Gastrointestinal Parasites of Dogs

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- Roundworms
- Hookworms
- Whipworms
- Tapeworms

Many parasites can infect the digestive system of dogs (see Table: Gastrointestinal Parasites of Dogs). The most common ones are described below. Some gastrointestinal parasites of dogs can also cause disease in people (see Table: Gastrointestinal Parasites of Dogs and Cats That Also Infect People).

Roundworms

The large roundworms known as ascarids are common in dogs, especially in puppies. The most important species is *Toxocara canis*, not only because its larvae may migrate in people, but also because infections are common. Fatal infections may occasionally be seen in young pups. *Toxascaris leonina* is typically much less common and is generally seen in older dogs.

In puppies, infection with *Toxocara canis* usually occurs by transfer into the developing fetus through the placenta. The worms can be found in the intestines of the puppies as early as 1 week after birth. Pups may also be infected while nursing. If pups less than 3 months old eat the eggs that have been in the environment for at least 4 weeks, the eggs hatch, releasing larvae that penetrate the intestinal wall. The larvae migrate through the liver, reach the lungs via the bloodstream, are coughed up, swallowed, and mature to egg-producing adults in the small intestine. Many larvae will be carried by the bloodstream to other parts of the dog's body and remain in the tissues of the dog for years in an inactive form. If immune system suppression occurs, these larvae can become active.

Normally, adult dogs have some resistance to infection. However, during the period around the birth of a litter, the immunity of the female dog to infection is partially suppressed, and the inactive larvae become active, crossing the placenta to the pups and sequestering in the mammary tissue, where they are transmitted in the colostrum and milk. Due to immune system suppression at the time of whelping, active infections may occur in the pregnant dog, with substantial numbers of eggs passed in the feces.

The first indication of infection in young animals is lack of growth and loss of condition. Infected animals have a dull coat and often appear "potbellied." Worms may be vomited and are often passed in the feces. In the early stages, migrating larvae may cause pneumonia, which can

be associated with coughing. Diarrhea with mucus may be evident. Infection in dogs and cats is diagnosed by detection of the roundworm eggs in feces using a microscope.

There are a number of compounds available for treating roundworm infections in dogs. Certain preventive programs for heartworm infection also control intestinal roundworm infections. Transmission of infection from mother to newborn can be greatly reduced by a program of antiparasitic drugs given during pregnancy and after the birth of a litter. Otherwise, the pups should be treated as early as possible. Ideally, treatment should be given 2 weeks after birth and repeated at 2- to 3-week intervals to 2 months of age, then monthly to 6 months of age. Nursing dogs should be treated on the same schedule as their pups. Your veterinarian will prescribe the appropriate medication for this infection.

Because people, especially children, can become infected with roundworms, it is important to practice good hygiene (e.g., prompt removal of feces and washing hands) in potentially contaminated areas or around affected dogs.

Hookworms

Several types of hookworms can cause disease in dogs. *Ancylostoma caninum* is the principal cause of canine hookworm disease in most tropical and subtropical areas of the world. *Ancylostoma braziliense* infects dogs and is sparsely distributed from Florida to North Carolina and along the Gulf Coast in the United States. It is also found in Central and South America and Africa. *Uncinaria stenocephala* is the principal canine hookworm in cooler regions. It is the primary canine hookworm in Canada and the northern fringe of the United States, but it is found with frequency across the country.

Hookworm eggs are first passed in the feces 15 to 20 days after infection. They hatch in 1 to 3 days when deposited on warm, moist soil. Transmission may result when larvae are ingested or, in the case of *A. caninum*, from the colostrum or milk of infected dogs. Infections with *Ancylostoma* species can also result from larval invasion through the skin. Skin penetration in young pups is followed by migration of the larvae through the blood to the lungs, where they are coughed up and swallowed to mature in the small intestine. However, in animals more than 3 months old, larvae may remain in the body tissues in a state of arrested development. These larvae are activated after removal of adult worms from the intestine or during pregnancy, when they accumulate in the small intestine or mammary glands of the mother.

Anemia in young puppies is the characteristic, and often fatal, sign of *Ancylostoma caninum* hookworm infection. The anemia is the result of the bloodsucking and the bleeding internal wounds that occur when these hookworms shift their internal feeding sites in the small intestine, leaving open wounds in their wake. Surviving puppies develop some immunity and show less severe signs. Nevertheless, malnourished and weakened animals may continue to grow poorly and suffer from longterm anemia. Mature, well-nourished dogs may harbor a few worms without showing signs; these dogs are often the direct or indirect source of infection for pups. Diarrhea with dark, tarry feces accompanies severe infections. Anemia, loss of appetite, weight loss, and weakness develop in longterm disease. Pneumonia may occur in pups with overwhelming infections, making breathing difficult.

Neither of the other common species of hookworms tends to cause anemia. However, blood fluid loss around the site of attachment in the intestine may reduce blood protein by greater than 10%. Dermatitis or inflammation of the skin (particularly in the spaces between the toes) due to larval invasion of the skin may be seen with *Uncinaria stenocephala*.

A diagnosis can often be made from the identification of hookworm eggs upon microscopic examination of fresh feces from infected dogs. Even though infections may be severe, eggs will not typically be seen on fecal examinations of pups prior to 16 days (the length of time needed for a new infection to produce eggs). Thus, severe anemia and death from infections acquired from nursing may be seen in young pups before eggs are passed in their feces. This can occur as early as 1 or 2 weeks of age.

A number of drugs and drug combinations are approved for treatment of hookworm infections. In addition, many heartworm medications also control certain species of hookworms. When anemia is severe, blood transfusion or supplemental iron may be needed, followed by a high-protein diet until the blood hemoglobin level is normal.

When newborn pups die from hookworm infection, subsequent litters from the same mother should be treated weekly for hookworms for about 12 weeks beginning at 2 weeks of age. In addition, your veterinarian may prescribe daily medication for pregnant dogs from day 40 of pregnancy to day 2 after whelping. This greatly reduces the transmission of the disease to the pups through nursing. Your veterinarian will prescribe the most appropriate medication program for your dog.

Female dogs should be free of hookworms before breeding and kept out of contaminated areas during pregnancy. Housing and bedding for pregnant and nursing dogs must be sanitary and cleaned regularly. Consult your veterinarian about any special disinfectants to add to cleaning solutions or laundry water. For outside activities, concrete runways that can be washed at least twice a week in warm weather are best. Sunlit clay or sandy runways can be decontaminated with sodium borate.

Whipworms

Adult whipworms (*Trichuris vulpis*) in dogs are typically found in the colon and cecum, a part of the large intestine. They attach themselves firmly to the intestinal wall. Eggs are passed in the feces and become infective in about 4 to 8 weeks. Under ideal conditions, whipworm eggs can remain dormant in the environment for several years, unless they become dried out. Once infective eggs are ingested, larvae develop in the small intestine and then move to the cecum and colon, where the adults mature.

No signs are seen in light infections, but as the number of worms increases the cecum and colon can become inflamed, which can cause diarrhea and weight loss. Fresh blood might be seen in the feces in heavy infections and anemia may also result.

Because whipworm eggs take a month to become infective, whipworms can be controlled with good sanitation. Prompt removal and proper disposal of feces is critical. Whipworms are

susceptible to drying; therefore, keeping the dog in an environment that is clean and dry reduces the risk of infection considerably. For this reason, kenneled dogs should be maintained on concrete slabs, and never on dirt. A variety of medications—including some monthly drugs that prevent infections with other parasites like heartworms—are available for treating whipworm infections. Your veterinarian will choose one that is appropriate for your dog.

Tapeworms

Several types of tapeworms—properly known as cestodes—may infect dogs. Adult tapeworms are segmented worms found in the intestines of dogs. They rarely cause serious disease.

Most urban dogs eat prepared foods and have restricted access to natural prey. These dogs may acquire *Dipylidium caninum* (the common tapeworm of dogs and cats) from eating fleas. Suburban, rural, and hunting dogs have more access to various small mammals, in addition to raw meat and offal from large mammals. The possibility of exposure to a number of different tapeworm species can be expected in such dogs and typically are *Taenia* species or *Echinococcus granulosus*. Other species of tapeworms that may infect dogs include *Spirometra mansonoides* and *Diphyllobothrium* and *Mesocestoides* species.

Signs of infection vary from a failure to digest and absorb food normally, malaise, irritability, variable appetite, and shaggy coat to colic and mild diarrhea. There may be no signs in mild cases. In rare cases, telescoping of the intestine (intussusception), emaciation, and seizures are seen. Diagnosis is based on finding tapeworm segments or eggs in the feces or stuck to the hair around the anus.

Control of tapeworms requires both treatment and prevention. Even confined dogs can contract *Dipylidium caninum* because it can cycle through fleas. Thus, flea control is the critical preventive step even for indoor dogs. Animals that roam freely usually become reinfected by eating dead or prey animals. Preventing such feeding will limit exposure to other tapeworm species. An accurate diagnosis will enable the veterinarian to provide effective advice on treating the infection and preventing reinfection.

Gastrointestinal Parasites of Cats

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- Roundworms
- Hookworms
- Tapeworms

Many parasites can infect the digestive system of cats (see Table: Gastrointestinal Parasites of Cats). The most common ones are described below.

Roundworms

The large roundworms known as ascarids are common in cats, especially in kittens. The most important species is *Toxocara cati*, as it is both very common and will infect people. *Toxascaris leonina* also infects cats, but is typically much less common and does not infect people.

Infections with *Toxocara cati* are most likely to be acquired by ingestion of eggs passed in the feces of infected animals and by eating prey such as mice that carry the parasites. Sometimes, parasites can be passed to kittens through the mother's milk. Adult parasites can then be found in the small intestine of kittens as early as 3 to 4 weeks of age. In kittens that have eaten infective eggs, hatched larvae penetrate the intestinal wall, travel to the lungs via the bloodstream, are coughed up, swallowed, and mature to egg-producing adults in the small intestine. However, larvae (an immature stage of the parasite) can sometimes also live within other organs of affected animals and people. Adult cats generally have some resistance to infection. However, around the time when they give birth, immunity to infection may be suppressed and significant numbers of eggs may be present in feces.

Infections are often not associated with any signs. The first indication of infection in young animals can be lack of growth and loss of condition. Infected cats can have a dull coat and often are "potbellied." Worms may be vomited or passed in the feces. In the early stages, migrating larvae occasionally cause pneumonia, which can be associated with coughing. Diarrhea with mucus may be evident. Infection is diagnosed by microscopic detection of eggs in feces.

Several drugs are effective for treatment of roundworm infections in cats. Certain preventive programs for heartworm infection also control intestinal roundworm infections. Ideally, treatment for kittens should be started at 3 to 4 weeks of age, repeated at 2-week intervals until 3 months of age, and then continued monthly until 6 months of age. Your veterinarian will prescribe the most appropriate medication for your cat.

Because people, especially children, can become infected with roundworms, it is important to practice good hygiene (e.g., prompt removal of feces and washing of hands) in potentially contaminated areas or around affected cats.

Hookworms

Several types of hookworms can cause gastrointestinal disease in cats. *Ancylostoma tubaeforme* is the most likely to cause illness and is found globally. *Ancylostoma braziliense* is found in central and South America, southeast US, and Africa. *Ancylostoma ceylanicum* is found throughout Asia, the Middle East, and parts of South America. *Uncinaria stenocephala* is found globally in temperate and subarctic climates (including Canada and the northern US), but infections with this species are rare. Cats can become infected by ingesting the larvae in the environment (passed in the feces of an infected animal), by eating infected rodents, or by larval penetration of the skin. Infection is more common in kittens. When larvae mature to adults, they live in the small intestine.

Most infected cats show no signs. Anemia occasionally occurs and is the result of bloodsucking by the worms in the small intestine. Feces may become loose and have a tarry consistency. Loss of appetite, weight loss, and weakness occasionally develop in longterm disease. A diagnosis can often be made from the microscopic identification of hookworm eggs in fresh feces from infected cats.

A number of drugs and drug combinations are approved for treatment of hookworm infections. In addition, some heartworm medications also control certain species of hookworms. Deworming programs for roundworms in cats will usually also control hookworm infections.

Tapeworms

Several types of tapeworms—properly known as cestodes—may infect cats. Adult tapeworms are segmented worms found in the intestines. They rarely cause serious disease. The common tapeworm of cats, *Dipylidium*, is acquired from eating fleas. Much less frequently, cats with access to infected house (or outdoor) mice and rats can acquire other types of tapeworm infections from these sources. In parts of the Middle East, southern Europe, and northern Africa, tapeworms can also be acquired by eating reptiles. Signs of tapeworm infection vary and can include a failure to digest and absorb food normally (unthriftiness), malaise, variable appetite, poor hair coat, and mild diarrhea. Often, there are no signs. Very rarely, seizures are seen. Diagnosis is based on finding tapeworm segments or eggs in the feces.

Control of tapeworms requires both treatment and prevention. Flea control is critical for tapeworm control, even for indoor cats. In addition to being exposed to fleas, cats that roam freely may also become reinfected by eating dead or prey animals. Confined animals can be reinfected by fleas. An accurate diagnosis will enable your veterinarian to provide effective advice on treating the infection and preventing reinfection. Several drugs are available for the treatment of tapeworms in cats.