BULETIN VETERINER UDAYANA

pISSN 2085-2495
eISSN 2477-2712

Received: 12 Nov 2025; Accepted: 30 Nov 2025; Published: 10 December 2025

TREATMENT OF *DIPYLIDIUM CANINUM* INFECTION IN A LOCAL DOG ALONG WITH SUPPORTIVE THERAPY USING LIVRON-B PLEX® AND FISH OIL

Pengobatan Infeksi *Dipylidium Caninum* Pada Seekor Anjing Lokal Disertai Terapi Suportif Menggunakan Livron-B Plex® Dan Minyak Ikan

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How to cite: Pasek IMA, Arjentinia IPGY, Soma IG. 2025. Treatment of *Dipylidium caninum* infection in a local dog along with supportive therapy using Livron-B Plex® and fish oil. *Bul. Vet. Udayana*. 17(6): 1921-1931. DOI: https://doi.org/10.24843/bulvet.2025.v17.i06.p15

Abstract

Dipylidium caninum is a tapeworm that inhabits the small intestine of dogs and cats, particularly in warm and humid regions. It has an indirect life cycle that requires fleas as intermediate hosts and vertebrates as definitive hosts. This parasite is considered zoonotic because it can be transmitted to humans through ingestion of infected fleas or dog ticks. Dogs are common companion animals that require proper care and management, both for their health and for the well-being of the humans who keep them. The case animal in this report is a female dog named Aci, 4 months old, weighing 4.2 kg, with orchid-brown hair. This study was conducted to identify *D. caninum* infection in this dog. Based on the anamnesis, physical examination, clinical assessment, and supporting diagnostic tests, the dog was diagnosed with *D. caninum* infection, with a favorable prognosis. Causal therapy was administered using a deworming medication (Caniverm®), at a dose of ½ tablet containing fenbendazole, pyrantel embonate, and praziquantel. Supportive therapy included vitamin B-complex (Livron B.plex tablets), and fish oil was provided to promote hair growth. Evaluation of the dog's condition five days after therapy indicated significant improvement, as evidenced by fecal examination showing no presence of worms. Routine deworming is recommended every three months. Infected animals should be quarantined to prevent transmission to other pets, bathed regularly, and kept in a clean environment. Feces in the yard should be promptly removed to reduce the risk of reinfection.

Keywords: *Dipylidium caninum*, dogs, zoonosis

Volume 17 No. 6: 1921-1931
December 2025
https://doi.org/10.24843/bulvet.2025.v17.i06.p15

Abstrak

Dipylidium caninum adalah cacing pita pada usus kecil anjing dan kucing yang ditemukan di daerah yang lebih hangat dan lembab dengan siklus hidup tidak langsung yang membutuhkan kutu sebagai inang perantara dan vertebrata sebagai inang definitif. Penyakit ini merupakan penyakit zoonosis karena dapat ditularkan kepada manusia melalui hospes perantara berupa pinjal atau kutu anjing. Anjing merupakan salah satu hewan kesayangan yang perlu mendapat perhatian untuk dipelihara dan dikembangbiakkan dengan berbagai tujuan dan dapat memberikan kebahagiaan tersendiri bagi manusia. Hewan kasus yaitu seekor anjing bernama Aci yang berjenis kelamin betina, berumur empat bulan, dengan bobot 4,2 kg, rambut berwarna coklat anggrek. Laporan ini menyajikan kasus infeksi *D. caninum* pada anjing. Berdasarkan anamnesis, pemeriksaan fisik, pemeriksaan klinis dan pemeriksaan penunjang dapat disimpulkan bahwa anjing kasus didiagnosis mengalami infeksi *D. caninum* dengan prognosis *fausta*. Terapi kausatif dilakukan dengan pemberian obat cacing (Caniverm®) ½ tablet yang mengandung *Fenbendazole, Pyranteli Embonas* dan *Praziquantelum.* Terapi suportif yaitu vitamin B kompleks (Livron B.plex tablet). Untuk penumbuh rambut diberikan *fish oil*. Evaluasi pemulihan dari anjing kasus *D. caninum*, lima hari setelah di terapi menunjukkan kondisi yang membaik yang ditunjukkan dengan hasil feses yang menunjukkan tidak ada cacing. Pemberian obat cacing secara rutin tiga bulan sekali, Mengandangkan hewan yang terinfeksi agar tidak menularkan ke hewan lainnya dan mandikan secara rutin serta selalu menjaga kebersihan lingkungan, feses yang terdapat di pekarangan rumah harap segera dibersihkan.

Kata kunci: Anjing**,** *Dipylidium caninum*, zoonosis

INTRODUCTION

Dogs are beloved companion animals that require proper attention, care, and breeding for various purposes, and they can bring considerable joy to humans (Ahada *et al.*, 2020). Their relatively simple husbandry and efficient feeding practices contribute to their growing popularity. As a result, dogs form strong bonds with humans and commonly serve as guards, hunters, and household pets (Gutema *et al.*, 2021). However, dogs also act as reservoirs for numerous zoonotic parasites, which pose significant public health, economic, and social challenges, particularly in developing countries where dog movement and management practices are often insufficiently regulated (Yudhastuti, 2020).

Parasitism is among the most common health problems affecting dogs worldwide. Although effective antiparasitic drugs are available, many canine parasites possess complex life cycles that make complete eradication difficult. In addition, dogs are frequently infected with internal parasites, sometimes without showing obvious clinical signs (Wani *et al.*, 2015).

D. caninum is a tapeworm that inhabits the small intestine of domestic dogs and cats and is commonly encountered in warm and humid regions. *D. caninum* primarily infects dogs and cats but can also cause human infections (Taylor *et al.*, 2007). The disease is zoonotic because transmission to humans can occur through ingestion of infected intermediate hosts, typically dog fleas or ticks (Cahyani *et al.*, 2020). The parasite has an indirect life cycle that requires a flea as the intermediate host and a vertebrate as the definitive host. Mature proglottids may be observed in the perianal region, on pet bedding, or in feces. After the proglottids are ingested, the released eggs are consumed by flea larvae or nymphal fleas, where the oncospheres (tapeworm embryos) hatch and develop into infective cysticercoids. These cysticercoids persist during the insect's metamorphosis, and pets become infected when they ingest adult fleas.

Clinical signs in dogs infected with *D. caninum* include the presence of chains of segments or

Volume 17 No. 6: 1921-1931
December 2025
https://doi.org/10.24843/bulvet.2025.v17.i06.p15

individual proglottids in the feces, perianal irritation that causes scooting behavior, and visible worm segments around the perianal area (Yuniarti and Lukiswanto, 2013). Humans become infected by accidentally ingesting infected fleas, often while playing with pets or through environmental exposure (Ramana *et al.*, 2011). Mild *D. caninum* infections in humans are frequently asymptomatic, although some individuals may experience abdominal pain, diarrhea, or anal pruritus.

This report presents a case of *D. caninum* infection, focusing on its diagnosis, treatment, and prevention, with emphasis on its occurrence in primary host animals (dogs and cats) as well as its potential transmission to humans.

RESEARCH METHODS

Signalment and History

The case animal was a 4-month-old female dog named Aci, weighing 4.2 kg, with orchid-colored fur. The owner reported that the dog was restless and frequently rubbed its anus on the ground. The dog had previously suffered from scabies, which had been treated five months earlier. The dog did not have diarrhea, but its soft stools contained proglottids. The animal had never received vaccinations or deworming. It had a good appetite and was fed home-cooked meals, such as rice mixed with chicken liver. The dog was kept loose in the yard with two other dogs and occasionally wandered outside the fence, although only this dog's feces contained worms.

Clinical Examination

The physical examination included assessment of body temperature, heart rate, pulse rate, respiratory rate, body condition score (BCS), and capillary refill time (CRT). Five mucosal surfaces (conjunctiva, nasal mucosa, oral mucosa, anal mucosa, and vulva) were inspected. Lymph nodes were palpated, and the level of pruritus was evaluated by observing the frequency of scratching during the examination. A thorough inspection was carried out to identify any lesions. The clinical examination involved inspection, palpation, and auscultation of the digestive, respiratory, urogenital, circulatory, and neuromuscular systems.

Ancillary Test

Skin Examination

Skin scrapings were collected from alopecic lesions on the earlobe using the superficial skin scraping technique. The scrapings were placed on a glass slide containing 10 percent KOH solution, chopped and flattened to avoid clumping, covered with a coverslip, and examined under a microscope at 100× magnification.

Ear Examination

An otic swab was obtained using a cotton swab to collect earwax from the ear canal. The swab containing the earwax was placed on a slide with 10 percent KOH solution, chopped and flattened to prevent clumping, and examined under a microscope at 100× magnification.

Fecal Examination

A digestive examination was performed using a native test. A small amount of stool was placed on a slide with a toothpick, followed by the addition of two to three drops of distilled water and homogenization. The sample was then covered with a coverslip and examined under a microscope at 10× magnification.

Terakreditasi Nasional Sinta 4, berdasarkan Keputusan Direktur Jenderal
Pendidikan Tinggi, Riset, dan Teknologi No. 158/E/KPT/2021

Volume 17 No. 6: 1921-1931
December 2025
https://doi.org/10.24843/bulvet.2025.v17.i06.p15

Hematology Examination

A complete hematology test was conducted by collecting 1 ml of blood from the cephalic vein. The sample was placed in a tube containing ethylenediaminetetraacetic acid (EDTA) and analyzed using a hematology analyzer.

Diagnosis and Prognosis

Based on the history, physical examination, clinical evaluation, and supporting diagnostic tests, the dog was diagnosed with *D. caninum* infection, and the prognosis was considered favorable.

RESULTS AND DISCUSSIONS

Results

Clinical Examination

According to the data in Table 1, the clinical examination showed a heart rate of 136 beats per minute and a pulse rate of 134 beats per minute. These values indicate an elevated heart rate and pulse rate. The increases were likely caused by the animal being startled and uncomfortable during the examination. This agrees with Widodo *et al.* (2011), who stated that increases in heart and pulse rates can occur when an animal is startled or after physical activity. The capillary refill time (CRT) was less than 2 seconds, the Body Condition Score was 4 out of 9, the respiratory rate was 30 breaths per minute, and the body temperature was 38.6°C. Physical examinations of the genitalia, mucosal surfaces, circulatory system, respiratory system, lymph nodes, urogenital system, musculoskeletal system, nervous system, and eyes showed no abnormalities. However, abnormal findings were noted in the skin, digestive system, and ears. A skin examination revealed alopecia on both earlobes and dull hair (Figure 1).

A fecal examination showed soft, paste-like stool with a brownish-yellow color and the presence of proglottids (Figure 2). Ear canal inspection revealed an accumulation of soft, wet, blackish-brown cerumen in both ear canals.

Skin and Ear Examination

A superficial skin scraping test produced negative results, indicating the absence of *Notoedres cati* and *Sarcoptes scabiei* mites. An otic swab test also produced negative results, indicating the absence of *Otodectes cynotis* mites.

Fecal Examination

A native fecal examination revealed the presence of *D. caninum* eggs. These eggs are contained within characteristic egg sacs that are excreted in the feces. Each egg sac is round to oval in shape (Figure 3).

Hematology Examination

The hematology results showed a slight decrease in Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), and hematocrit (HCT). Reductions in these values generally indicate anemia or another blood disorder, and this pattern most commonly suggests microcytic anemia. The hematology findings for the case dog are presented in Table 2.

Treatment

In this case, the deworming medication Caniverm® (Bioveta, Ivanovice na Hané, Czech Republic) was administered at a dose of one-half tablet, and the dose was repeated after 14 days. Deworming treatments often require repetition after 14 days due to the parasite's life cycle. Worm eggs can remain dormant in the body for several days to weeks, and if larvae hatch after the initial treatment, they may develop into adult worms and cause reinfection.

Terakreditasi Nasional Sinta 4, berdasarkan Keputusan Direktur Jenderal
Pendidikan Tinggi, Riset, dan Teknologi No. 158/E/KPT/2021

Volume 17 No. 6: 1921-1931
December 2025
https://doi.org/10.24843/bulvet.2025.v17.i06.p15

Supportive therapy included daily fish oil supplementation for 10 days. The dog also received supportive care consisting of bathing with a sulfur-containing shampoo, which has sublimating chemical properties. A supplement containing vitamin B complex, vitamin C, folic acid, iron, calcium, and nicotinamide (Livron B-plex tablet, PT. Phapros Tbk, Jakarta, Indonesia) was administered orally once daily for 5 days. The ears, which had accumulated blackish-brown cerumen, were cleaned using cotton buds.

Discussion

Dipylidium caninum primarily infects dogs and cats and can also cause infection in humans, making it a zoonotic parasite (Taylor *et al.*, 2007). Transmission to humans occurs through ingestion of infected intermediate hosts, particularly dog fleas or ticks (Cahyani *et al.*, 2020). The parasite has an indirect life cycle that requires a flea as the intermediate host and a vertebrate as the definitive host. Visible adult proglottids may be found in the perianal region, on bedding used by pets or humans, or in feces (Nurcahyo *et al.*, 2024).

Macroscopically, adult *D. caninum* are whitish tapeworms measuring 10 to 70 cm in length and 2 to 3 mm in width. Their bodies consist of a scolex with four suckers, a neck, and 60 to 175 proglottids. The proglottids contain two lateral genital pores and may be gravid. Gravid proglottids contain 3 to 30 eggs and have a shape resembling pumpkin or cucumber seeds. They exhibit active motility, enabling them to migrate out of the anus or be expelled with the feces, thereby disseminating eggs onto the host's hair, skin, and the surrounding environment.

The life cycle of *D. caninum* is heteroxenous and involves definitive hosts (dogs, cats, and occasionally humans) and intermediate hosts (fleas). Proglottids are expelled intact in feces or emerge from the perianal region. In the environment, these proglottids disintegrate and release egg packets, which may also be found free in fecal material. The intermediate host is most commonly the larval stage of dog or cat fleas, *Ctenocephalides* spp. (Athaillah *et al.*, 2022). Flea larvae ingest the eggs, and the oncospheres are released in the larval intestine. These oncospheres then penetrate the intestinal wall, enter the hemocoel, and develop into cysticercoids. The cysticercoids persist as the flea matures to adulthood. Vertebrate hosts become infected when they ingest adult fleas carrying cysticercoids. In the small intestine, the cysticercoids mature into adult tapeworms within approximately one month. The mature tapeworms, which may reach lengths of up to 60 cm and widths of about 3 mm, attach to the intestinal mucosa by their scolex. Gravid proglottids detach from the strobila and are expelled in the feces. Humans may also become infected by ingesting fleas containing cysticercoids. Children are reported to be most frequently affected due to close contact with infested pets (Sardjono *et al.*, 2020).

Infection in dogs is often asymptomatic, although proglottids may be visible in the feces. Several clinical signs are associated with dipylidiasis, including anal pruritus. This pruritus often results in scooting behavior, which occurs when the dog rubs its perineal area on the ground in response to irritation caused by the passage of gravid proglottids (Yuniarti and Lukiswanto, 2013). Additional clinical signs may include diarrhea, anorexia, weight loss, and a dull or unkempt coat.

Humans become infected by accidentally ingesting infected fleas during contact with pets or through environmental exposure (Ramana *et al.*, 2011). Children are particularly susceptible to *D. caninum* infection because of their frequent close contact with animals and limited hygiene awareness, such as inadequate handwashing or eating food while playing on the floor. Human infections may be asymptomatic, similar to those in animals, or may present with non-specific symptoms including abdominal pain, discomfort, bloating, diarrhea, reduced appetite,

Terakreditasi Nasional Sinta 4, berdasarkan Keputusan Direktur Jenderal
Pendidikan Tinggi, Riset, dan Teknologi No. 158/E/KPT/2021

Volume 17 No. 6: 1921-1931
December 2025
https://doi.org/10.24843/bulvet.2025.v17.i06.p15

weight loss, and anal pruritus. Persistent pruritus can cause scratching of the perianal area, which may result in abrasions and dermatitis (Asnifatima *et al.*, 2021).

After anamnesis, clinical examination, and supporting tests, the case dog was confirmed to be infected with the parasite *D. caninum*. The dog had a Body Condition Score of 4/9, with ribs easily palpable under a thin fat layer and evident abdominal tuck when viewed laterally. Clinical signs included restlessness and rubbing the anus on the ground. The dog had a history of scabies five months prior, which had already been treated. The dog did not exhibit diarrhea; its stools were soft but contained visible proglottids. The animal had never been vaccinated or dewormed. Appetite and water intake were normal, and the diet consisted of home-cooked food such as rice mixed with chicken liver. The dog was kept loose in the yard with two other dogs and occasionally wandered outside the fence, although only this dog's feces contained worms. *D. caninum* is transmitted through direct contact between infected and healthy animals. Environmental conditions significantly influence animal hygiene and health. Dogs kept outdoors, caged, or in semi-outdoor conditions have a higher risk of *D. caninum* infection (Adnyana *et al.*, 2024).

Fecal examination using the native method revealed proglottids and eggs of *D. caninum*. Indonesia's humid tropical climate provides an ideal environment for the proliferation of soil-transmitted parasites (Beriyajaya *et al.*, 1997). Eggs of *D. caninum* are shed in the feces of vertebrate hosts and are subsequently ingested by flea larvae along with organic debris. Inside the flea, the eggs develop into larvae and later into cysticercoids within the body cavity. When a vertebrate host, such as a dog, ingests an infected flea, *D. caninum* infection occurs. The cysticercoids then develop into adult worms in the host's small intestine. Adult worms typically reside in the small intestine and can cause clinical problems when present in large numbers. Severe infections in young animals generally result in nonspecific symptoms such as constipation and diarrhea (Cahyani *et al.*, 2019). Humans can also become infected with *D. caninum*, leading to symptoms such as abdominal pain, nausea, and vomiting.

Hematological evaluation showed that the dog had microcytic anemia. Anemia is a condition characterized by insufficient numbers of healthy red blood cells or inadequate hemoglobin concentration. Hemoglobin is a protein within red blood cells responsible for transporting oxygen throughout the body. Low hemoglobin levels impair oxygen delivery to tissues. A low HCT indicates a reduced proportion of red blood cells in the blood. Low MCV smaller-than-normal red blood cells, whereas low MCH indicates reduced hemoglobin content per cell. These values collectively indicate microcytic anemia, a condition in which red blood cells are both smaller and fewer in number than normal. This disorder arises from conditions that limit hemoglobin synthesis. Iron deficiency is the most common cause of microcytic anemia because iron is essential for hemoglobin production, although it is not the only possible cause (Rumpaisum *et al.*, 2021).

Causative therapy was administered to eliminate the etiologic agent. Since *D. caninum* is a parasitic cestode, deworming treatment was provided. The dog received one half tablet of Caniverm® (Bioveta, Ivanovice na Hané, Czech Republic). Caniverm is an antiparasitic medication used to treat cestode, nematode, and trematode infections in pets such as dogs and cats. It contains fenbendazole, pyrantel embonate, and praziquantel.

Fenbendazole is an antiparasitic agent commonly used to treat helminth and protozoal infections in animals. It belongs to the benzimidazole class and acts by inhibiting microtubule function in parasite cells, which leads to paralysis and death. Pyrantel embonate is an anthelmintic used to treat parasitic worm infections. It induces neuromuscular paralysis in worms, preventing survival and reproduction until the parasites are eliminated through feces

Terakreditasi Nasional Sinta 4, berdasarkan Keputusan Direktur Jenderal
Pendidikan Tinggi, Riset, dan Teknologi No. 158/E/KPT/2021

Volume 17 No. 6: 1921-1931
December 2025
https://doi.org/10.24843/bulvet.2025.v17.i06.p15

(Putra *et al.*, 2024). Praziquantel increases the permeability of the parasite's cell membrane to calcium ions, leading to muscle paralysis and death or detachment of the worms from the intestinal wall. Deworming medications cannot kill parasite eggs, so treatment was repeated 14 days after the initial administration to ensure eradication of *D. caninum*.

In the host's small intestine, ingested cysticercoid larvae are released and attach to the intestinal wall using the scolex, initiating development into adult worms. Within approximately 2 to 3 weeks, gravid proglottids detach from the strobila and are excreted in the feces. After disintegration, egg capsules are ingested by flea larvae. The hexacanth embryos then develop into cysticercoids in parallel with the flea's larval development (Athaillah *et al.*, 2022).

Praziquantel is an anthelmintic primarily effective against cestodes and is a pyrazinoisquinoline derivative. It is rapidly absorbed following oral administration and undergoes hepatic metabolism before biliary excretion. Metabolism occurs mainly through hydroxylation and conjugation. Peak plasma concentrations are reached within 1 to 2 hours. Most metabolites are excreted in the urine, with a small proportion excreted unchanged. Praziquantel acts through two mechanisms. At low effective concentrations, it increases muscle activity in worms due to the loss of intracellular calcium ions, leading to reversible contractions and spastic paralysis, which causes detachment from the intestinal wall. At higher therapeutic doses, praziquantel induces vacuolization and vesiculation in parasite tissues, resulting in disruption and death (Plumb, 2018).

Supportive therapy included supplements containing vitamin B complex, vitamin C, folic acid, iron, calcium, and nicotinamide (Livron B.plex tablets, PT. Phapros Tbk, Jakarta, Indonesia) administered orally once daily for five days. Livron B.plex is formulated to support metabolic processes and tissue repair. Fish oil was administered once daily for ten days. According to Wahyudi *et al.* (2020), fish oil contains omega-3 fatty acids, specifically EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), which improve coat quality and reduce hair loss (Rumpaisum and Widyastuti, 2021).

The dog also received supportive therapy in the form of bathing with sulfur-containing shampoo. Sulfur has keratolytic properties and is effective in killing mites due to its mild heating effect. Sulfur facilitates desquamation of the stratum corneum by promoting keratinocyte maturation and exfoliation. According to Zaelany *et al.* (2017), sulfur is effective in eliminating mites that reside in burrows within the epidermis. Bilateral ear canals contained accumulated blackish brown cerumen, which was cleaned using cotton swabs.

Evaluation five days after therapy showed improvement. Fecal examination revealed no worms, and a repeated native test performed five days after deworming showed no eggs. In this case, the disease was successfully resolved due to accurate diagnosis and appropriate therapeutic management.

CONCLUSION AND SUGGESTIONS

Conclusion

Based on the history, physical examination, clinical assessment, and supporting diagnostic tests, the dog was diagnosed with *D. caninum* infection with a favorable prognosis. Causative therapy consisted of administering half a tablet of a deworming medication (Caniverm®, Bioveta, Ivanovice na Hané, Czech Republic) containing fenbendazole, pyrantel embonate, and praziquantel. The causative therapy along with supportive therapy with Livron B.Plex helped fulfill nutritional requirements and supported metabolic function and tissue regeneration. Fish oil was administered once daily for 10 days. Evaluation five days after treatment showed improvement, as indicated by fecal examination results that revealed no worms.

Terakreditasi Nasional Sinta 4, berdasarkan Keputusan Direktur Jenderal
Pendidikan Tinggi, Riset, dan Teknologi No. 158/E/KPT/2021

Volume 17 No. 6: 1921-1931
December 2025
https://doi.org/10.24843/bulvet.2025.v17.i06.p15

Suggestions

Pet owners are advised to administer prescribed medications properly, including mixing them with food and ensuring that the animal consumes the full dose. Regular deworming every three months is recommended. Infected animals should be confined to prevent transmission to other pets. Owners should also bathe their animals regularly, maintain good environmental hygiene, and promptly remove any feces found in the yard.

ACKNOWLEDGEMENTS

The author would like to express his sincere gratitude to all staff members of the Veterinary Internal Medicine Laboratory for their valuable assistance, guidance, and support throughout this study, from its initiation to its completion. The author also extends his appreciation to the owners of the animals involved in the case study for their cooperation and continuous support in providing the information necessary for the preparation of this case report.

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Volume 17 No. 6: 1921-1931
December 2025
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Tables

Table 1. Present Status Examination Results

Parameter	Results	Normal range*	Interpretation
Heart rate (beats/min)	136	90-120	Increased
Pulse (beats/min)	134	90-120	Increased
Capillary Refill Time (CRT) (s)	<2	<2	Normal
Respiration (breaths/min)	30	20-30	Normal
Rectal temperature (°C)	38.6°C	38.5-39.5°C	Normal

*Reference: Widodo *et al.* (2011).

Volume 17 No. 6: 1921-1931
December 2025
https://doi.org/10.24843/bulvet.2025.v17.i06.p15

Tabel 2. Hematological examination results

Parameter	Unit	Results	Normal range*	Interpretation
WBC	10^3/uL	14.9	6.0-17.0	Normal
Lymphocytes	10^3/uL	2.4	0.8-5.1	Normal
Monocytes	10^3/uL	1.7	0.0-1.8	Normal
Granulcytes	10^3/uL	10.8	4.0-12.6	Normal
RBC	10^6/uL	6.37	5.50-8.50	Normal
HGB	g/dL	12.0	11.0-19.0	Normal
HCT	%	38.0	39.0-56.0	Decreased
MCV	fL	59.8	62.0-72.0	Decreased
MCH	pg	18.8	20.0-25.0	Decreased
MCHC	g/dL	31.5	30.0-38.0	Normal
RDW-CV	%	18.5	11.0-15.5	Normal
RDW-SD	fL	35.0	20.0-80.0	Normal
PLT	10^3/uL	460	117-460	Normal
MPV	fL	8.6	7.0-12.9	Normal
PDW		9.1	5.0-20.9	Normal
PCT	%	0.395	0.100-0.500	Normal

Abbreviations: WBC: White Blood Cell; RBC: Red Blood Cell; HGB: Hemoglobin; HCT: Hematocrit; MCV: Mean Corpuscular Volume; MCH: Mean Corpuscular Hemoglobin; MCHC: Mean Corpuscular Hemoglobin Concentration; RDW: Red-cell Distribution Width, PLT: Platelet; MPV: Mean Platelet Volume; PDW: Platelet Distribution Width, PCT: Procalcitonin. *Reference: Dharmawan (2002).

Figures

Figure 1. The alopecia observed on both ears.

Figure 2. Soft, yellowish-brown feces containing proglottids (red arrow)

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Volume 17 No. 6: 1921-1931
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https://doi.org/10.24843/bulvet.2025.v17.i06.p15

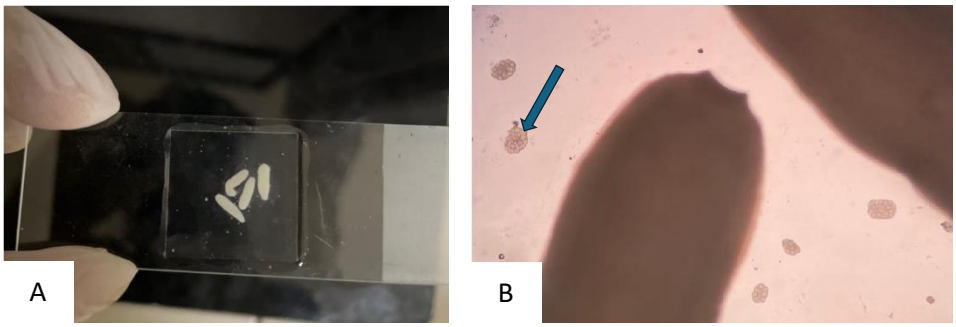

Figure 3. (A) Proglottids on a glass slide. (B) Native fecal examination showing *Dipylidium caninum* eggs (blue arrow) at 100× magnification.

Figure 4. Feces condition after treatment.

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