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Case Report

PARASITIC INFECTION IN A ONE-YEAR-OLD MALE NIGERIAN INDIGENOUS BREED DOG: A CASE STUDY

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ABSTRACT
Accurate and timely diagnosis of disease is critical for guiding prompt treatment, and preventing harm to the patient. A one-year-old apparently healthy male indigenous breed dog was presented to the Small Animal Clinic of the University of Jos Veterinary Teaching Hospital, Jos, Plateau State, Nigeria, for a medical check-up. Blood and faecal samples, as well as some arthropods obtained from the dog were submitted to the Diagnostic Unit of the Hospital for haematological and parasitological analyses. While the faecal sample was subjected to faecal flotation and sedimentation, the blood sample was subjected to thin blood smear, Giemsa staining and haematology. Examination of all the samples revealed two ectoparasites: the brown dog tick, *Rhipicephalus sanguineus*, sensu lato (s.l.), and the cat flea, *Ctenocephalides felis*. The haemoparasite identified was *Babesia canis*, while the faecal sample revealed hookworm (*Ancylostoma*) eggs. The dog was treated with albendazole 15 mg/kg *per os* and imidocarb dipropionate 6.6 mg/kg subcutaneously, along cypermethrin pour on. Physical and laboratory examination of the animal three weeks post-treatment showed that it was free from these incriminating parasites. Understanding diagnostic accuracy is crucial for enhancing clinical outcomes, thereby ensuring the health of both animal patients and their owners.

Keywords: Parasitic infection, *Rhipicephalus sanguineus*, *Ctenocephalides felis*, *Babesia canis*, *Ancylostoma* spp., Nigerian indigenous breed dog

INTRODUCTION
Dogs are one of the most cherished pet animals found in many households worldwide. This canine species comes in different breeds and benefits its owners in various ways. Recent research showed that owning a dog benefits its owner physically and emotionally, and improves happiness and health. The companionship derived from keeping dogs can help in coping with a crisis that stems from loneliness (Arford, 2023). According to the World Animal Foundation, there are about 900 million dogs globally**.** This includes pets and free-roaming animals (Alt, 2024). Dog breeding is fast becoming a lucrative business globally (www.globalinforesearch.com). Also, with the increasing demand for security dogs, companion pets, and exotic breeds (Hausmann *et al.*, 2023), dog farming, also known as dog breeding, is rapidly growing in popularity across Nigeria, where exotic and hybrid dogs, as well the Nigerian indigenous breed of dogs (NIBD), are reared (Somtochukwu, 2025). However, the dog industry is confronted with the challenge of managing diseases of infectious and non-infectious origin.

Parasitic diseases influence the health of dogs. Parasitic infections are a global phenomenon, and they can be associated with severe or mild symptoms. Ectoparasites, including ticks, mites, fleas, and biting flies, are responsible for dermatological conditions (Kaminsky & Mäser, 2025), and vector-borne diseases (viral, bacterial, or parasitic) in pets. Endoparasites, which are essentially helminths and pathogenic protozoa reside in the body of their hosts. These include hookworms (*Ancylostoma caninum*), whipworms (*Trichuris vulpis*), or protozoans such as *Babesia* and *Trypanosoma* species which are both haemoparasites, and a coccidia, *Cystoisospora canis* and *Giardia* spp. which are both internal parasites. Other parasites reside in canine body tissues and these include *Leishmania* spp., *Dirofilaria* spp, *Mycoplasma* spp., and *Acanthocheilonema* spp. Most of these infections are zoonotic, affecting humans, their pets, as well as other livestock globally, both in terms of severity and numbers (Kaminsky & Mäser, 2025).

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Accurate and timely diagnosis plays a crucial role in the well-being of sick animals. Disease diagnostics is critical for identifying diseases, monitoring treatment effectiveness, and enhancing overall veterinary care (Alharbi, 2025). Various techniques are used in the field of veterinary parasitology and entomology for the isolation and identification of the aetiologies of parasitic diseases. These laboratory techniques are employed at the University of Jos Veterinary Teaching Hospital in analysing parasitological samples. This study specifically focuses on the laboratory analyses of clinical samples from the NIBD for identification and speciation of the parasites therein, and to institute the appropriate treatment regimen.

CASE STUDY

On the 2nd of April 2025, blood sample in an EDTA-coated sample bottle, a faecal sample in a sample bottle, and gross specimens tagged "ectoparasites" in a Petri dish from the Small Animal Clinic, University of Jos Veterinary Teaching Hospital (UJ-VTH), Polo Gada-Biu, Jos, were submitted to the Diagnostic Unit of the Hospital for haematological and parasitological analyses. These samples were from a one-year-old male NIBD.

LABORATORY PROCEDURE

EXAMINATION OF ECTOPARASITES

The gross specimen (arthropods), presented in a Petri dish, were separated based on morphology and examined grossly, under the light microscope at 4X and 10X objectives, and photographed using a digital camera (Toup®). Morphological features on the cranial, caudal, dorsal, and lateral views were noted. For the adult (replete) tick, both the dorsal and the ventral views were photographed using the camera of an Android phone (Samsung A20s, SM-A207F/DS 720 x 1,560 pixels). Morphological identification of fleas and ticks were based on the reports of Campbell *et al.* (2018), García-Sánchez *et al.* (2022), and Kouassi *et al.* (2023).

EXAMINATION OF FAECAL SAMPLE

The faecal flotation and sedimentation techniques were employed to concentrate and isolate helminth eggs, coccidian oocysts, and protozoan cysts following the method described by Tagesu (2018). Approximately 3 g of the faecal sample was suspended in a saturated sodium chloride solution of a specific gravity of 1.20 and strained into a test tube. More of the flotation solution was added until a convex meniscus was observed. A cover slip was gently placed and allowed to stand for 15 minutes. Thereafter, the coverslip was removed, placed on a grease-free microscope slide, and examined under the microscope at 10X and 40X objectives. In the sedimentation method, approximately 5 g of the faecal sample was suspended in tap water and screened. The filtrate was allowed to sediment for 30 minutes, and the supernatant was discarded. The sediment was reconstituted with water and allowed to sediment again. This was repeated until the supernatant became clear. Aliquots of the sediment were observed under the light microscope as described earlier. Identification of helminth eggs was done using micrometry keys described by Sultan *et al.* (2025).

BLOOD SAMPLE EXAMINATION

A thin blood smear was prepared according to the method described by Bain *et al.* (2016). The smear was stained with Giemsa, air-dried, and examined under the microscope at 100X (oil immersion) objective, to identify haemoparasites. Also, blood sample was taken for the analysis of haemogram.

LABORATORY FINDINGS

The ectoparasites isolated were identified as *Rhipicephalus sanguineus*, the brown dog tick (Figures I & II) and *Ctenocephalides felis*, cat fleas (Figure III). The ticks, were both replete (r) and non-replete, n.r. (Figure I A). The dorsal view revealed the mouthparts (m.p.) on the head, the dorsal plate, the brown inornate scutum (s), which did not cover the entire dorsum (Figure I B), while the ventral view showed the anus (a), the position of the genital aperture (g.a.) between the second and the third coxa (Figure I C). This was identified as the female *Rhipicephalus sanguineus* (sensu lato, s.l.). In Figure II, the specimen that had hexagonal basis capitulum, b.c. (Figure II A), small rectangular areas separated by grooves, festoons (f) on the posterior margin of the abdomen and the scutum (s) covered the entire dorsum (Figure II B) was identified as male *Rhipicephalus sanguineus* (s.l.).
The cat flea, *Ctenocephalides felis* (Figure III) was identified because of its basic features (Figure III A & B), and the presence of two striking features in the head region: the oval shape nature of the head, with the length (a) twice the width (b), the equal length of the first and second spines in the genal comb, g,c. (Figure III C).
Faecal analysis revealed hookworm (*Ancylostoma*) egg (Figure IV). A blood parasite, *Babesia canis*, was observed in the red blood cell from the thin blood smear (arrow in Figure V A).
Table I shows the haemogram of the dog before and after treatment. The packed cell volume (PCV) was lower pre-treatment (38%) compared to the value obtained three weeks post-treatment (42%).
The values of markers of inflammation such as total white blood cells (WBC), band neutrophils, lymphocytes and eosinophils in pre-treatment were elevated in comparison to those of post-treatment, although pre- and post-treatment

values were in normal range. *Babesia canis* detected in the blood film pre-treatment may have already initiated the inflammatory processes, though at the latent stage.

TABLE I: HAEMOGRAM OF A ONE-YEAR-OLD MALE NIBD BEFORE AND AFTER TREATMENT

	PRE-TREATMENT	POST-TREATMENT	*REFERENCE VALUES
Plasma colour	Normal	Normal	
PCV (%)	38	42	35–57
Total WBC (10^3/µL)	13.5	12.8	5.0–14.1
Differential		**Absolute**	
Segmented Neutrophil (10^3/µL)	9.315	9.472	2.9–12.0
Band Neutrophil (10^3/µL)	0.405	0.256	0–0.45
Lymphocytes (10^3/µL)	3.780	2.816	0.4–2.9
Monocytes (10^3/µL)	00	00	0.1–1.4
Eosinophils (10^3/µL)	0.135	0.128	0–1.3
Basophils (10^3/µL)	00	00	0–0.14
Parasites in blood smear	*Babesia canis* +	NPF	
Interpretation	The PCV and the haemogram are within the normal ranges, however, thin blood smear revealed light Babesiosis.	The PCV and the haemogram are within the normal range.	

NPF = No parasites found; * Fielder, S. E. (2022)

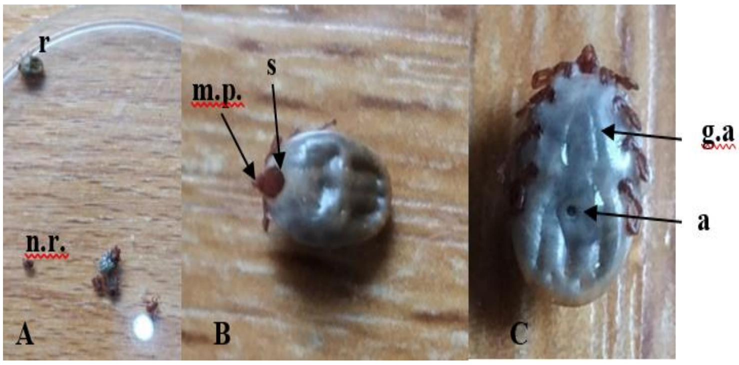

Figure I: Brown dog tick isolated from a one-year-old male Nigerian indigenous breed dog (NIBD) showing replete (r) and non-replete(n.r.) female and male, respectively (A); dorsal (B), and ventral (C) views of female *Rhipicephalus sanguineus*(s.l.) showing mouthparts (m.p.), inornate scutum (s), the position of the genital aperture (g.a.) and the anus (a).

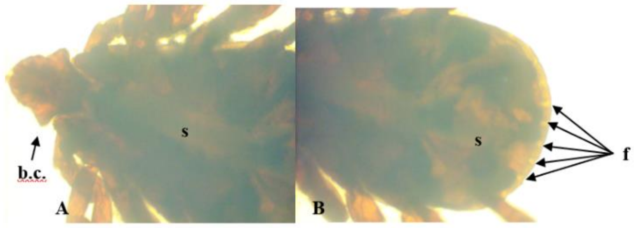

Figure II: Dorsal view (A & B) of non-replete male *Rhipicephalus sanguineus* (s.l.) from NIBD showing the dorsum, hexagonal basis capitulum (b.c.), inornate scutum (s) and festoons (f), (x 40)

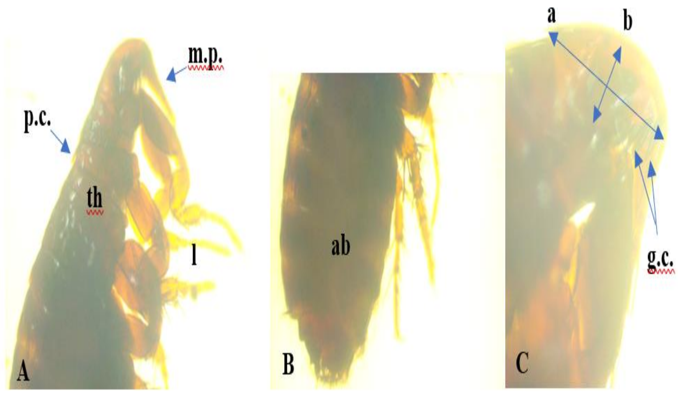

Figure III: Cranial (A) and caudal (B) views (x 40) of *Ctenocephalides felis* (cat flea) from NIBD showing the mouthparts (m.p.) pronotal comb (p.c.), thorax (th) abdomen (ab) and legs (l). C is the head region (x 100) showing, length (a) and width (b) of the head, and the equal genal comb (g.c.)

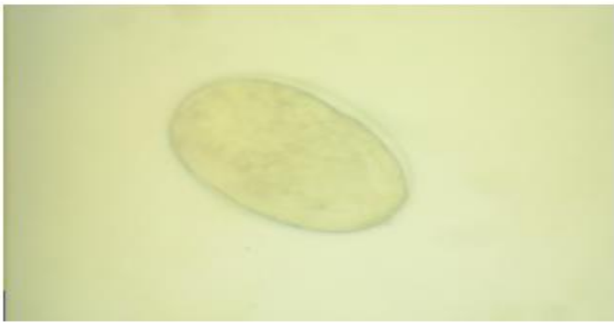

Figure IV: Hookworm (*Ancylostoma*) egg recovered from the faecal sample of NIBD, (x 400).

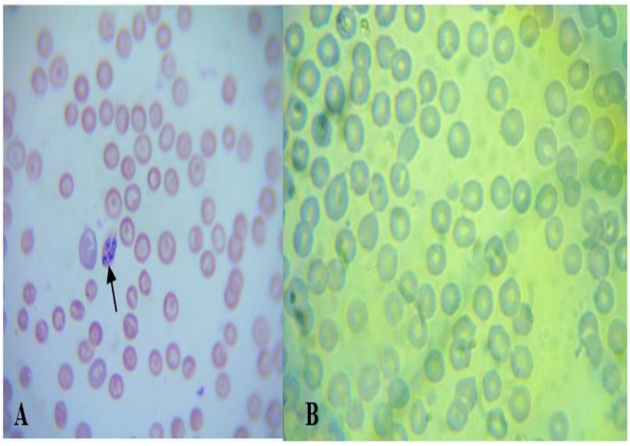

Figure V: Thin blood smear, Giemsa-stained from NIBD showing *Babesia canis* in a red blood cell (arrow, A) and no haemoparasites three weeks post-treatment (B), (x 1,000).

TREATMENT

The dog was treated with a broad spectrum anthelmintic, antiprotozoal and ectoparasiticide once as follows:
Tab. Albendazole 15 mg/kg p.o.

Inj. Imidocarb dipropionate 6.6 mg/kg SC

Ext appl. Cypermethrin 5 mL

DISCUSSION

Dogs, as companion animals, are often presented to the clinic not only for treatment, but for routine medical check-ups. The presence of the dog under study in the Veterinary Facility warranted thorough physical and laboratory examinations. The presence of a few ectoparasites on the dog, which are known to transmit pathogens, warranted blood and faecal sampling, even though the animal appeared healthy. Dog and cat fleas are known to transmit a tapeworm (cestode), *Dipylidium caninum*, but the infected animals might not exhibit any clinical signs, except for dragging their anus on the ground (scooting).

It is being reported that *D. caninum* infects humans who accidentally ingest the cysticercoid harboured by fleas (Chelkeba, 2020). It may not be unexpected that cat fleas, *Ctenocephalides felis*, should be found on the dog, instead of the dog flea, *C. canis*, as *C. felis*is the most prevalent species found on pets (Dryden, 1993; Millán-Orozco and Millán-Orozco, 2025). *D. caninum* egg was however, not detected in the stool of the dog.

The brown dog tick, *Rhipicephalus sanguineus* (s.l.), transmits several haemoparasites, including *Babesia canis,* a parasite responsible for a wide range of clinical signs including lethargy, weakness, fever, and dark urine (Irwin, 2010). However, based on the laboratory findings (Table 1 & Figure V A), the haemoparasite was observed to infect only one red blood cell, indicating that the infection was still at the latent stage. Though eosinophils are within the normal range, eosinophilia is often associated with parasitic infections (O'Connell & Nutman, 2015); in this case, babesiosis and ancylostomosis. However, with the prompt treatment instituted on the animal concerning both internal and external parasite control, the blood picture three weeks post-treatment showed no parasites seen (Figure V B).

Dogs do suffer from hookworm infection called ancylostomiasis. *Ancylostoma* spp., though only about 3 mm in length, its feeding habit can lead to severe anaemia because the parasite sucks the host's blood (Burke, 2024). With the presence of just one *Ancylostoma* egg in the entire faecal float and no other helminth egg even in faecal sedimentation, it is assumed that the burden of adult helminth parasites may be quite low in the gastrointestinal tract of the animal. However, timely anthelmintic treatment eradicated the worms. It is reported that hookworm larvae on infected soil can burrow into the skin of pets and humans, causing uncomfortable itching, commonly referred to as "ground itch" (Burke, 2024). Thus, *Ancylostoma* spp. has zoonotic potential. Faecal analysis three weeks post-treatment showed no parasites found on faecal flotation. This underscores the fact that pets should be routinely presented to the clinic for adequate medical attention to ensure that their health status is maintained. This practice not only keeps animals healthy but is also cost-effective.

CONCLUSION

The important ectoparasites recovered from this dog include the brown dog tick, *Rhipicephalus sanguineus* (s.l.) and *Ctenocephalides felis,* the cat flea. One haemoparasite, *Babesia canis,* and one nematode, *Ancylostoma* spp. constituted the endoparasites. Nonetheless, the animal did not succumb to clinical disease. As has been asserted, Nigerian native dogs have rightfully earned a reputation for their hardiness and adaptability, capable of flourishing in diverse climatic conditions.

CONFLICT OF INTEREST STATEMENT

The authors declare that they do not have a conflict of interest.

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