

Preventing Heartworm Infection in Dogs (Chemoprophylaxis)

Brands:

Ivermectin-based Products: Heartgard, Heartgard Plus, Iverhart Plus, Iverhart Max, Tri-Heart Plus

Milbemycin-based Products: Interceptor, Sentinel

Selamectin-based Products: Revolution

Moxidectin-based Products: Advantage Multi, Proheart6

Heartworm preventive medications are used to periodically kill larval heartworms that have managed to gain access to the dog's body. At this point, the products available are intended for monthly use. This means that they kill all the heartworm larvae (stage L3 and L4) that have accumulated in the past month each time they are given. Some products offer the ability to kill older larvae which helps keep the pet protected in case someone is late giving the heartworm preventive medication at some point. There are presently many choices, both topical and oral, plus, while the subject of this page is canine heartworm prevention, all the products discussed have feline formulations.

Ivermectin-based Products:

Heartgard®, Heartgard Plus® made by Merial

Iverhart Plus®, Iverhart Max® made by Virbac

Tri-Heart Plus® made by Schering Plough

The approval of ivermectin in 1987 represented a huge breakthrough in heartworm prevention. Preventive medication for the first time could be given once a month instead of every day. These monthly medications utilize an extremely low dose of ivermectin that is adequate to kill any L3 and L4 larval stages inhabiting the pet's skin tissues at the time the medication is given. In other words, infection takes place but is halted every month when the medication is administered.

If Given to a Heartworm Positive Dog by Accident

In most cases, no reaction of any kind occurs when an ivermectin-based heartworm preventive is given to a heartworm-positive dog.

In fact, giving an ivermectin-based heartworm preventive to an infected dog is the first step in heartworm treatment. Ivermectin kills the developing larval worms and clears the circulating microfilariae, thus rendering the dog unable to spread its infection and minimizing the number of adult worms to be killed in the second phase of treatment when the adult worms are specifically addressed.



If the larval worms die too quickly, a shock-like circulatory reaction can occur so for this reason the American Heartworm Society recommends that the first dose of ivermectin be given under veterinary supervision. This allows the dog to be observed for several hours following the oral dose in case of trouble. That said, in most cases no reaction of any kind occurs and the larval worms are cleared without event. This does mean, however, that giving this product to a dog with heartworm will kill all circulating microfilariae and the dog will test erroneously heartworm negative by Difil or Knott's testing. (ELISA test kits should still be accurate). In addition to killing microfilariae, ivermectin will also suppress reproduction in the adult female worms and shorten the overall life span of adult worms. Ivermectin does not kill adult heartworms (just the immature ones) although, as said, it cuts their life expectancy.

The Reach Back Effect

There is also a phenomenon called the reach back effect. This means that if a dog goes off heartworm preventive medication for a prolonged period (four months was the time tested), re-starting preventive could still curb adult heartworm infection in the heart and pulmonary arteries. In the 1988 experiment by Atwell, dogs who went off heartworm preventive for four months and then restarted with ivermectin had 95% fewer adult heartworms than dogs who went without ivermectin, although it should be noted that some heartworms were still able to establish infection. This means that if you skip several doses of ivermectin accidentally, it is still worth picking up where you left off.

Other Parasites Covered

Ivermectin at the heartworm preventive dose is not strong enough to kill common intestinal parasites. Because of this fact, the dewormer [pyrantel pamoate](#) was added to cover [hookworms](#) and [roundworms](#) in the original Heartgard product. As other ivermectin-based products have entered the market, these have also added pyrantel pamoate to extend the spectrum of protection.

[Whipworms](#) are not covered by any of the ivermectin-containing products at this time, but in order to remain competitive in the market, manufacturers may pay for treatment for whipworm infections acquired while their product is administered. The products containing both ivermectin and pyrantel pamoate are Heartgard Plus®, Iverhart Plus®, and Tri-Heart Plus®. Iverhart Max® includes both pyrantel pamoate and [praziquantel](#) so as to cover tapeworms as well.

Breed Sensitivity

There are breed-related sensitivities with ivermectin (i.e. collie-related breeds have some difficulties) though at the low doses used in the prevention of heartworm disease are not a problem for any breed.



Use of Large Animal Products

It is neither safe nor legal to obtain large animal ivermectin products for use in dogs for heartworm prevention. Discussions of doses have circulated around the Internet and in other sources advocating the use of highly concentrated ivermectin formulas for heartworm prevention in dogs. These doses are not comparable to the miniscule doses in licensed heartworm preventive products and using them represents an element of gambling. Large animal ivermectin products are vastly more concentrated than those meant for dogs and it becomes problematic to dilute them properly. Even small doses of these products are unnecessarily high and if they are inadvertently given to a sensitive individual death can result.

Milbemycin Oxime-based Products *Interceptor® & Sentinel® made by Novartis*

This product is also given monthly, also clears microfilariae, acts by killing all L3s and L4s accumulated in the month prior to administration, and will suppress female worm's ability to reproduce. There are a few important differences to note between this product and the ivermectin-based products, though.

If Given to a Heartworm Positive Dog by Accident

If milbemycin is inadvertently given to a dog who has active heartworm infection, the microfilariae are killed much faster than with the ivermectin products. This might sound like a good thing but in fact it increases the likelihood of the previously mentioned shock-like reaction when all the first stage larvae die at once. In a dog with a light infection this might not be important, but in a heavily infected dog it is safer not to use milbemycin to clear the microfilariae.

Of course, heartworm preventives are meant to be used in heartworm negative dogs. If these products are used according to their labeled instructions, this issue should never arise. Milbemycin-based preventives are safe and highly effective in preventing heartworms in dogs that are heartworm negative to begin with.

The Reach Back Effect

When milbemycin is given to a dog after a prolonged period without heartworm preventive (the Atwood experiment), the dog is expected to have 41% fewer heartworms than if heartworm prevention was not resumed. This was not as good a result as with the ivermectin products because ivermectin is better at killing older heartworm larvae. If one finds oneself in the situation of having skipped several months of heartworm prevention in the middle of heartworm season, one might do better to restart an ivermectin-based product rather than a milbemycin-based product.



Other Parasites Covered

Milbemycin, however, does not require the addition of other dewormers in order to provide a broad spectrum of parasite control. The milbemycin products control roundworms, hookworms, and whipworms without the addition of a second parasiticide. Milbemycin is also available combined with lufenuron for the control of fleas in the form of Sentinel®. Lufenuron is an oral flea sterilizer that prevents any fleas feeding on the dog from laying viable eggs.

Milbemycin can also be used in the treatment of demodectic mange. A special dosing schedule is needed to accomplish this; heartworm preventive doses are not adequate but milbemycin does offer a convenient treatment option for collie-type breeds.

There are no breed-related sensitivities for milbemycin.

Selamectin-based Products: *Revolution® made by Pfizer*

Ivermectin's entrance onto the anti-parasite warfront represented a culmination in the trend for broader and broader spectrum parasite control. Selamectin is a closely related cousin of ivermectin. It is designed for broad coverage of small animal parasites and will protect dogs not only against heartworm but also against ear mites, sarcoptic mange mites, ticks, and fleas. Cats are protected against heartworm, fleas, ear mites, roundworms, and hookworms. The product is topical, applied monthly and is fully approved for safe use in heartworm infected animals. Selamectin is not as effective at clearing microfilariae as other products and thus is not generally used in the treatment of active heartworm infections.

Moxidectin-based Products: *Advantage Multi® made by Bayer* *Proheart6® made by Fort Dodge*

Moxidectin is another relative of ivermectin. In 2007 it was combined with imidacloprid, the active ingredient in Advantage®, to create a broad spectrum topical for dogs and cats. The product prevents heartworm infection, kills roundworms, hookworms, and whipworms. The imidacloprid will kill the pet's fleas. As with selamectin, it can be given to heartworm positive dogs and it will decrease the number of circulating microfilariae but it is not a good choice in the treatment of active heartworm disease.

Moxidectin is available in Australia and Europe in a long-acting injectable form that is given once a year for heartworm prevention. A similar product, Proheart6®, was previously available in the U.S. but it was withdrawn from the market due to adverse events. The long-acting products were



developed to address the problem of accidental failure to administer the preventive on schedule. Since adverse events have not been problematic in Australia or Europe, it is possible that this mode of heartworm prevention may return to the U.S. as there is the potential to prevent a great deal of heartworm infection. Currently, however, the only moxidectin product available for small animals in the U.S. is Advantage Multi® which is given once a month as a topical.

When to Start Giving Heartworm Preventive Each Year?

Obviously the answer to this question is regional. Indeed it may be simplest to just use preventive medications all year round or to see what your regular veterinarian recommends for your area.

There is more to transmission than the simple presence of mosquitoes; it must also be warm enough for a long enough time period to allow the development of microfilariae to infect L3s within the mosquito's body. A simple formula involves counting the degrees above 57 degrees F reached each day. Each degree is called a heartworm development unit and when 234 heartworm development units have accumulated within a 30-day period, conditions have been reached that will allow the transmission of L3 heartworm to new hosts. A monthly heartworm pill, chewable, or topical must be given at the end of a month in which 234-heartworm development units has accumulated.

When 30 days pass and 234 heartworm development have not accumulated, mosquitoes will be dying from the cold before any microfilariae they carry can develop to the infective stage. Monthly heartworm preventive needs not be given after a month under these conditions.

If all this sounds complicated, it is. In addition, most of us have better things to do besides monitoring average weather temperatures. It may be simpler to use the product all year round or just go by the recommendations of a practicing veterinarian in the region in question.

