



Feline *Tritrichomonas foetus* Infection

Katy A. Martin, DVM, MPH, PhD, DACVM (Parasitology)
Iowa State University College of Veterinary Medicine, Ames, Iowa

Abstract

In cats, *Tritrichomonas foetus*, sometimes referred to as *Tritrichomonas blagburni*, colonizes the large bowel and causes chronic colitis. Clinical signs—including voluminous, foul-smelling diarrhea that contains blood and mucus—may last for years, although they are often intermittent. Young cats and cats in high-density populations (e.g., catteries, shelters, cat shows) are at the greatest risk of infection. Direct fecal exam, trophozoite culture, and PCR testing are the primary methods of diagnosis. While no treatments are approved for feline trichomonosis in the United States, ronidazole is recommended. Response to ronidazole treatment is varied, and availability of the compound is inconsistent.

Take-Home Points

- *Tritrichomonas foetus* is a common cause of chronic colitis in cats.
- During diagnostic testing, *T foetus* should be distinguished from other organisms, such as *Giardia* species and *Pentatrichomonas hominis*.
- Trophozoites are susceptible to common cleaning agents.
- A temporary response to treatment followed by recurrence of clinical signs is a common clinical feature.
- Ronidazole resistance poses a threat to feline health.

Tritrichomonas foetus was known as a parasite of the reproductive tract of cattle for many decades prior to its implication in feline large bowel diarrhea.¹ In the mid-1990s, trichomonads were noted in the feces of kittens experiencing colitis; these organisms were molecularly identified as *T foetus* in the early 2000s.²⁻⁵ It has since been determined that the *T foetus* affecting felines is a distinct genotype from that affecting bovine hosts.⁶⁻⁹ Some researchers have suggested that the feline genotype represents a separate species and have proposed the name *Tritrichomonas blagburni*.¹⁰

Clinical Signs

In cats, *T foetus* primarily colonizes the cecum, with the distal ileum and descending colon being colonized to a lesser extent. Similar to *Giardia duodenalis*, these organisms are noninvasive and remain within the mucus layer and in contact with the surface epithelium of the gastrointestinal tract.¹¹ Infection produces lymphoplasmacytic and neutrophilic inflammation, resulting in chronic colitis.¹¹ Clinically affected cats exhibit foul-smelling large bowel diarrhea, frequently containing mucus and/or blood.¹² In experimental infections, clinical signs occur 2 to 7 days following ingestion of trophozoites.⁴ In severe cases, inflammation of the anus and rectal prolapse may occur.¹³ Cats may experience diarrhea for years, although it is common for clinical signs to be intermittent.¹⁴ A temporary response to antibiotic treatment followed by recurrence of clinical signs is a common clinical feature of disease.¹⁵

Infections and clinical signs are most common in young cats, with the median age of diagnosed cats being 1 year.¹⁴ Infection is often associated with high-population density situations such as catteries and shelters.¹² Asymptomatic infections occur and may serve as a source of infection for other cats.¹²

Life Cycle

The life cycle of *T foetus* is straightforward and involves only 1 life stage—the trophozoite. Trophozoites divide by binary fission within the host and are shed in the feces. Transmission between cats is direct, via the fecal–oral route. A common scenario is exposure of susceptible cats via shared litter boxes, with ingestion of trophozoites occurring during the grooming process.^{16,17} Trophozoites can survive for several days in

moist feces but are not long-lived under clean, dry environmental conditions.¹⁸ Trophozoites are susceptible to many common cleaning agents, including ethanol and bleach.¹⁹

Diagnosis

Differentials for the clinical presentation associated with *T foetus* infection in cats include other intestinal parasites such as *Giardia*, *Cryptosporidium*, and *Cystoisospora*. Diagnosis of feline trichomonosis can be made via direct fecal examination, culture, or PCR testing.

Fecal Examination

Direct fecal examination as a diagnostic method for feline *T foetus* infections has low sensitivity but is simple and inexpensive to perform. The specificity of this test depends on the individual examining the slide and their ability to differentiate *T foetus* from other flagellate protozoans such as *Giardia* species and *Pentatrichomonas hominis*.

T foetus trophozoites are pear-shaped, 10 to 25 µm in length, and 3 to 15 µm in width.²⁰ They possess 3 anterior flagella—hence the genus name—and a single posterior flagellum, which originates from an undulating membrane that spans the majority of the length of the organism (FIGURE 1). The movement of *T foetus* is described as jerky, although the organisms do exhibit forward motility. The jerky movement of *T foetus* should be differentiated from the “falling-leaf” movement of *Giardia* organisms.¹²



FIGURE 1. *Tritrichomonas foetus* trophozoites are pear-shaped with 3 anterior flagella (2 are visible in this image) and a single posterior flagellum that originates from an undulating membrane.

The sensitivity of direct fecal examination for *T foetus* diagnosis has been reported to be as low as 4% in naturally infected cats; sensitivity can be maximized by using fresh, nonrefrigerated diarrhetic feces.^{18,21,22} Fecal flotation to rule out *Cryptosporidium*, *Cystoisospora*, and *Giardia* infections should be included in the workup of these cases, with zinc sulfate being the flotation solution of choice for detecting *Giardia*.

Fecal Culture

Fecal culture to enrich trophozoites can be performed using the commercially available InPouch TF Feline test pouches (Biomed Diagnostics) or modified Diamond's trypticase–yeast extract–maltose media.¹⁸ To perform trophozoite culture, media should be inoculated with a small amount of feces (grain of rice) and incubated at room temperature or 37 °C (98.6 °F).¹² Cultures should be maintained in the dark, and pouches should be in an upright position.

Cultures can be observed daily using light microscopy for the presence of organisms. Trophozoites are typically observed within 72 hours when cultures are incubated at 37 °C, while room temperature–incubated samples may require up to 12 days of culture to reach observable numbers.¹² The number of organisms present in the fecal inoculum affects the incubation time required to reach observable numbers. It is recommended that fecal culture for *T foetus* be performed in-clinic and the inoculated media not be shipped for evaluation, as fluctuating temperatures during shipment may affect the results.¹²

It is recommended that fecal culture for *T foetus* be performed in-clinic and the inoculated media not be shipped for evaluation, as fluctuating temperatures during shipment may affect the results.¹²

While *Giardia* organisms do not survive beyond 24 hours within the InPouch system, *P hominis* can proliferate within the pouches.¹² Careful morphologic evaluation or molecular methods should be employed to differentiate *T foetus* from *P hominis*.

PCR Testing

Many *T foetus* PCR protocols have been published, and testing is widely available at diagnostic laboratories throughout the country. PCR is considered the most sensitive and specific diagnostic test for *T foetus* infections in cats. Sample collection and submission guidelines may vary between laboratories and should be followed closely to ensure accurate test results. PCR testing allows for differentiation between *T foetus*, *P hominis*, and *Giardia* species.

Histopathology

Trophozoites can be observed histologically in colonic biopsy samples, but the sensitivity of histopathologic identification as a diagnostic method is considered quite low.¹¹ Immunohistochemistry and in situ hybridization are used in research but are not generally available for diagnostic use. Histopathologic evaluation can aid in ruling out or deprioritizing inflammatory bowel disease as a cause for chronic diarrhea in cats.

Treatment

Following diagnosis, efforts should be made to prevent continued exposure and reinfection. Cleaning and disinfection of the litter box and other surfaces should be performed frequently to eliminate trophozoites.

Treatment options for feline trichomonosis are limited, and response to treatment is inconsistent (**TABLE 1**). Nitroimidazole compounds, including metronidazole, ronidazole, and tinidazole, have been used to treat *T foetus* infections in cats.²³ Ronidazole is currently considered the treatment of choice; however, this compound is not always available, and there are reports of ronidazole-resistant infections.²⁶ In instances when ronidazole is unavailable, tinidazole is the recommended treatment, although it is less efficacious.²⁵ Neither of these products is labeled for use in cats or for the treatment of *T foetus* infections in any host. Metronidazole demonstrates minimal efficacy against feline *T foetus* infections.^{27,28}

TABLE 1 Treatment Options for *Tritrichomonas foetus* Infections in Cats²³⁻²⁵

COMPOUND	TREATMENT REGIMEN	POTENTIAL ADVERSE EFFECTS	NOTES
Ronidazole	30 mg/kg PO q24h for 14 days	- Neurologic signs (e.g., seizures, ataxia, tremors), especially when given above the recommended dose. Stop treatment if neurologic signs occur. - Teratogenic; caregivers should handle the compound with gloves; do not use in kittens less than 3 months of age or in pregnant or nursing queens.	- Preferred treatment; product availability is inconsistent - Ronidazole resistance is an emerging issue
Tinidazole	30 mg/kg PO q24h for 14 days	Limited data available	Less effective but recommended when ronidazole is unavailable

The recommended dose for ronidazole (30 mg/kg/day) is the highest dose that can be safely administered to cats. Reversible neurotoxicity occurs in some cats.^{12,14,24} If neurologic signs occur, the treatment should be stopped. If a compounding pharmacy is used as a source for ronidazole or tinidazole, the prescribing veterinarian should ensure the pharmacy is reputable, as dosing errors can lead to adverse effects, including neurotoxicity.

It is estimated that 60% of cats treated as recommended with ronidazole will have near-complete resolution of clinical signs, although they may remain infected.¹² Failure of clinical signs to resolve may be a result of inaccurate diagnosis, underdosing of ronidazole, reinfection, or infection with a ronidazole-resistant population of *T. foetus*. The prevalence of ronidazole-resistant *T. foetus* is unknown but is estimated to be significant.²⁶

It can be challenging to determine if resolution of diarrhea following treatment is a result of true infection clearance or simply concealment of the infection. In cases where the true infection status is important (e.g., prior to reintroduction to a multicat environment), post-treatment PCR testing on a colonic flush sample is recommended.¹²

Summary

Feline *T. foetus* infections are a common cause of chronic colitis, especially in young cats and cats in high-density populations (e.g., catteries, shelters).

Intermittent, foul-smelling diarrhea containing blood and mucus is the most common clinical presentation. Asymptomatic infections occur and likely serve as a source of infection for susceptible cats. Diagnostic options include direct fecal examination, trophozoite culture, and PCR testing, each with its own benefits and limitations. Ronidazole is the treatment of choice, but it is not always available and treatment is often unrewarding. **TVP**

References

- Rae DO, Crews JE. *Tritrichomonas foetus*. *Vet Clin North Am Food Anim Pract*. 2006;22(3):595-611. doi:10.1016/j.cvfa.2006.07.001
- Romatowski J. An uncommon protozoan parasite (*Pentatrichomonas hominis*) associated with colitis in three cats. *Feline Pract*. 1996;24:10-14.
- Romatowski J. *Pentatrichomonas hominis* infection in four kittens. *JAVMA*. 2000;216(8):1270-1272. doi:10.2460/javma.2000.216.1270
- Levy MG, Gookin JL, Poore MF, Litaker RW, Dykstra M. Information on parasitic gastrointestinal tract infections in cats. *JAVMA*. 2001;218(2):194-195.
- Levy MG, Gookin JL, Poore M, Birkenheuer AJ, Dykstra MJ, Litaker RW. *Tritrichomonas foetus* and not *Pentatrichomonas hominis* is the etiologic agent of feline trichomonal diarrhea. *J Parasitol*. 2003;89(1):99-104. doi:10.1645/0022-3395(2003)089[0099:TFANPH]2.O.CO;2
- Reinmann K, Müller N, Kuhnert P, et al. *Tritrichomonas foetus* isolates from cats and cattle show minor genetic differences in unrelated loci ITS-2 and EF-1a. *Vet Parasitol*. 2012;185(2-4):138-144. doi:10.1016/j.vetpar.2011.09.032
- Šlapeta J, Müller N, Stack CM, et al. Comparative analysis of *Tritrichomonas foetus* (Riedmüller, 1928) cat genotype, *T. foetus* (Riedmüller, 1928) cattle genotype and *Tritrichomonas suis* (Davaine, 1875) at 10 DNA loci. *Int J Parasitol*. 2012;42(13):1143-1149. doi:10.1016/j.ijpara.2012.10.004
- Sun Z, Stack C, Šlapeta J. Sequence differences in the diagnostic region of the cysteine protease 8 gene of *Tritrichomonas foetus* parasites of cats and cattle. *Vet Parasitol*. 2012;186(3-4):445-449. doi:10.1016/j.vetpar.2011.12.001

9. Šlapeta J, Craig S, McDonell D, Emery D. *Tritrichomonas foetus* from domestic cats and cattle are genetically distinct. *Exp Parasitol*. 2010;126(2):209-213. doi:10.1016/j.exppara.2010.04.024
10. Walden HS, Dykstra C, Dillon A, et al. A new species of *Tritrichomonas* (Sarcostomastigophora: Trichomonida) from the domestic cat (*Felis catus*). *Parasitol Res*. 2013;112(6):2227-2235. doi:10.1007/s00436-013-3381-8
11. Yaeger MJ, Gookin JL. Histologic features associated with *Tritrichomonas foetus*-induced colitis in domestic cats. *Vet Pathol*. 2005;42(6):797-804. doi:10.1354/vp.42-6-797
12. Gookin JL, Hanrahan K, Levy MG. The conundrum of feline trichomonosis: the more we learn the 'trickier' it gets. *J Feline Med Surg*. 2017;19(3):261-274. doi:10.1177/1098612x17693499
13. Sui Y, Song P, Chen G, et al. Gut microbiota and *Tritrichomonas foetus* infection: a study of prevalence and risk factors based on pet cats. *Prev Vet Med*. 2024;226:106162. doi:10.1016/j.prevetmed.2024.106162
14. Xenoulis PG, Lopinski DJ, Read SA, Suchodolski JS, Steiner JM. Intestinal *Tritrichomonas foetus* infection in cats: a retrospective study of 104 cases. *J Feline Med Surg*. 2013;15(12):1098-1103. doi:10.1177/1098612x13495024
15. Tolbert MK, Gookin JL. Mechanisms of *Tritrichomonas foetus* pathogenicity in cats with insights from venereal trichomonosis. *J Vet Intern Med*. 2016;30(2):516-526. doi:10.1111/jvim.13920
16. Hale S, Norris JM, Šlapeta J. Prolonged resilience of *Tritrichomonas foetus* in cat faeces at ambient temperature. *Vet Parasitol*. 2009;166(1-2):60-65. doi:10.1016/j.vetpar.2009.07.032
17. Van der Saag M, McDonell D, Šlapeta J. Cat genotype *Tritrichomonas foetus* survives passage through the alimentary tract of two common slug species. *Vet Parasitol*. 2011;177(3-4):262-266. doi:10.1016/j.vetpar.2010.11.054
18. Gookin JL, Foster DM, Poore MF, Stebbins ME, Levy MG. Use of a commercially available culture system for diagnosis of *Tritrichomonas foetus* infection in cats. *JAVMA*. 2003;222(10):1376-1379. doi:10.2460/javma.2003.222.1376
19. Martin KA, Kovach K, Moscoso E, Carreiro E, Jesudoss Chelladurai JRJ, Brewer MT. Assessment of in vitro efficacy for common surface disinfectants and antiseptics against *Tritrichomonas foetus* trophozoites. Original research. *Front Vet Sci*. 2023;10:1282274. doi:10.3389/fvets.2023.1282274
20. Yao C, Köster LS. *Tritrichomonas foetus* infection, a cause of chronic diarrhea in the domestic cat. *Vet Res*. 2015;46(1):35. doi:10.1186/s13567-015-0169-0
21. Gookin JL, Levy MG, Law JM, Papich MG, Poore MF, Breitschwerdt EB. Experimental infection of cats with *Tritrichomonas foetus*. *Am J Vet Res*. 2001;62(11):1690-1697. doi:10.2460/ajvr.2001.62.1690
22. Gookin JL, Stebbins ME, Hunt E, et al. Prevalence of and risk factors for feline *Tritrichomonas foetus* and *Giardia* infection. *J Clin Microbiol*. 2004;42(6):2707-2710. doi:10.1128/jcm.42.6.2707-2710.2004
23. Gookin J, Copple C, Papich M, et al. Efficacy of ronidazole for treatment of feline *Tritrichomonas foetus* infection. *J Vet Intern Med*. 2006;20(3):536-543. doi:10.1892/0891-6640(2006)20[536:eorfto]2.0.co;2
24. Rosado TW, Specht A, Marks SL. Neurotoxicosis in 4 cats receiving ronidazole. *J Vet Intern Med*. 2007;21(2):328-331. doi:10.1892/0891-6640(2007)21[328:nicrr]2.0.co;2
25. Gookin JL, Stauffer SH, Coccato MR, Poore MF, Levy MG, Papich MG. Efficacy of tinidazole for treatment of cats experimentally infected with *Tritrichomonas foetus*. *Am J Vet Res*. 2007;68(10):1085-1088. doi:10.2460/ajvr.68.10.1085
26. Gookin JL, Stauffer SH, Dybas D, Cannon DH. Documentation of in vivo and in vitro aerobic resistance of feline *Tritrichomonas foetus* isolates to ronidazole. *J Vet Intern Med*. 2010;24(4):1003-1007. doi:10.1111/j.1939-1676.2010.0534.x
27. Gookin JL, Papich MG, Meier EK, et al. Auranofin is lethal against feline *Tritrichomonas foetus* in vitro but ineffective in cats with naturally occurring infection. *Vet Parasitol*. 2024;331:110295. doi:10.1016/j.vetpar.2024.110295
28. Burgener I, Frey C, Kook P, Gottstein B. [*Tritrichomonas fetus*: a new intestinal parasite in Swiss cats]. *Schweiz Arch Tierheilkd*. 2009;151(8):383-389. doi:10.1024/0036-7281.151.8.383

Author



Katy A. Martin

Dr. Martin received her DVM degree in 2018 from Iowa State University. Following veterinary school, she completed a combined PhD and residency training program in veterinary parasitology supported by the National Center for Veterinary Parasitology and Elanco Animal Health. She is currently an assistant professor in the department of veterinary pathology at Iowa State University.



Subscribe to Research Wrapped

Do you want to stay current on the latest veterinary research, but just don't have the time (or access)?

Introducing "Research Wrapped," a monthly report from Today's Veterinary Practice that features key insights from the latest scientific studies that can be applied in practice. Sign up today to receive the report in your inbox on the first Thursday of each month.

Scan to
Subscribe!

