

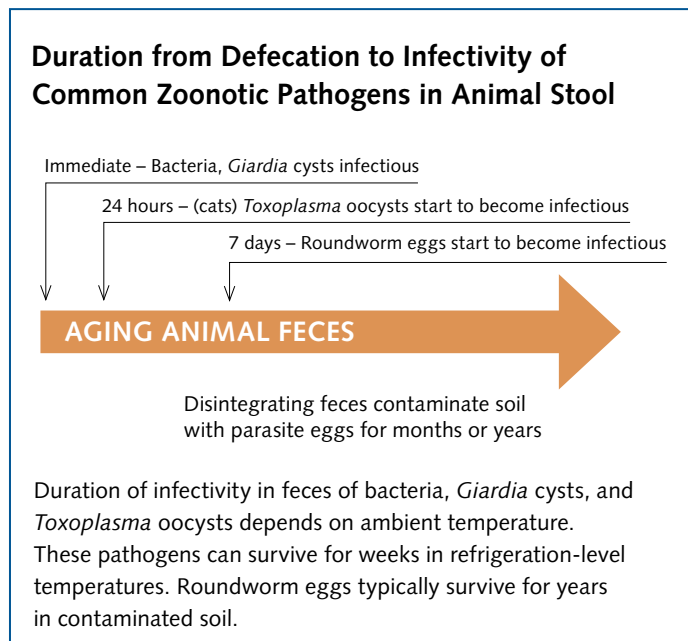
# The Link Between Animal Feces and Zoonotic Disease

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Animals add a great deal of enjoyment to our patients' lives, and pet ownership can lead to lower stress, lower blood pressure, and increased exercise.<sup>1,2</sup> However just as human feces present health hazards, so do animal feces. Primary care physicians can help prevent health problems in their patients by promoting good sanitation and veterinary care to their pet-owning patients.

Animal owners may mistakenly believe that only fresh, odiferous feces present a health risk. In fact, many parasite eggs found in feces do not reach the infectious stage until days or weeks after the animal defecated. Allowing feces to dry out and disintegrate contaminates the soil and creates an elevated risk for exposure to parasites. Most parasite eggs can remain viable in soil for months or years. People or other animals may become infected through fecal-oral exposure to this soil. The single most important step pet owners can take to protect both themselves and their pets is to remove stool *daily*. Weekly removal is not frequent enough.



There are many pathogens that can be found in animal stool. Animals infected with intestinal pathogens may be asymptomatic, have diarrhea, or may develop systemic disease. Certain infections in pets, such as ascariasis and giardiasis, are easily detected in routine tests on pet feces performed in veterinary clinics. This routine fecal examination is recommended two to four times a year for puppies and kittens, and one to two times per year in adult pets, depending on the animal's risk of exposure to the

parasites.<sup>3</sup> Other intestinal zoonotic infections in pets, such as salmonellosis, colibacillosis, and toxoplasmosis, require more advanced testing.

Veterinary care is always recommended for ill animals, which also helps to protect human health. Animals that are found to be infected with zoonotic pathogens are treated by veterinarians, thereby reducing the overall risk of human exposure. Here, we discuss a few pathogens commonly found in local pets.

## Pathogens Commonly Found in Pets

Pets infected with *Salmonella* or *Campylobacter* produce stool that is immediately infectious to people or other animals. These pathogens are diagnosed in pets via fecal culture, a test that is not commonly performed unless the pet has diarrhea that is resistant to standard treatment. In the case of *Campylobacter*, puppies and kittens are more likely to become infected than adult animals, to develop diarrhea from the infection, and to transmit it to humans. *Salmonella* can infect dogs and cats of all ages via exposure to contaminated pet foods, raw meat, or consumption of prey.<sup>4</sup> To date in 2011, five brands of pigs' ears and taffy-style dog treats have been recalled for potential *Salmonella* contamination.<sup>5</sup> Feeding raw meat to pets has become popular in the past few years, creating additional risk of *Salmonella* exposure to humans through direct contact with the meats, contamination of surfaces, or through exposure to infected pets' feces.

*Giardia* is a protozoan intestinal parasite that infects most mammals. Just as with bacterial infections, *Giardia* cysts are immediately transmissible to people. Pets become infected when they ingest the cysts in the feces of other animals or drink contaminated water in the environment.<sup>4</sup> Giardiasis is frequently diagnosed in local dogs and occasionally in cats. A 2006 unpublished study of 10 local dog parks by LA County Veterinary Public Health found that approximately 22% of dogs tested positive for the protozoan.

There are many different *Giardia* species and genotypes. The ability to infect an animal varies for each strain. Many strains are not infectious to people. However, since advanced diagnostics like genotyping are rarely performed,<sup>4</sup> the true zoonotic risk from local giardiasis cases in pets is unknown. Fecal centrifugation and flotation tests, and *Giardia* ELISA tests, are commonly performed on pets to identify *Giardia* infections. These tests are often a part of the annual physical exam or are performed when the pet has diarrhea. Local pets are often treated for *Giardia* infection, although recurrence is common.

Toxoplasmosis is a zoonotic disease caused by the protozoan parasite *Toxoplasma gondii*. Cats are the **definitive hosts**, meaning that the parasite can sexually reproduce only in cats, and produce oocysts that are shed in the stool. Cats become infected when they consume infected small prey, such as rodents. Most other animals (including humans, dogs, and rodents) are **intermediate hosts**, meaning that after they



become infected, the parasite does not sexually reproduce; it converts into cysts that become dormant in muscle and nervous tissue. Intermediate hosts do not shed oocysts in their feces. Initial infection (of a person or animal) occurs either congenitally or through ingestion of tissue cysts in meat or oocysts from cat feces.<sup>4</sup>

In most cats and dogs, just as in humans, infection is usually subclinical, although infected pets can become ill with fever and respiratory, ocular,

or neurological signs. Kittens, puppies, and immunocompromised pets are more likely to become ill when infected. Tests for toxoplasmosis are usually performed only when the animal has signs compatible with clinical disease. In these cases, serological tests (for IgM, IgG) are performed.<sup>6</sup>

### Key Points about Toxoplasmosis in Cats

- After becoming infected for the first time, cats shed *Toxoplasma* oocysts in the feces for only about 2-3 weeks. After this point, the cat develops lifelong immunity and no longer sheds the oocysts.
- The *Toxoplasma* oocysts in these feces then take 1-5 days after defecation to sporulate and become infective to people and other animals.
- Serologic testing of cats provides little useful public health information. *Seropositive* animals are not necessarily considered a risk because they have lasting immunity and typically do not shed oocysts. *Seronegative* cats may appear safer, but if they later become infected (for example, after eating a mouse that enters the house) they will transiently shed oocysts.
- Pregnant women do not need to get rid of their cats, per guidance from the Centers for Disease Control and Prevention. They do need to follow safety guidelines to prevent exposure, as described in the patient handout<sup>7</sup> (see page 6).


People are typically infected through ingestion of raw or undercooked meat, or through oral exposure to contaminated soil. Gardening or playing in uncovered sandboxes can lead to exposure as outdoor cats often defecate in these areas.

There are several species of ascarids, or roundworms, that infect dogs, cats, and wildlife (such as raccoons and skunks). Children are at the highest risk of roundworm infection, especially those with pica. Roundworms found in dogs and cats may cause visceral or ocular larva migrans in humans.

Roundworms in wildlife, especially raccoons, are neurotropic and can cause significant brain injury. As with all fecal pathogens, people become infected via the fecal-oral route. However, roundworms are unique in a few respects<sup>7</sup>:

- Roundworm eggs in animal stool do not begin to become infectious until the stool has aged for a week or longer.
- Roundworm eggs can remain viable for years, creating long-term contamination of soil wherever infected feces are allowed to disintegrate.
- Roundworms are some of the easiest parasites to detect and eliminate. Standard fecal examination and deworming performed by veterinarians effectively treat this infection in pets.

Various texts describe the clinical presentation of these infectious diseases in detail. There are many additional zoonotic diseases that can be transmitted by animal feces, including *E. coli* infection, cryptosporidiosis, hookworm infection, hydatid disease, yersiniosis, and psittacosis (birds —by inhalation). Physicians can help protect their patients against a long list of zoonotic diseases by promoting the general principles of good sanitation and proper veterinary care.

Asking patients about pet ownership is a great way to build doctor-patient rapport. It can also provide opportunities to point out the connections between human and animal health, and to recommend routine fecal testing for pets. To assist in this discussion, refer to the patient resource titled “The Problem with Animal Waste” on page 6. It is easy to photocopy this handout and share with pet-owning patients. 

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## PATIENT RESOURCE

# The Problem with Animal Waste

Animal stool (poop, feces, waste) can contain bacteria and parasite eggs that infect humans and pets. Infection happens when tiny amounts of animal stool containing the germs reach the mouth. People may also become accidentally infected when they touch their mouth with soiled hands. Children often have their hands in their mouths and are at higher risk of infection.

Did you know that old, dried-out stool is *more* likely to contain infectious parasite eggs than is fresh stool? If a pet is infected with parasites, the eggs from the parasites are passed into the pet's stool. But the eggs can't infect anyone until the stool has "aged." This usually takes 1-7 days. Animal stool that is allowed to dry up and/or disintegrate can contaminate soil with parasite eggs for months or years!

## What You Can Do to Reduce Infection

### Keep your pet healthy.

- Have your pet's stool checked regularly by a veterinarian for parasites. Fecal testing and deworming are important for all pets, especially for puppies and kittens, and pets with diarrhea.
- Do not feed raw meat to your pet. Bacteria and parasites can be spread to pets through raw meat.
- Keep your cat indoors. When cats hunt and eat rodents or birds, they can become infected with a parasite called *Toxoplasma gondii*.
- Do not let your dog eat feces.

### Discard pet stool DAILY.

- Wear gloves or cover hands with a waterproof bag (that has no holes) when removing stool. Wash hands well afterward.
- Pick up dog stool immediately when on a dog walk. The person who steps in it later may be you!
- Do not remove stool by hosing it down with water – this just washes the parasite eggs into the ground.
- Discard dog stool at least daily from your yard. Don't let it "grow old."
- Clean stool out of litter boxes every day, before parasites like *Toxoplasma gondii* have a chance to become infectious.

### Protect your yard.

- The stool of raccoons and other nocturnal wildlife often carry roundworm eggs. Do not tempt wildlife to stay in your yard: Do not leave pet food and water outdoors after dusk. Pick up fallen fruit every day. Do not touch or harass wildlife.
- Cover children's sandboxes when not in use so that cats do not use them as litter boxes.

**For pregnant women.** To protect yourself and your baby from toxoplasmosis, which can be carried in the stool of cats, you ALSO need to follow these extra safety tips. You do NOT have to give up your cat.

- Have someone else handle the litter box duties, if possible. If you must handle these duties, wear disposable gloves and wash your hands thoroughly with soap and water afterward.
- Stool must be removed from the litter box daily. Empty and clean the entire litter box at least weekly.
- Avoid stray cats, especially kittens. Do not get a new cat while you are pregnant.
- Wear gloves when gardening. Avoid working in areas frequently visited by cats. Wash your hands when you are finished.

