

## Roundworms: Dogs & Puppies

There are two species of roundworms affecting dogs and puppies: *Toxocara canis* and *Toxascaris leonina*. Both are treated with the same medication protocol, so when eggs are seen on a fecal flotation exam, it is not necessary to determine which species is present.

### How Infection Occurs

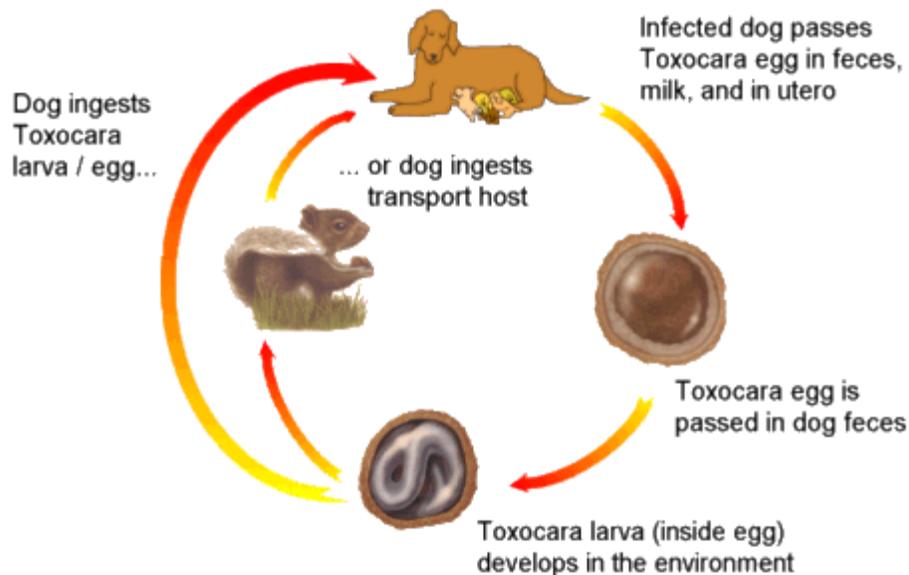
In dogs, there are four ways by which infection with *Toxocara canis* occurs:

- Consuming infective worm eggs from soil in the environment (generally through normal grooming).
- Nursing from an infected mother dog.
- Consuming a prey animal (usually rodent) that is carrying developing worms.
- During embryonic development when an infected mother dog is pregnant (most puppies are infected this way).

Note: cats cannot be infected with *Toxocara canis*.

### Life as a Roundworm

*Toxocara canis* has one of the most amazing life cycles in the animal kingdom. It is crucial to understand this life cycle if effective treatment is to be pursued.



**Step One:** *Toxocara* eggs are passed in the host's feces. If a fecal sample is tested, the eggs can be detected. The embryonic worm develops in the outdoor environment inside its microscopic egg for one month before it becomes able to infect a new host. If environmental conditions are favorable, it takes about a month for the egg to become infective but *Toxocara* eggs are famous for weathering harsh environmental conditions. Eggs can remain infective for months to years. Note: Fresh feces are not infectious.

**Step Two:** The egg containing what is called a second stage larva is picked up by a dog or by some other animal. The egg hatches in the new host's intestinal tract and the young worm burrows its way out of the intestinal tract to encyst in the host's other body tissues. If the new host is a dog, the life cycle proceeds. If the new host is a member of another species, the larvae wait encysted until the new host is eaten by a dog.

*Step Three:* These second stage larvae can remain encysted happily for years. If the host is a dog, the larvae mostly encyst in the host's liver. When the time comes to move on, the larvae excyst and migrate to the host's lungs where they develop into third stage larvae. They burrow into the small airways and travel upward towards the host's throat. A heavy infection can produce a serious pneumonia. When they get to the upper airways, they can generate coughing. The worms are coughed up into the host's throat where they are swallowed, thus entering the intestinal tract for the second time in their development.

If the host is pregnant, the larvae do not migrate to the lung after they excyst; instead they home to the uterus and infect the unborn puppies. The second stage larvae make their way to the puppy's lungs to develop into third stage larvae.

If the host is a nursing mother, second stage larvae can migrate to the mammary gland instead of the lung after excysting. Puppies can be infected by drinking their mother's milk, though, due to the intrauterine cycle described above, the litter would probably already be infected.

Note: When dogs are dewormed, this affects only worms in the intestinal tract. It does not affect encysted larvae. It is very difficult to prevent mother to puppy transmission and routine deworming is not adequate.

*Step Four:* Once back in the intestine, the larvae complete their maturation and begin to mate. The first eggs are laid about one week after the fourth stage larvae have arrived in the intestine and about 4 to 5 weeks after infection has first occurred. From here the cycle repeats.

### **Why is Infection Bad?**

Roundworm infection can have numerous negative effects. It is a common cause of diarrhea in young animals and can cause vomiting as well. Sometimes the worms themselves are vomited up, which can be alarming as they can be quite large with females reaching lengths of up to seven inches. The worms consume the host's food and can lead to unthriftiness and a classical pot-bellied appearance. Very heavy infections can lead to pneumonia as the worms migrate, and if there are enough worms the intestine can become obstructed.

It should also be noted that human infection by this parasite is especially serious (see below). It is important to minimize the contamination of environmental soil with the feces of infected animals so as to reduce the exposure hazard to both humans and other animals.

### **How do we know if our Dog is Infected?**

You may not know and this is one of the arguments in favor of regular deworming. Regular deworming is especially recommended for dogs that hunt and might consume the flesh of hosts carrying worm larvae. Puppies are frequently simply assumed to be infected and automatically dewormed.

Of course, there are ways to find out if your dog is infected. If a dog or puppy vomits up a worm, there is a good chance this is a roundworm (especially in a puppy). Roundworms are long, white and described as looking like spaghetti. Tapeworms can also be vomited up but these are flat and obviously segmented. If you are not sure what type of worm you are seeing, bring it to your veterinarian's office for identification.

Fecal testing for worm eggs is a must for puppies and a good idea for adult dogs having their annual check up. Obviously, if there are worms, they must be laying eggs in order to be detected, but by and large fecal testing is a reliable method of detection.



### **How do we get rid of Roundworms?**

Numerous deworming products are effective. Some are over the counter and some are prescription. Many flea control and/or heartworm prevention products provide a monthly deworming that is especially helpful in minimizing environmental contamination. Common active ingredients include:

- Febantel (active ingredient in Drontal and Drontal plus)

- Pyrantel pamoate (active ingredient in Strongid, Nemex, Heartgard Plus and others)
- Piperazine (active ingredient in many over the counter products)
- Fenbendazole (active ingredient in Panacur)
- Milbemycin Oxime (active ingredient of Interceptor and Sentinel)

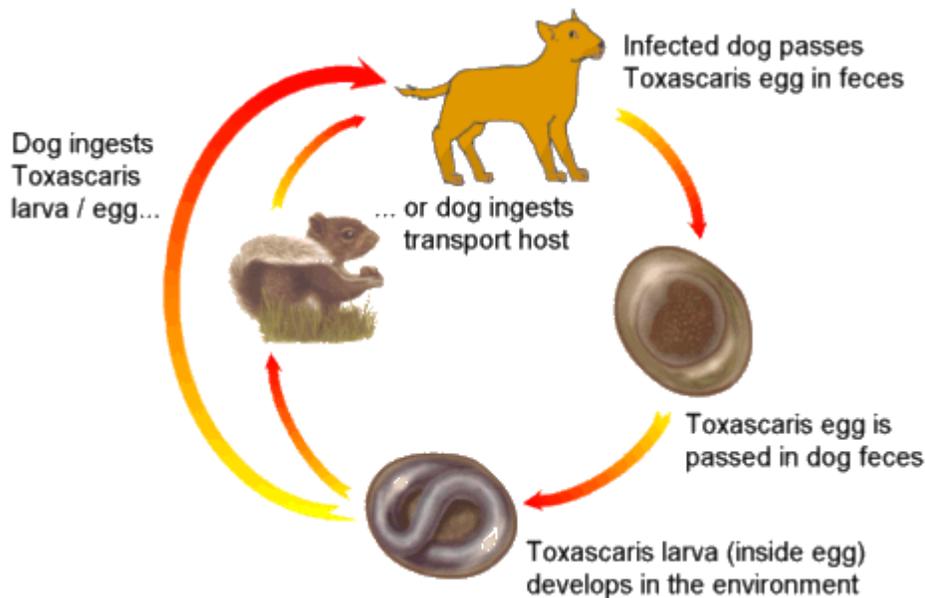
There are two important concepts to keep in mind about deworming. Medications essentially anesthetize the worm so that it lets go of its grip on the host intestine and passes with the stool. Once it has been passed, it cannot survive in the environment and dies.

This means that you will likely see the worms when they pass, so be prepared as they can be quite long and may still be alive and moving when you see them.

The other concept stems from the fact that larvae in migration cannot be killed by any of these products. After the worms are cleared from the intestine, they will be replaced by new worms completing their migration. This means that a second and sometimes even a third deworming is needed to keep the intestine clear. The follow-up deworming is generally given several weeks following the first deworming to allow for migrating worms to arrive in the intestine where they are vulnerable. Do not forget your follow-up deworming.

### What about *Toxascaris Leonina*?

The life cycle of *Toxascaris leonina* is not nearly as complicated. They do not migrate through the body in the way that *Toxocara* does. Instead, the *Toxascaris* second stage larva is consumed and simply matures in the intestine, a process which takes 2 to 3 months. Like *Toxocara*, *Toxascaris* can infect hosts of other species, though with *Toxascaris* the larvae can develop into third stage larvae in these other hosts while with *Toxocara* larval development is arrested in species other than the dog.



Note: *Toxascaris leonina* can infect both dogs and cats alike.