

Introduction

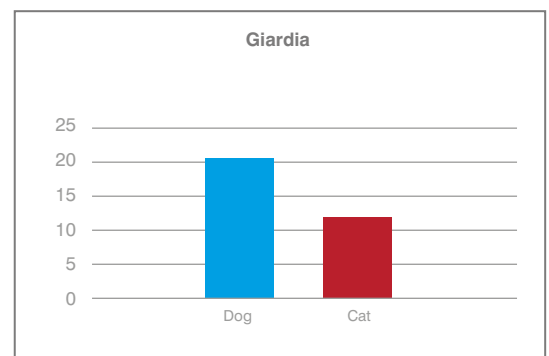
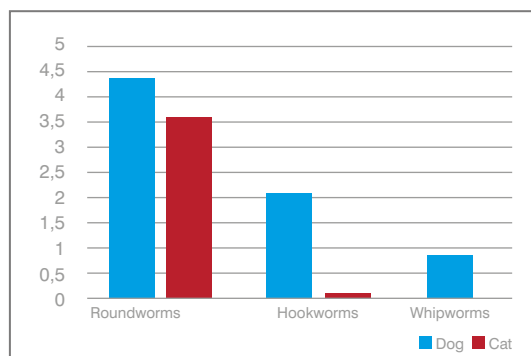
Veterinary practices routinely implement parasite control programmes as part of insuring the health of their patients. Supported by various professional parasitology groups, many of these programmes focus on intestinal parasites and are founded in routine testing and deworming. For dogs and cats, most of these control strategies target the more common intestinal parasites: ascarids (roundworms), hookworms and whipworms. The programmes serve several goals, such as reducing the risk of clinical disease in the individual pet, eliminating the shedding of eggs and the subsequent contamination of the environment from infected patients, and reducing the risk of zoonotic spread to humans.

It is generally recommended to make an individual risk assessment for each animal, taking into account all possible pathways of infection. However, while it is commonplace for veterinary practices to dispense deworming products for home administration during patient visits, routine testing programmes are not practiced as often. Faecal testing remains the only reliable way to determine the infection status for intestinal parasites and to make a reasonable treatment decision. Traditional test methods can be cumbersome, time-consuming and have variable levels of accuracy. IDEXX Laboratories developed a more easy, convenient and accurate way for regular intestinal parasite screening.

Prevalence of intestinal parasites

In dogs and cats, the prevalence of infection varies between regions and differs depending on the animal's lifestyle, age and level of care. Special infection risk exists in puppies and breeding bitches, during contacts at dog/cat shows, pet obedience schools and dog parks/runs, as well as through frequent coprophagy or carrion eaters. Shelter animals tend to have higher infection rates than well-cared-for pets that visit the vet on a regular basis, and outdoor housed pets or hunting dogs will have higher exposure to infective larva when routing in soils or consuming prey. But even well-cared-for pets are at risk if they live in a multi-pet household or visit public areas that other pets frequent. Even strictly indoor cats can show considerable infection rates with e.g. ascarids.

Percentage of positive samples from several European countries, that have been submitted to IDEXX Reference Laboratories for faecal flotation in 2016:



**Despite deworming,
infection rates
remain high**

Deworming pills are very effective at eliminating adult infections. The above figure, however, suggests that despite routine dispensing of these medication, the infection rate is significant with a high percentage of pets harbouring an infection. There are several possible explanations why infection levels remain so substantial: re-infection, lack of compliance in administering the deworming products or not deworming the correct worm species or worm stage with the appropriate pharmaceutical compound.

Re-infection – Tick and flea prevention medications have a long duration of activity that last weeks to months. Many oral deworming tablets, usually only treat the infections that are present at time of administration. They do not have prolonged activity beyond that dosing, which leaves pets susceptible closely following deworming administration.

Lack of compliance – Although deworming product dispensing compliance is high amongst veterinary practices, pet owner administration compliance is not. A 2013 Bayer Animal Health study of 1.000 pet owners found that only 21 % of cat owners deworm their pets every three months.ⁱ A study of dog owners found that only 50 % of owners had given a deworming dose in the last 3 months.ⁱⁱ

Non-compliance in pet owners can be attributed to:

- Simply forgetting, even if they have purchased products
- Lack of education or concern about the risks of parasitic infections (e.g. no individual risk assessment); for internal parasites, this is compounded by the fact that pet owners don't visualise infections like they do with fleas and ticks
- Cost of medications
- Misinformed concerns about adverse effects of medications

Incorrect deworming – If the infecting worm species is misidentified, or if consideration for the stage of the worm's development is not considered, a pharmaceutical treatment may be prescribed and applied that is ineffective. In such cases, the pet will be incorrectly presumed to be worm-free, increasing the chance that the infection will spread.

**The risk to humans:
zoonosis**

Soil-transmitted helminthiasis affect more than 2 billion people worldwide.ⁱⁱⁱ It is well established that the companion animal ascarids cause human infections primarily from the canine ascarid (*Toxocara canis*), but the cat ascarid (*Toxocara cati*) has also been implicated and probably underestimated. Young children are most often affected, due to increased exposure from outdoor play activities and frequent gaps in good hygiene. One of many published studies looking at *Toxocara* exposure rates in children found that 4.6 % of children had circulating serum antibodies; this exposure rate grew to nearly 30 % in children of lower socioeconomic status.^{iv} Another study found that while a 'low-risk' control group has a seroprevalence to *Toxocara* of 1.9 %, dog and cat owners had a significantly higher risk of exposure at 5.6 % and 10.9 % respectively.^v People can be affected by so-called larva migrans visceralis and can show gastrointestinal symptoms with e.g. abdominal pain, fever, hepatomegaly, eosinophilia and asthmatic reactions; migration into eye and brain are associated with severe complications.

Regular testing improves control strategies

Sound prevention programmes include not only regular deworming, but also routine testing protocols. Leading parasitologists and parasitology groups like the European Scientific Counsel of Companion Animal Parasites (ESCCAP) recognise and advocate for the practice of periodic deworming as well as regular testing in veterinary clinical practice.^{vi} As mentioned earlier, practice compliance on the dispensing of medication is very high with European practices: 52 % report 'always' dispensing deworming medications and another 45 % report 'sometimes'. Testing compliance, however, is much lower with 54 % of practices reporting they 'never' conduct faecal testing with deworming dispensing and only 29 % reporting 'sometimes'.^{vii}

Adding testing to parasite control programmes has multiple benefits:

- **Testing provides prevalence data** – Testing pets as part of the routine visit lets vets learn what parasites are infecting patients and putting families at risk. It provides important input for an individual risk assessment and builds the base for control strategies. Knowledge of what parasitic agents are prevalent in the clinic's area allows vets to formulate an appropriate control programme and increase awareness and vigilance in the practice's staff.
- **Prevalence data can be used to educate and motivate pet owners** – Real data from the client's local practice can be a powerful tool for educating pet owners on the actual risk of infection in their pet. Sharing this information and making the risk 'real' helps to drive awareness as well as compliance in administering deworming medication.
- **Identifying positive animals identifies which pets need treatment** – Knowing which animals are infected and with what parasite allows for the proper medication to be dispensed. Equally important is to inform and educate the pet owner on the fact their pet is being exposed to parasites and if not treated, will continue to shed these parasites into their environment as well as being at risk of breaking with disease and potentially put their families at risk of infection. Regular testing identifies such pets, so that they can be treated to reduce the threat.

The limitations of current testing methods

Currently, the most common method for diagnosing intestinal parasite infections is faecal flotation, either passive or by centrifugation. There are many issues that may complicate the diagnosis of infections with this method, including:

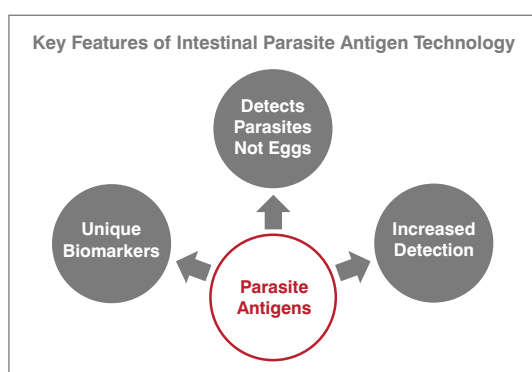
- **Misidentification** – Pollen and other debris may be misidentified as eggs.
- **Inappropriate identification** – False positives can result from coprophagy. One study showed that 32 % of canine roundworm infections (*T. canis*) by flotation when confirmed by PCR were actually the cat roundworm *T. cati*, a non-infective parasite in the dog.^{viii} The same is true for non-infectious *T. canis* eggs ingested and passed by a dog after coprophagy (other dogs or fox faeces).
- **Nothing to identify** – Many parasites shed eggs intermittently, so a specimen from an infected animal may still generate a false-negative diagnosis if only a single faecal flotation is examined. Thus, flotation requires three consecutive-day faecal sample collections for sufficient sensitivity in patent infections. Furthermore, a flotation solution should show at least a specific gravity of 1.3 not to miss heavy eggs and include the centrifugation step.
- **Non-identification** – Faecal flotation lacks the ability to detect infections during the prepatent period when an adult infection is present but eggs are not being shed yet (e.g., the prepatency for whipworms is usually 3 months) or with single-sex infections, when eggs are simply not present in the infected animal.
- **Multiple-day sampling compliance** – As explained above, three samples are required in many cases, to be collected over the course of three days. This makes compliance problematic.

A novel pioneering test for optimised protocols

Knowing what parasites are a threat in your area is the basis for any effective parasite control programme. However, at the moment, many veterinary practices have not yet adopted regular routine wellness testing as part of their intestinal parasite control efforts. This is why IDEXX Laboratories has developed a unique new product designed to bring ease and accuracy to intestinal parasite testing: PetChek™ IP.

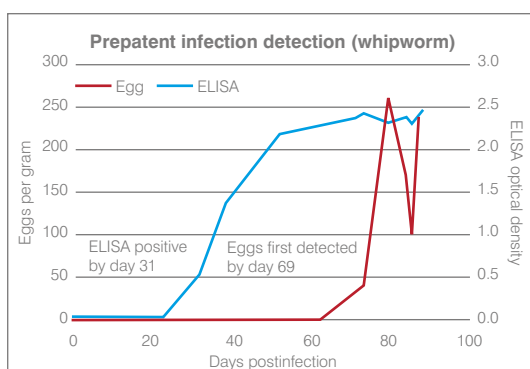
Aligned with established deworming protocols, PetChek™ IP tests for common intestinal parasites that are usually included in regular deworming schedules: ascarids, hookworms and whipworms. PetChek™ IP uses novel technology developed by IDEXX for the detection of antigens to the adult stages of these three nematodes in faeces, and coupled them with our Giardia antigen test for the most accurate results. ix, x

This new technique utilises ELISA technology for detecting protein biomarkers secreted or excreted by nematodes in the intestinal lumen. Detecting these discrete biomolecules indicates the presence of the specific metabolically active nematode infection as these biomarkers are produced by the worms and not the eggs.



This makes for more reliable testing because:

- The antigen ELISA method is more sensitive with higher detection rates and detection of pre-patent stages
- The test is more specific for the infection as it detects specific biomarkers of the adult parasites and is not confounded by spurious eggs from other species or subjectivity related to visual identification
- The sample size required is also only 10 % of traditional methods and multiple-day sampling is not required, increasing the pet-owner compliance



Workflow-free approach makes adopting routine testing easier than ever

PetChek™ IP is a home collection kit that conveniently puts the sampling and submission process in the hands of the pet owner, while results are returned directly to the veterinary practice. For the clinic, the product is 'workflow-free': the practice only needs to dispense the kit – no samples are taken to your practice, no stool handling, no three-day composite of samples, no requisition forms. Using a special barcode system, the kit is electronically linked to your practice upon placing your IDEXX order and therefore allows you to simply hand the PetChek™ IP kit to the pet owner. The rest happens on your behalf.

With PetChek™ IP you can not only better educate your clients on the risks of intestinal parasitic infections, but also actively involve them in safeguarding the health of their pets and family members, as well as contributing to the wellbeing of other pets and people in their environment.



ⁱ Bayer Animal Health. Bayer Veterinary Care Usage Study 2013

ⁱⁱ Matos, et al. Parasite control practices and public perception of parasitic diseases: A survey of dog and cat owners. Preventive Veterinary Medicine. 2015

ⁱⁱⁱ World Health Organization and partners unveil new coordinated approach to treat millions suffering from neglected tropical disease. [http://whqlibdoc.who.int/press_release/2006/PR]

^{iv} Herrmann N, Glickman LT, Schantz PM, et al: Seroprevalence of zoonotic toxocarasis in the United States: 1971-1973. American Journal of Epidemiology 122(5): 890-896, 1985.

^v Kimmig P, Naser K, Frank W. Seroepidemiologic studies of human toxocarasis. Zentralbl Hyg Umweltmed. 1991. 191(4): 406-422

^{vi} European Scientific Counsel Companion Animal Parasites. Worm control in cats and dogs. www.esccap.com. Sept 2010.

^{vii} IDEXX Market Research 2016

^{viii} 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

^{ix} 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.

^x Elsemore DA, Geng J, Cote J, Hanna R, Lucio-Forster A, Bowman DD. Enzyme-linked immunosorbent assays for coproantigen detection of *Ancylostoma caninum* and *Toxocara canis* in dogs and *Toxocara cati* in cats. Accepted manuscript at J Vet Diagn Invest.