conditions and weaning (stress factors) [1,2].

Ruminant coccidiosis is caused by protozoan parasite of *Eimeria* species which are host-specific whereas colibacillosis is caused by *Escherichia coli* (gram negative, rod shaped, facultative anaerobic

bacteria) [1,3]. The *Eimeria* and *E. coli* are always present in the environment and small intestine (normal floara) of adult animals which are immune to clinical disease and most of the species of these microorganisms are harmless. However, some species of *Eimeria* including *Eimeria christenseni*, *E. arloingi*, *E. caprina*, *E. ovinoidalis* and *E. hirci* cause disease in goats in which *Eimeria arloingi* is the most pathogenic species and strains of *E. coli* such as shiga toxin-producing *E. coli*, enterotoxigenic *E. coli*, enteroaggregative *E. coli*, enteroinvasive *E. coli*, enteropathogenic *E. coli*, and diffusely adherents *E. coli* are pathogenic and cause diarrhea in the host [4,5].

These diseases can be transmitted through ingestion of contaminated water and food by pathogenic species or strains and direct or indirect contact with infected animals or person. The life cycle of coccidia is complicated and has many stages of development (21 days from oocytes to adult protozoa) whereas the

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incubation period of colibacillosis is 3-5 days and both *Eimeria* and *E. coli* multiply inside the epithelial cells of small intestine. Young animals, 1-4 months of age and two weeks of age are most susceptible for both *Eimeria* and *E. coli* respectively and adult animals develop clinical disease during stress that can result death [6]. In goats, both diseases cause significant enteric disease which can cause damage to epithelial cells of small intestine during growth and multiplication of the microorganisms that result diarrhea, inefficient weight gains and occasionally death [7,8].

The primary clinical sign of coccidiosis and colibacillosis is diarrhea that can contain blood or mucous and other signs include abdominal pain, loss of appetite and weight, fever, dehydration, depression, weakness, rough hair coat, rectal straining, convulsions and death [9]. These diseases can be diagnosed based on history and clinical signs, microscopic examination of feces for oocysts in coccidiosis and isolation and identification of *E. coli* by bacterial culture, biochemical, molecular and serological tests in colibacillosis and post-mortem in both cases. Both Coccidiosis and Colibacillosis are differential to each other and other differentially diagnosed diseases include salmonellosis, parasitic gastro-enteritis and viral infections like corona and rota viruses [10,11].

Treatment in both clinical coccidiosis and enteric colibacillosis consists specific antibiotic therapy with sulfa drugs (sulfadimethoxine, sulfamethazine, sulfachlorpyridazine, trimethoprim-sulfamethoxazole) and antiprotozoal drugs used to treat coccidiosis include amprolium, decoquinat, monensin, lasalocid and fluid replacement therapy in both conditions can give better treatment outcome [12,13]. Good husbandry practices, using feeds with coccidiostat, isolating infected animals and avoiding predisposing factors can prevent these diseases which cause huge economic losses in livestock industries [14,15]. Therefore, the current case report describes the concurrent infection of the doe with clinical coccidiosis and enteric colibacillosis and its treatment outcome.

CASE DESCRIPTION

An adult local breed doe weighing 50 kg with a body condition score of 3 out of 5 was presented to Veterinary Teaching Hospital in College of Veterinary Medicine of Agriculture in Addis Ababa University, Bishoftu on April 23/2021 with primary complaint of loss of appetite, weakness and diarrhea for three days. The doe had a history of kidding two weeks prior to presentation. The owner has stated that the doe is kept in semi-intensive management practice without any treatment and deworming for about one year and five months. He also reported that three other kids and a lamb had previously died of similar symptoms in the flock. Physical examination findings from the doe indicate body temperature of 39.9°C, respiratory rate of 24 breaths/minute, heart rate of 72 beats/minute with delayed capillary refill time and skin tent, pale and dry mucus membrane. Clinical examination revealed that the doe had poor body condition score, was dull and depressed, showed fever and dehydration, presence of greenish brown pasty fecal staining around the perineum region and well-formed feces covered with greenish mucoid discharge as indicated from Figure 1. The EEDiE App based smart phone disease diagnosis revealed this case as Coccidiosis (51.6%) and Colibacillosis (46.3%). Therefore, based on history, physical and clinical examination findings and EEDiE App based diagnosis result; the case was diagnosed as Coccidiosis and enteric colibacillosis concurrently.

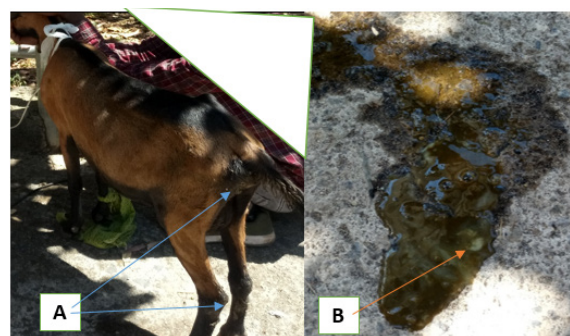


Figure 1: Picture of suspected doe with major signs (A, indicates the doe with soiled perineum by diarrhea and B, indicates greenish and mucoid watery diarrhea).

Laboratory investigation and its findings

Fecal sample was taken directly from the rectum of the doe and placed on tryptone soya broth in screw capped tube and clean universal bottle for bacterial isolation and parasitic demonstration respectively and immediately transported to veterinary microbiology and parasitology laboratory of Addis Ababa University in CVMA, Bishoftu. After enrichment and incubation at 37°C overnight, some amount of the sample was inoculated on Xylose Lysine Deoxycholate (XLD) agar medium followed by incubation at 37°C for 24 hours, which grows *E. coli* with large, flat and yellow colonies (Figure 2A). From XLD pure colony was taken and smear was prepared for gram staining and the result showed red stained gram-negative rods by oil immersion as indicated from Figure 2B. For parasitological examination, 3 grams of fecal sample from universal bottle was taken immediately and dissolved with 42 ml of floatation fluid (magnesium sulphate) and processed by simple floatation technique to detect oocysts and nematode eggs and the result showed that ellipsoidal oocysts were observed under 40X magnification as indicated from Figure 2C. Therefore, based on history, clinical signs, EDDiE App based diagnosis and laboratory result, the diseases affecting the doe were confirmed as clinical Coccidiosis and enteric Colibacillosis concurrently.

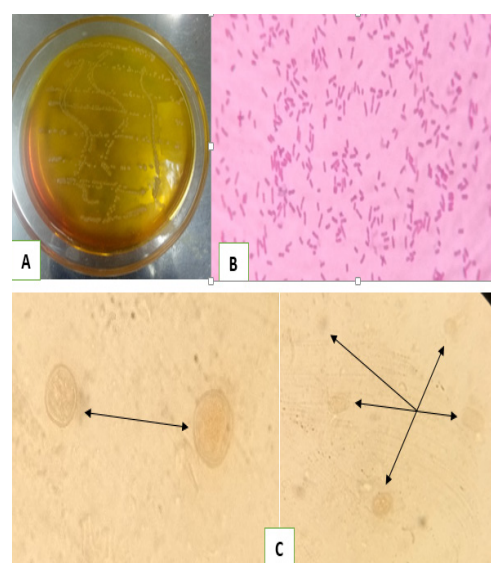


Figure 2: Laboratory results of Coccidiosis and Colibacillosis suspected doe (A, indicates growth of *E. coli* on XLD agar, B, gram staining of *E. coli* from XLD and C, indicates oocysts from faecal floatation).

Case management and treatment outcome

After confirmation of the current case as concurrent infection of clinical coccidiosis and enteric colibacillosis, the doe was medically treated by Sulphamethoxazole-Trimethoprim injection (Interchemie werken 'De Adelaar' B.V., Holland) at the recommended dose rate of 1 ml/16 kg body weight for five days twice daily for the first two days with 12 hours interval and once a day for the remaining three days intramuscularly, Amprolium (Corid) at a dose rate of 50 mg/kg body weight once a day for five days orally with feed to reduce fecal shedding of *Eimeria* oocysts and a non steroidal anti-inflammatory Dexamethasone sodium phosphate injection (Lincoln parenta LTD, Gujarat, India) 1.5 ml/50 kg body weight IM for three days were used. Additionally, intravenous infusion of Lactated Ringer's solution with 40% glucose saline was administered for two days (Figure 3A) to replenish dehydration and intramuscular multivitamins injection for thiamine deficiency as a result of amprolium administration were also used in the therapeutic regimen. The doe was constantly monitored during the treatment in which diarrhea was stopped after the second day therapy and after prompt and vigorous therapy it showed clinical improvement and complete recovery was established after two weeks (Figure 3B) as the owner reported.

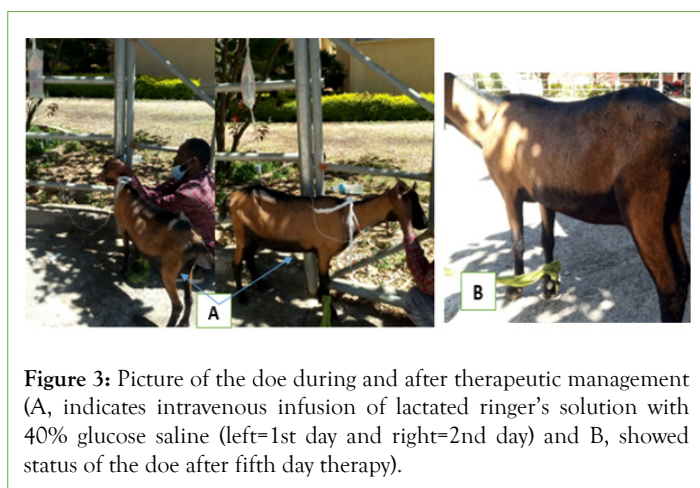


Figure 3: Picture of the doe during and after therapeutic management (A, indicates intravenous infusion of lactated ringer's solution with 40% glucose saline (left=1st day and right=2nd day) and B, showed status of the doe after fifth day therapy).

RESULTS AND DISCUSSION

Sheep and goat production in Ethiopia, especially in the central area is based on semi-intensive grazing system with combination of high stocking density and poor husbandry practice which contributes to an increased incidence of infectious diseases. In case of coccidiosis and colibacillosis, such grazing and managing system give advantages to the deposition of oocysts and *E. coli* from either infected or carrier animals into the environment and vice versa that increases the infection of new susceptible animals [16,17]. *Coccidia* and *E. coli* are normally found in healthy adult goats and will not be considered as dangerous; however, if the number of oocyst per gram is greater than 20,000 (coccidiosis) and when predisposing factors like poor hygiene and husbandry practice, overcrowding, stress, food and water deprivation are found in the flock/herd or individual animal they become infectious and cause clinical coccidiosis and enteric colibacillosis [18,19]. This is in agreement with the current case report that the development of coccidiosis could be due to infection of the doe by colibacillosis that create favorable condition for oocysts to multiply when the immunity of this doe become suppressed as the result of enteric colibacillosis which can be developed due to different predisposing factors.

Bacteria, protozoa, virus and fungi are few virulent microorganisms that may cause enteritis leading to diarrhea in newborn small ruminants than adults [20]. In the current case, the isolated bacteria and protozoa were *E. coli* and coccidian oocysts which caused clinical coccidiosis and enteric colibacillosis in an adult doe which indicates colibacillosis and coccidiosis are the major causes of diarrhea with several common clinical signs including diarrhea, dehydration, weakness, abdominal pain with rectal straining, rough hair coat and weight loss in different age groups. However, this finding contrasts with others that state colibacillosis and coccidiosis affect kids and other newborns than adult animals which may be due to deficiency of immunoglobulins, multiple stresses, weaning and poor hygiene and nutrition [21,22].

CONCLUSION AND RECOMMENDATIONS

In the current case report, the doe was infected by enteric colibacillosis and clinical coccidiosis concurrently, therefore the clinical therapeutic and management protocol used was vigorous therapy by antiprotozoal amprolium selectively for coccidiosis, antibiotic sulphamethoxazole-trimethoprim, anti-inflammatory dexamethasone, multivitamin and supplementary therapy by lactated ringer's and 40% glucose solution which are effective for both enteric colibacillosis and clinical coccidiosis cases. So, that the doe has showed better therapeutic improvement and recovery. This is in line with other findings conducted by Richard and his co-founders, Sykes and Papich, Constable with his friends and Taylor with his coals that stated the primary therapeutic plan for animals infected by enteric diseases like colibacillosis, coccidiosis, salmonellosis and others including viral infections is usually with vigorous antimicrobial, anti-inflammatory and supportive therapy with fluids and others to reduce morbidity and mortality of animals.

Coccidiosis and colibacillosis are wasting and most economically important diseases of ruminants in Ethiopia. Early diagnosis and prompt therapy with proper hygiene and good husbandry practices are the key to control and prevent these diseases and their associated losses.

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