



Intestinal Parasites

_____ Your pet has been diagnosed with _____. See below for more information on specific parasites.

_____ Your pet is overdue to be checked for intestinal parasites by fecal analysis. You can drop off a small stool sample any time our office is open. Read further to learn why this is important to protect your pets and your family.

Intestinal parasites are parasites that live in your pets' intestines and use your pet both as their nutrition and as part of their life cycle. Some are actual worms in the traditional sense, others are small single-celled organisms and all may or may not cause clinical signs such as diarrhea, weight loss, or vomiting. **Some of these can also be passed to humans**, children being especially vulnerable, which is one of the reasons that we recommend checking fresh stool samples at least yearly and taking steps to keep your pet parasite-free. This handout contains a summary of the major intestinal parasites we see in our area.

There are some important points to keep in mind regarding all intestinal parasites. Most of the time there is no outward sign of parasites (i.e. you will not "see worms" as you might expect). When we check a stool sample we are looking for eggs, not worms, and we are using a microscope to do it. There are no deworming products that will kill all the types of parasites, and pets can have more than one kind at the same time. So if you suspect worms, we will ask for a stool sample to try and confirm the type(s) so we can treat properly. We will also recommend a follow up stool check to make sure the worms are gone, especially in puppies and kittens. All puppies and kittens should have at least two stool samples checked before 6 months of age, even if they have been previously dewormed. Also, pets can have worms that are not currently shedding eggs and therefore cannot be diagnosed. Puppies and kittens especially will often be dewormed for common parasites even if the stool sample is found to be negative. A simple way to reduce the risk of parasites to pets and humans in your local environment (yard) is to pick up the feces at least weekly. Also, keep cats out of your sandboxes and practice good hand washing.

Note: Heartworm is also a parasite that occasionally occurs here, but it does not occur in the intestines and is not explained as part of this information. If you have questions about heartworm please contact our office.

Roundworms

Roundworms are one of the most common worms that we see and it is also the most potentially dangerous to humans that get infected. In pets it can cause vomiting, diarrhea, cough and pneumonia. Pet owners may become aware of roundworms when a pet vomits up a long (can be 7") spaghetti-like worm. There are several species of roundworm and they do not all have the same life cycle, but the basics are as follows: Adult worms live in

the small intestine, feed off the host's nutrients, and produce eggs which are passed in feces. It takes at least a month for the egg, once passed, to mature and be able to infect another host. The infective egg is then picked up by a dog, cat or an intermediate host like a smaller mammal. If the new host is a dog or cat the life cycle continues, if it is another animal the larvae (immature worms) migrate and form a cyst in the animal's tissues and lie dormant until the intermediate host is ingested (eaten) by a dog or cat. Once in the intestine of the dog/cat, the worms migrate out of the intestines and into the tissues where they encyst and may remain for years. When ready, they migrate out of the tissues and into the lungs where they cause the host to cough. They are coughed up into the throat, then swallowed and end up back in the gastrointestinal tract where they finish maturing and begin to produce eggs.

If the host is pregnant the larvae do not encyst in the tissues, they instead migrate to the uterus and infect unborn puppies/kittens by traveling to their lungs. Also if the host is nursing the larvae migrate to the mammary glands and infect newborns directly through milk, although they are likely already infected at that stage.

In summary, there are four different ways for your pet to become infected with roundworms and deworming medicine is effective only on parasites in the intestinal tract. There are no drugs that will kill encysted larvae.

Humans become infected by ingesting soil contaminated with infective larvae (usually children, by placing dirty hands in their mouths). Humans are not the correct host, but the worm still attempts to complete its life cycle trying to migrate through tissues, often the eye, and gets lost. If the worm dies in the tissues it causes an inflammatory reaction and can cause blindness if present in the eye when this happens.

Hookworms

Adult hookworms live in the small intestine of the host (your pet). They attach to the wall of the intestine and feed on the host's blood. Males and females breed and the females produce eggs that are released and passed into the environment in the feces. The eggs hatch into larvae in the environment (in the soil) and go through a couple of stages of development before they are ready to infect a new host. New hosts are infected by larvae either penetrating the skin of the host where it touches the ground (feet, belly, etc.) or by being ingested (eaten) by the host when they lick their skin. After the larvae gain entry into the host they can do one of two things: 1. They can remain in the intestine until maturity and produce eggs to complete the life cycle. 2. They can migrate through all the tissues of the body and either end up back in the intestines, or stop and form a cyst around themselves and lie dormant for years. Female dogs pass hookworms to their puppies when pregnancy hormones tell the encysted larvae to "wake up" and migrate directly to the unborn pups or to the mammary glands where the pups ingest them and become infected after birth. Therefore, puppies are sometimes born with hookworms and can become severely ill when the worms start consuming their blood. Adult dogs do not usually have debilitating disease from hookworms. Intestinal worms are easily treated with available medications; there is no way to kill encysted larvae in the body.

Humans can become infected with hookworms two ways. Cutaneous Larval Migrans occurs when infective hookworm larvae penetrate bare skin, usually feet, in areas where

soil is contaminated from animal feces. The condition is usually very itchy and there may be a visible “tract” lesion in the skin where the larva has migrated. Less commonly, people can become infected by eating improperly washed vegetables grown in contaminated soil. Both are easily treatable if the correct diagnosis is made.

Whipworms

As a general rule, only dogs get infected with whipworms, it is rare in cats. Whipworms live in the large intestine where they burrow their heads into the tissue and feed on blood. Eggs are passed in the feces and require 2-4 weeks in the environment to mature and become capable of infecting a new host. A new host becomes infected by swallowing the egg, usually through grooming behaviors. The ingested egg hatches in the small intestine, releasing a larva which hangs out in the local glandular tissue for about a week before being carried downstream to the large intestine. Once in the large intestine it embeds in the tissue to feed and, once mature, begins mating.

Whipworms are not transmissible to humans. They can cause chronic diarrhea problems in dogs and in rare cases can cause a syndrome which features inability to regulate salt balance which can create crisis of dehydration. Adult whipworms are not always producing eggs, therefore deworming will sometimes be recommended if there is a high enough suspicion even with a negative fecal exam. Whipworms require a special dewormer and deworming schedule due to long maturation cycles. Once soil is contaminated with whipworms, it will remain so for years as it is nearly impossible to kill them or remove them. If your pet has been infected, they need frequent (at least twice yearly) fecal checks because they are at risk for reinfection if they remain in the same environment.

Tapeworms

There are two types of tapeworms that commonly affect companion animals. By far the most common is the species *Dipylidium*. Pets become infected by ingesting a flea that contains the tapeworm eggs. Therefore, by definition, if a pet has tapeworms it also has fleas and you can not get rid of tapeworms without addressing the flea problem. After the flea is eaten, usually through normal self-grooming, its body is digested and the tapeworm eggs hatch into the intestine. The larva attaches to the wall of the small intestine and matures by creating segments from the head and neck that add to the length of its body. After about 3 weeks the end segments that were created first mature into nothing but an egg sac and break off from the main body where they exit either in the feces or by crawling out the anus. A pet owner might notice small white segments that resemble a grain of rice (or a sesame seed if it has dried up) around the animal’s anus or in the environment (pet’s bed, your bed, etc.). When the sac breaks open eggs are released into the environment where immature larval fleas ingest them along with organic debris and flea excrement, and begin the cycle again.

The second type of tapeworm, *Taenia* species, lives in the small intestine of the host dog or cat and produces eggs pretty much the same way as *Dipylidium*. After the eggs are

released into the environment, however, the eggs are picked up by an intermediate host during feeding such as a small rodent or deer. The immature tapeworm hatches in the new host's intestine and enters the bloodstream where it travels to the liver, wandering around and leaving bloody tracks until it falls out of the liver and lands in the abdominal cavity and waits. A dog or cat becomes infected by ingesting the larval tapeworm when it eats the animal and the life cycle continues.

Because tapeworm eggs are released after the segments exit the body, they are not usually found on a routine fecal exam, the segments are found on the pet by the owner. They usually do not cause debilitating disease or signs of gastrointestinal upset. Humans can only become infected with these two tapeworms the same way dogs and cats do – by ingesting fleas or carrion.

Spirometra – is a tapeworm type that we see rarely in cats and dogs. Adult worms live in the intestines and shed eggs (not motile segments) in the feces. The eggs hatch in water and the microscopic larvae are eaten by small crustaceans. These are then ingested by the cat or dog drinking the contaminated water, or by tadpoles, rats, mice, lizards, etc that are themselves eaten by the dog or cat. Affected pets can show signs of diarrhea or no signs at all. Humans can be infected by eating undercooked meat from an affected animal or by drinking from the contaminated water source. Treatment requires a special worming schedule with higher than normal doses of medication.

Coccidia

Coccidia are single-celled organisms (i.e. they are not a 'worm') that infect the host's intestinal tract and can cause serious, life-threatening diarrhea, especially in a young animal. There are numerous species of coccidia, the ones that infect dogs and cats do not infect humans. Their life cycle involves immature coccidia called oocysts being passed in stool and contaminating the environment, where they mature into sporulated oocysts and are then able to infect a new host by being ingested. Once ingested the sporulated oocyst breaks open, releasing eight sporozoites, each of which invades an intestinal cell and begins to reproduce until the cell is full and bursts open, killing the cell. The newly released organisms infect new cells and continue the process until many intestinal cells are killed and the ability to absorb water and nutrients is affected.

Coccidia are not always detectable on a routine fecal, and there are no medications that can kill them. Only the immune system of the host can do that. The drugs we give help keep the coccidia from reproducing until that can happen. Consequently, pets sometimes need a very long course of medication. Coccidia are common in group housing situations where density of population and the stress of group living on the immune system support infection. Since they cannot be wiped out with medications and in low numbers usually will not cause the animal to be ill, often if just a few are found on a routine fecal no treatment will be recommended at that time other than to monitor for diarrhea and continue routine fecal screening.

Giardia

Giardia is another single-celled organism and is the most common gastrointestinal parasite affecting humans in the United States. The source of infection for both humans and pets is usually ingestion of water contaminated by giardia cysts. Once inside the host, the cyst is digested, releasing two trophozoites, which is the motile form of giardia and look something like a disc with several whip-like structures hanging off. They can move around, attach to the intestine, or be passed in the feces to re-contaminate the environment. Along the way they can cause diarrhea.

Giardia can be difficult to detect on routine fecal screening unless motile forms are spotted swimming around. There is now a special test that detects the presence of giardia proteins that is helpful in diagnosis. There are a couple of different drugs that can be used for treatment, none are 100% reliable. To prevent re-infection, the only way to decontaminate the environment is to dry it out completely. Bleach water diluted 1:32 is effective on indoor surfaces. The pet's fur can be a source of re-infection, thus animals should be bathed before being re-introduced into a newly cleaned environment.