Diagnostic update

Fecal Dx antigen testing—find parasite infections the microscope misses

Introduction

In order to ensure the health of patients, a fecal examination for intestinal parasites is an important part of a regular checkup. Regardless of the fecal procedure used, there can be some limitations on accurately identifying infections with some parasites. Detection of hookworm, roundworm, whipworm, and flea tapeworm can be difficult with the current diagnostics. IDEXX Reference Laboratories offers Fecal Dx® antigen testing as an additional tool for detecting these common parasites.

Background

In small-animal practice, hookworms, roundworms, whipworms, and flea tapeworms are commonly encountered intestinal parasites in canine and feline patients. They each have a unique life cycle, and their prepatent period, the time in which they infect a host before laying eggs, may range from 14–21 days in hookworms, 14–30 days in roundworms, 14–35 days in flea tapeworms, to as long as 74–90 days in whipworms.[1–5] This prepatent period may allow infections to go undetected on fecal flotation, increasing the chance for the appearance of clinical signs prior to evidence of eggs or proglottids in the stool.

Prevalence

In dogs and cats, the prevalence of infection with each intestinal parasite varies from region to region and tends to occur more frequently in shelter animals than in well-cared-for dogs and cats that visit the veterinarian on a regular basis. Outdoor pets and those that consume prey with possible infective larvae in their tissues may be more likely to be infected.

Studies have shown that hookworm and roundworm prevalence in pet dogs was 2.5% and 2.2% respectively[6] and 20.2% and 15.2% in shelter dogs.[7] One study of approximately 1,500 feline fecal specimens found that 7.5% of the cats were shown to be infected with Toxocara cati.[8]

The whipworm prevalence in dogs in the U.S., based on detection of eggs in feces, ranges from 1.2% in pet dogs[6] to 14.3% in shelter dogs.[7] In North America, whipworm infections in cats are rare.[9]

Clinical signs

Some dogs and cats infected with these common intestinal parasites may show no clinical signs, but others may develop a variety of gastrointestinal signs that depend on the parasite and age of the patient. Signs may range from mild diarrhea, vomiting, and ill thrift to severe bloody diarrhea, anemia, and occasionally death.[1–3] Dogs and cats with flea tapeworm infections rarely develop any clinical signs.[4]

Current diagnostics

Currently, the most common method for diagnosing intestinal parasite infections is fecal flotation, either passive or by centrifugation. There are many issues that may complicate the diagnosis of infections with this method. One possible complication is misidentification. Pollen and other debris may be misidentified as eggs. In addition, the inappropriate identification of eggs from other species as a result of coprophagy (the ingestion of infected feces) may also occur. One study researching this occurrence found that 31.5% *Toxocara*-positive canine fecal specimens were in fact *T. cati* eggs.[10]

Another common problem concerns the varying density of the different eggs, which makes it difficult for a clinician to select the ideal fecal flotation solution to ensure adequate recovery of eggs from all potential parasites.

Yet another challenge with fecal flotation is that this method of egg identification lacks the ability to detect infections during the prepatent period or with single-sex infections, when eggs are simply not present in the infected animal.

Finally, fecal flotation may not always be reliable as a single test. Because many parasites shed eggs intermittently, a specimen from an infected animal may still generate a false-negative diagnosis if only a single fecal flotation is examined. For all these reasons, there is a need to find a better tool for the diagnosis of the most common intestinal parasites found in dogs and cats.

Testing innovations from IDEXX Reference Laboratories

Antigen detection is commonly used to diagnose heartworm and *Giardia* infections, and is also available for these additional parasites. IDEXX Reference Laboratories has developed Fecal Dx antigen testing, which includes immunoassays for the detection of hookworm, roundworm, whipworm, and flea tapeworm antigens in feces. These antigens are secreted by the adult worm and are not present in their eggs, which allows for detection of prepatent stages as well as the ability to overcome the challenges of intermittent egg shedding. Early detection during the prepatent period will also reduce the frequency of environmental contamination with potentially infectious eggs. As recommended by the Companion Animal Parasite Council (CAPC), fecal tests for antigen should be combined with microscopic examination

of feces for eggs for the widest breadth of detection of intestinal parasites in dogs and cats.[1–4]

Detect more infections—nematodes

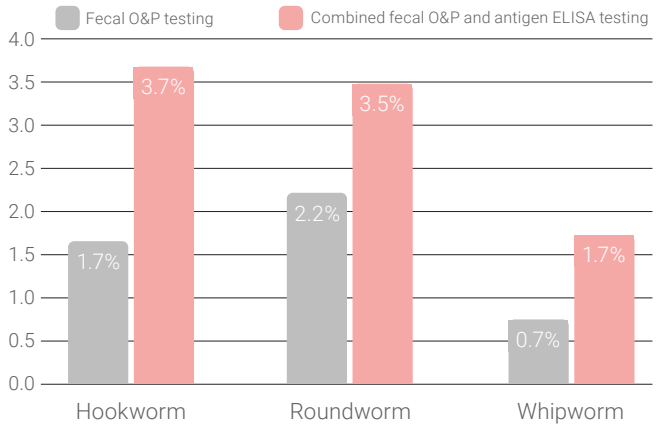
More than 750,000 IDEXX Reference Laboratories fecal results, consisting of both canine and feline specimens, were analyzed for positive nematode results. These specimens were submitted for testing using both fecal flotation by centrifugation (fecal O&P) and fecal antigen ELISA methods for hookworm, roundworm, and whipworm.[11]

Hookworm eggs were detected in 1.7% of the specimens. The hookworm-specific antigen ELISA was positive in an additional 2.0% of specimens that were negative for hookworm eggs, thus bringing the total hookworm detection with the combined fecal O&P and antigen ELISA testing to 3.7%.

Roundworm (ascarid) eggs were detected in 2.2% of the specimens. The roundworm-specific antigen ELISA was positive in an additional 1.3% of specimens that were negative for roundworm (ascarid) eggs, thus bringing the total roundworm detection with the combined fecal O&P and antigen ELISA testing to 3.5%.

Whipworm eggs were detected in 0.7% of the canine specimens. The whipworm-specific antigen ELISA was positive in an additional 1.0% of specimens that were negative for whipworm eggs by fecal O&P testing, thus bringing the total whipworm detection with the combined fecal O&P and antigen ELISA testing to 1.7%.

Intestinal parasite detection



Detect more infections—cestodes

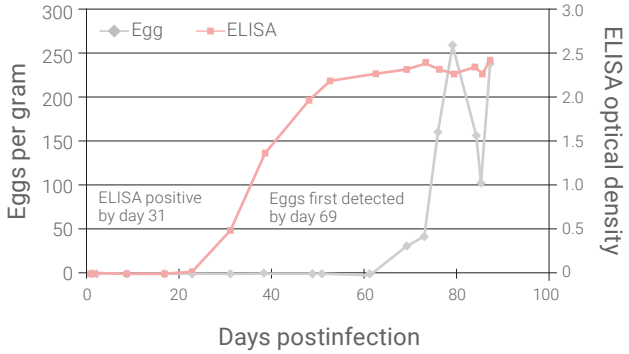
Studies have previously demonstrated that PCR can detect *Dipylidium caninum* in feces from experimentally infected and field dogs.[5] In a study using experimentally infected dogs, 88% of the specimens that were PCR positive were also positive for flea tapeworm by coproantigen immunoassay.[12] In a field study of dogs infested with fleas, positive and negative agreement between *D. caninum* PCR and coproantigen detection was 77% and 97%, respectively.[12] Analysis of 893 specimens submitted to IDEXX Reference Laboratories detected flea tapeworm antigen in 5.8% of the specimens while only 2 (0.22%) were positive on fecal flotation by centrifugation (fecal O&P).[13]

Detect infections earlier

Because of the lack of egg detection with fecal O&P testing during the prepatent period and single-sex infections, many parasite infections may go undetected for a period of time and, therefore, create a difficulty in correlating clinical signs to fecal test results. In an experimental infection study conducted at IDEXX, the fecal antigen ELISAs were able to detect infection during this prepatent stage.[14]

The graph below illustrates the identification of a whipworm infection approximately 30 days before fecal O&P testing when using the whipworm-specific antigen ELISA.

Prepatent infection detection



Treatment

There are a variety of anthelmintic products available for both treatment and control of intestinal parasite infections. Please see the current Companion Animal Parasite Council (CAPC) recommendations for guidance.[1–4]

Fecal Dx® antigen testing detects worm antigen. A positive antigen test indicates infection. Antigen-positive and egg-negative specimens can be seen during the prepatent period, with single-sex infections, and as a result of intermittent egg shedding. Microscopic identification of eggs in antigen-negative specimens may be due to coprophagy or because the amount of antigen is below the level of detection. Treatment should be considered for patients found positive by antigen, egg, or proglottid detection.

Public health considerations and preventive measures

Because of the zoonotic potential of these parasites, most commonly hookworm and roundworm, immediate disposal of feces is important. This will also reduce the likelihood of reinfections and prevent the long-term contamination of the environment. Monthly anthelmintic medications can be helpful in preventing the continuation of the cycle.

Contacting IDEXX

Laboratory Customer Support
If you have any questions regarding test codes, turnaround time, or pricing, please contact our Laboratory Customer Support Team at 1-888-433-9987.

Expert feedback when you need it
Our medical specialty consulting service is available for expert and complimentary consultation. Please call 1-888-433-9987 if you have questions.

Recommended reading

Elsemore DA, Geng J, Flynn L, Cruthers L, Lucio-Forster A, Bowman DD. Enzyme-linked immunosorbent assay for coproantigen detection of *Trichuris vulpis* in dogs. *J Vet Diagn Invest*. 2014;26(3):404–411.

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8. Gates MC, Nolan TJ. Endoparasite prevalence and recurrence across different age groups of dogs and cats. *Vet Parasitol.* 2009;166(1–2): 153–158.
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10. Fahrion AS, Schnyder M, Wichert B, Deplazes P. *Toxocara* eggs shed by dogs and cats and their molecular and morphometric species-specific identification: is the finding of *T. cati* eggs shed by dogs of epidemiological relevance? *Vet Parasitol*. 2011;177(1–2):186–189.
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12. Beall M, Tyrrell P, Bezold T, Hanna R, Hanscom J, Rogosienski O, Elsemore D. *Dipylidium caninum* coproantigen detection by immunoassay agrees with nucleic acid detection by PCR in dogs with experimental and natural infections. Paper presented at: American Association of Veterinary Parasitologists 67th Annual Meeting; June 26, 2022; Snowbird, UT.
13. Elsemore D. Detection of *Dipylidium caninum* coproantigen in experimental and natural infections [AAVP Abstract 23]. Paper presented at: American Association of Veterinary Parasitologists 67th Annual Meeting; June 26, 2022; Snowbird, UT.
14. Elsemore DA, Geng J, Flynn L, Cruthers L, Lucio-Forster A, Bowman DD. Enzyme-linked immunosorbent assay for coproantigen detection of *Trichuris vulpis* in dogs. *J Vet Diagn Invest*. 2014;26(3):404–411.

The information contained herein is intended to provide general guidance only. As with any diagnosis or treatment, you should use clinical discretion with each patient based on a complete evaluation of the patient, including history, physical presentation, and complete laboratory data. With respect to any drug therapy or monitoring program, you should refer to product inserts for a complete description of dosages, indications, interactions, and cautions.

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