

Treating Whipworms in the Dog

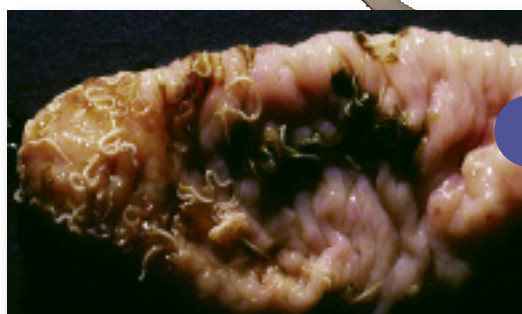
You have asked...

Do I need to treat whipworm infection before starting a monthly heartworm preventive that is also labeled for whipworm?

The experts say...

Whipworm (*Trichuris vulpis*) is a parasite of the cecum and colon of dogs.¹⁻³ Although dogs may present no clinical signs, heavy infections can cause bouts of diarrhea (with mucus and frank blood) that alternate with periods of passing normal stools. In light infections, the worms are restricted to the cecum, but as the parasite burden increases, worms are found more distally into the colon. In very heavy infections, worms can cover almost the entire wall of the large bowel, from cecum to rectum.

Clinical signs appear to be due mainly to the number and physical presence of worms that have their anterior ends threaded through the colonic mucosa. Whipworms, both males and females, live with their anterior thin, whip-like stichosome esophageal portion of the body threaded within the surface epithelium of the large bowel wall (**Figures 1 & 2**). The host reacts with inflammatory cells, including eosinophils, and blood is lost into the bowel lumen. The posterior of the worm's body is free within the lumen of the large bowel. The vulva of the female worm is located where the body leaves the mucosa. The male has a tail that ends with several spirals and looks like a coiled spring (**Figure 3**). Mating probably occurs regularly,



1 Inverted cecum of a dog at necropsy. Note the relatively small number of whipworms. Only the thick portion of the worms is visible. The long anterior end with the stichosome esophagus is embedded in the intestinal mucosa.

CONTINUES



2

The stichosome esophagus in the anterior portion of the whipworm. The esophagus is glandular with several large cells in the surface forming large folds. At about every third fold, a nucleus is visible in the center of each cell (**white arrowhead**). Running along the length of the esophagus, about halfway between the nuclei and the ventral border, the small lumen of the esophagus can be observed (**black arrow**).

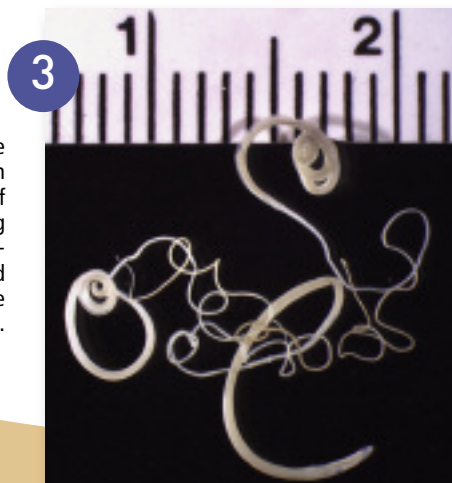
with the male wrapping its spring-like body around the female. A single spicule has a sheath covered with spines. It takes approximately 74 to 90 days for adult females to begin passing eggs into the host's feces. The eggs, which are football or lemon shaped (**Figure 4**), are not infectious when passed but require several weeks in soil to develop into infective larvae within their eggshell. The life cycle is direct, with infection by ingestion of eggs in soil or soil-contaminated objects. Once whipworms reach adulthood, they probably do not change their location within the intestine.

CURRENT CANINE WHIPWORM PRODUCTS

Six products are currently approved for canine whipworm treatment in the U.S. (**Table 1**):

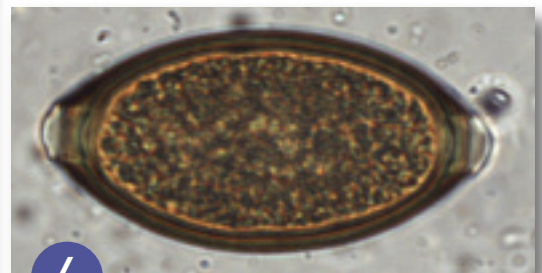
1. Fenbendazole Q 24 H at 50 mg/kg for 3 days.

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Two male and 1 female *Trichuris vulpis* in a dish showing the curled tail of the males and the long anterior esophageal portion of the worm that had been embedded in the mucosa.



4

Trichuris vulpis egg from a canine fecal sample showing the typical polar plugs and the single cell present in the egg when passed.

WHIPWORM FACTS⁴

- *Trichuris vulpis* occurs in the dog, fox, and coyote.
- Whipworm eggs can remain viable in the environment for years.
- Each female *Trichuris vulpis* can produce more than 2000 eggs/day.
- Infected animals may show clinical signs before eggs are shed in feces.
- Eggs may be shed intermittently.
- Eggs are quite dense and difficult to float.
- Centrifugation with Sheather's sugar solution or zinc sulfate solution increases the sensitivity of whipworm egg detection.



Table 1. Efficacy of Available Products for the Treatment of Whipworms in Dogs

Active Ingredients	Trade Name NADA numbers	Study	No. of Animals/Group		Timing of Evaluation	Percent Efficacy (%)
			Treated	Control		
Fenbendazole	Panacur NADA 121-473 July 8, 1983	Natural infection	24	24 [#]	3-10 days	100%
		Natural infection	6	6 [#]	3-10 days	100%
		Natural infection	3	3 [#]	3-10 days	100%
Febantel, pyrantel, & praziquantel	Drontal Plus Tablets NADA 141-007 May 19, 1994 Drontal Plus Taste Tabs NADA 141-007 January 12, 2006	Lab Studies 1 & 4	12	15	7 days posttreatment	93.99%*
		151-656 151-682 151-696	30	30	7 days posttreatment	85.74% [†] 91.57% [†] 91.50% [†]
Milbemycin oxime	Interceptor Flavor Tabs NADA 140-915 December 29, 1992	MW-147-01-88	12	12	7 days posttreatment	97.1%*
Milbemycin oxime & lufenuron	Sentinel Flavor Tabs NADA 141-084 April 10, 1997	<i>T vulpis</i> efficacy	10	10	7 days posttreatment	90.4% [†]
Milbemycin oxime & spinosad	Trifexis NADA 141-321 January 4, 2011	Natural infection T3ADIE0603	11	11	8 days posttreatment	100% [†]
		Experimental infection T3A370811	10	10	7 days posttreatment	96.5% [†]
Moxidectin & imidacloprid	Advantage Multi for Dogs NADA 141-251 December 20, 2006	151-430	11	11	10 days posttreatment	97.2% [†]
		151-468	8	8	10 days posttreatment	98.6% [†]
		151-473	10	10	10 days posttreatment	90.1% [†]

Efficacy in naturally infected dogs compared with untreated dogs: $\frac{\text{Mean of control} - \text{Mean of treated}}{\text{Mean of control}} \times 100 = \% \text{ Efficacy}$

* Arithmetic mean

[†] Geometric mean

[#] Critical trial; each dog served as its own control

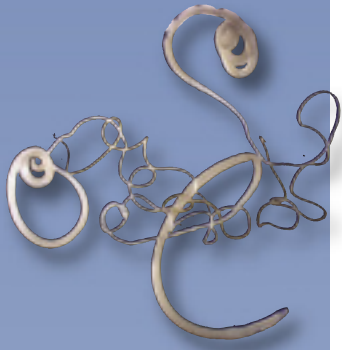
Advantage Multi[®] for Dogs (imidacloprid + moxidectin) Topical Solution is a registered trademark of Bayer Healthcare LLC, Animal Health Division.

Drontal[®] Plus Tablets and Drontal[®] Plus Taste Tabs[®] are registered trademarks of Bayer Healthcare LLC, Animal Health Division.

Interceptor[®] Flavor Tabs[®] and Sentinel[®] Flavor Tabs[®] are registered trademarks of Novartis AG.

Panacur[®] is a registered trademark of Intervet/Schering-Plough Animal Health.

Trifexis[™] (spinosad + milbemycin oxime) is a pending registered trademark of Elanco Animal Health, a Division of Eli Lilly & Company.



2. Febantel once at 25 mg/kg, formulated with 5 mg/kg praziquantel and 5 mg/kg pyrantel pamoate
3. Milbemycin oxime monthly at 0.5 mg/kg, formulated alone
4. Milbemycin oxime monthly at 0.5 mg/kg, formulated with 10 mg/kg lufenuron
5. Milbemycin oxime monthly at 0.5 mg/kg, formulated with 30 mg/kg spinosad
6. Moxidectin monthly at 2.5 mg/kg, formulated with 10 mg/kg imidacloprid

KEY POINTS

- Whipworms are parasites of the cecum and colon of dogs.
- Clinical signs appear to be mainly due to the number and physical presence of worms that have their anterior ends threaded through the mucosa.
- Currently 6 products are approved for canine whipworm treatment in the U.S.
- There is no need to treat whipworm-infected dogs before starting monthly broad-spectrum intestinal parasite treatment and heartworm prevention with products labeled for whipworm efficacy.

All 6 products have similar efficacies when administered one time per labeled dosing protocol.

Because of the long prepatent period of whipworms and the typical reduced efficacy of many anthelmintics against larval intestinal worms when compared with adults, veterinarians often administer fenbendazole or febantel formulated with praziquantel and pyrantel 2 additional times to clear dogs of any newly maturing worms. The other 4 products that include milbemycin oxime or moxidectin are labeled for monthly administration as heartworm preventives and routinely kill any adult whipworms with each administration.

PIVOTAL DATA FOR LABEL CLAIMS

The current Guidance for Industry document from the Center for Veterinary Medicine (CVM) of the Food and Drug Administration (FDA) suggests the following pivotal data for a label claim:

- Two studies, each with 6 adequately infected control and treated dogs in which the worms are counted at necropsy

- A statistically significant ($p < 0.05$) difference in parasite counts between the control and treated dogs
- Efficacy > 90% with one treatment when the geometric means are compared between the treated and untreated dogs

Earlier claims were granted under guidelines that required > 90% efficacy but may not have required as many studies or may have allowed critical trials to be conducted. In critical trials versus controlled trials, the animal serves as its own control in that effectiveness of the product is determined by a comparison of each animal's degree of parasitism before and after treatment. These studies require fecal collection after treatment to determine the number of worms passed as well as worm counts at necropsy.

AND THE ANSWER IS...

Because all 6 products have similar efficacies, there is no need to treat whipworm-infected dogs before starting monthly broad-spectrum intestinal parasite treatment and heartworm prevention with products containing oral milbemycin oxime or topically applied moxidectin. Because these eggs are environmentally resistant while in soil, reexposure and reinfection are common, providing another reason for repeated treatment or the use of monthly administered products.

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See Aids & Resources, back page, for references & suggested reading.