

RECOMMENDED INTAKE PROTOCOL FOR SHELTERS RECEIVING DISPLACED HURRICANE KATRINA ANIMALS

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(Note 9/2017: these guidelines were developed in response to concerns about health consequences for people and animals as a result of relocating animals following Hurricane Katrina and last updated 9/2005. Of particular concern was the possibility of transporting parasites, and especially heartworm, from endemic to non-endemic areas. Since this time, transport programs in general have become much more commonplace and some of the precautions described below may no longer be considered necessary. However, as a cautious starting point these guidelines may still prove helpful in developing plans for animals relocated in association with Hurricane Irma.)

This protocol is intended as a supplement to the AVMA/CDC guidelines for hurricane animal health, which can be found at <http://www.bt.cdc.gov/disasters/hurricanes/katrina/animalhealthguidelines.asp>. Animals affected by the hurricane are at extra risk for infectious and behavioral issues as a result of trauma, exposure to toxins and contaminated food and water, and holding and/or transport in crowded facilities. Protecting human as well as animal health is of utmost importance; disease outbreaks or human illness as a result of transportation programs could jeopardize future rescue efforts. Please emphasize to all staff and volunteers that protecting their *own* health is as important to the success of the program as caring for the animal's health.

These guidelines are my *suggestions*, based on reading, discussion and personal experience. They are by no means exhaustive or definitive.

Three short check lists and a shopping list follow. These cover animal intake, caretaker and environmental precautions, and suggested supplies to have on hand. The reasons for these recommendations and some of the finer points are elaborated upon in the subsequent document for those of you with time and curiosity ☺

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Intake protocol for dogs: short check list

- Written medical and observation record
- Identification check
- Identification band or tag and microchip
- Exam by a veterinarian
- Vaccinations:
 - DHLPP (yes, including Leptospirosis)
 - Bordetella
 - rabies
- Panacur ®: 50 mgs/kg orally once daily for 4-5 consecutive days (Strongid or Nemex may not be adequate)
- Consider prophylactic coccidia treatment for all high risk animals if coccidia is found on fecal exam in some animals.
- Flea and tick control
- Heartworm tests
- Heartworm preventative for all, including heartworm positive
- Fecal float and smear especially if diarrhea persists after prophylactic deworming
- A bath
- Additional testing as indicated by symptoms: especially parvo, ringworm, skin scraping
- Quarantine period: Minimum 1 week
- Behavioral/mental health care: Bedding and toys
- Behavioral assessment: initial assessment of CAUTION or not; clear labeling as such if assessed as bite risk; full assessment as per normal shelter policy after 5 day adjustment period

Intake protocol for cats: short check list

- Written medical and observation record
- Identification check
- Identification band or tag and microchip
- Exam by a veterinarian
 - Careful skin exam; Woods lamp and fungal culture for ALL lesions
 - Careful oral exam
- Vaccinations:
 - FVRCP modified live subcutaneous
 - +/- intranasal FVRC
 - rabies
 - consider FeLV vaccine and booster
- Panacur ®: 50 mgs/kg orally once daily for 4-5 consecutive days (preferred over Strongid/Nemex)
- Consider prophylactic coccidia treatment for all high risk animals if coccidia is found on fecal exam in some animals.
- Flea and tick control
- FeLV/FIV tests
- Fecal float and smear especially if diarrhea persists after prophylactic deworming
- A bath if odd smell, skin lesions, visible soiling
- Additional testing as indicated by symptoms: especially parvo (for panleukopenia), ringworm
- Quarantine period: Minimum 1 week
- Behavioral/mental health care: Bedding and toys
- Behavioral assessment: initial assessment of CAUTION or not; clear labeling as such if assessed as bite risk; full assessment as per normal shelter policy after 5 day adjustment period

Caretaker precautions:

- Protective clothing: including gloves, long sleeved tops and pants, goggles and masks
- Protective animal handling equipment: including muzzles in a variety of sizes, sturdy leashes, and control poles.
- Hand washing: including liquid soap and paper towels
- Hand sanitizer: if handwashing not available
- Change of clothes: Before leaving shelter or handling other animals
- Non-contaminated area for breaks and snacks.
- Information: regarding zoonotic disease risk, provided verbally and via clearly visible posted signs.
- Rabies vaccination: pre-exposure vaccines, particularly if working with bite-quarantine dogs or those showing evidence of open wounds and/or neurological disease.

Environmental precautions:

- Isolation area: physically separate holding area
- Feces pick up and careful disposal
- Designated garbage cans for feces and other waste
- Broad spectrum disinfectant and cleaner active against parvovirus
- Foot baths at run (for symptomatic dogs) and ward entrances. *((2017 note: footbaths are no longer considered reliable in preventing foot-borne spread of pathogens in a veterinary context; dedicated boots or shoe covers should be used if durable fecal pathogens are considered a risk.))*

Precautions for other pets in the household of foster parents and adopters:

- Check to make sure protection against DHPP and FVRCP is current (vaccine record or titers)
 - a. Consider booster vaccines for Bordetella and Leptospirosis in dogs prior to bringing home a hurricane refugee dog if vaccination is more than 6 months ago
 - b. Consider vaccination of pet cats for FeLV if cats of unknown or questionable status are being added to household (remember recently exposed cats may not test positive for 1-3 months)
- All pets in household started on flea and tick control
- All pets in household on heartworm preventive if caring for heartworm positive dog
- Keep new animals separate in easily cleaned area for minimum 7 days if quarantine and initial deworming has not already been performed at a shelter
- As always, pets in foster households should be in good health and tested negative for heartworm (dogs) and FeLV/FIV (cats)

Shopping list: are you ready?

Here are some supplies it would be good to have on hand in preparation for care of hurricane refugee animals. This is just a start; please let me know what needs to be added.

- Liquid hand soap
- Paper towels
- Plenty o' garbage cans, suitably labeled for feces, other waste if applicable
- Fully stocked hand sanitizers, if applicable
- Gloves in a variety of sizes
- Gowns, smocks, big shirts or other long sleeved protective garments
- Goggles
- Surgical masks
- Long sleeved jumpsuits or Tyvek® suits for heavily contaminated areas
- Muzzles in a variety of sizes
- Control poles for each dog housing area
- Microchips
- Digital camera
- Stethoscopes
- Thermometers and disposable thermometer covers
- ID bands or tags
- DHLPP vaccines
- FVRCP vaccines
- FeLV and FIV tests
- Rabies vaccines
- Bordetella vaccines
- Panacur, lots of it
- Topical flea/tick control product
- Syringes and needles
- Serum and EDTA blood tubes
- Heartworm tests
- Parvo tests
- Heartworm preventative
- Fecal exam supplies (depending on preference)
- Skin scrape supplies
- Ringworm diagnostics: Woods lamp, fungal culture plates, sterile toothbrushes
- Trifectant® or equivalent disinfectant
- Bleach
- Disinfectant spray bottles for exam surfaces, carriers, etc.
- Shampoo or Dawn dish detergent
- Pans for foot baths
- Pre-printed signs and information sheets
- Blankets and beds for animals
- Disinfectable toys
- Dog crates to send home with foster parents or for control of activity following heartworm treatment, if applicable

Animal intake protocol (annotated version):

1. **Written medical and observation record:** Each animal needs a written medical record, including a description of the animal, identification, vaccinations received and date, results of any exams or tests, and a daily observation and treatment log. This should be posted on the animal's cage (ideal) or if that is not possible, maintained in a binder in the animal housing area. Daily observations of appetite, stool, urine, respiratory health, and attitude should be maintained for all animals for at least the first week in the shelter.
2. **Identification check:** Each animal should be scanned for a microchip and checked for ID including tags, collars and tattoos. Choke chains should be noted, then removed for the safety of the animal.
3. **Identification:** Each animal should be digitally photographed, microchipped, and given an ID band or other external identification. Animals should be given collars and temporary ID tags when sent to foster care.
4. **Exam by a veterinarian:** Examination of all body systems with follow up diagnostics as need. Skin scrape (for mange) and *ringworm diagnostics* should be performed if suspect lesions are noted. (Ringworm may be more common in these animals, dogs as well as cats, than we are used to in some areas of the country.) Any problems requiring follow up exams or treatment should be clearly listed.
5. **Canine vaccinations:** All dogs *at intake*: **DHLPP, Bordetella and rabies** vaccines, unless reliable documentation exists that these vaccines have already been provided. Puppies should receive booster DHLPP vaccines every two weeks while in a shelter, or every 3-4 weeks while in foster care, until the age of 16 weeks.
 - a. Why Lepto? Although vaccination against leptospirosis is not part of our usual shelter dog recommendations, Katrina refugee dogs are likely to have been exposed to contaminated water and are therefore at increased risk for leptospirosis infection. Although vaccination will not protect the dogs that are already infected, it may protect other dogs housed in the same area should some dogs be shedding lepto in their urine. NOTE that vaccination does not prevent infection or shedding, and therefore does NOT necessarily prevent human infection.
 - b. Why rabies? Many shelters vaccinate dogs for rabies at the time of adoption rather than at intake. This is a fine choice in most situations, because risk of exposure to rabies within a shelter is very low. However, many of the hurricane dogs will be going to foster care, where there is more possibility of exposure. NOTE that vaccination will have no effect on a previous exposure. If these dogs were infected with rabies prior to vaccination, they can still transmit the disease to humans. Follow state guidelines regarding minimum age of administration for rabies vaccines (3-4 months).
6. **Feline vaccinations:** All cats *at intake*: **FVRCP modified live subcutaneous vaccine** and **rabies** vaccine unless reliable records exist that these vaccines have

already been given. Shelters may consider FeLV vaccination for cats going into group housing. This vaccine must be boosted in 3 weeks.

- a. Why FeLV? Vaccination against FeLV is not part of our usual shelter cat vaccine recommendations. The risk of transmission via fomites is very low, and investment in testing is generally preferable. However, hurricane refugee cats may have been previously indoor cats exposed only recently to FeLV. Infection may not be detected until 1-3 months later. Therefore, if these cats are going to be placed together in group housing, vaccination may be prudent.
7. **Panacur ®:** 50 mgs/kg orally once daily for 4-5 consecutive days; repeat monthly for three months in dogs (for treatment of whipworms). In addition to roundworms and hookworms, Panacur ® (fenbendazole) is effective against whipworms and most cases of Giardia. Neither of these parasites is reliably diagnosed by commonly used methods of fecal floatation. Therefore it may be best to assume that they are present (both whipworm and Giardia in dogs, Giardia in cats) and treat accordingly. Strongid or Nemex are not sufficient to treat whipworm or Giardia. Whipworm eggs are extremely durable in the environment, so dogs should be kept off grass or other un-cleanable areas until the first round of treatment has been completed.
8. **Flea and tick control:** Ideally all animals should be treated. If this is impractical, then treat on an as-needed basis as external parasites are recognized. Bear in mind that environmental control may be necessary to prevent reinfestation, depending on the product used.
9. **Heartworm tests** for all if possible. Although heartworm disease does not pose a big threat for direct transmission (worms must mature for at least a couple of weeks in a mosquito before they can be transmitted to another dog), knowledge of the heartworm status of the dogs will help prognostically, and allow foster parents to anticipate whether treatment will be required. *Mosquito control* in areas where infected dogs are sheltered will help prevent transmission as well. Note that recently acquired infections will not be picked up by the heartworm test; all dogs should be retested in 4-6 months.
10. **Heartworm preventive product** for all dogs, *including heartworm positive dogs and pet or shelter dogs housed in the same environment – from a mosquito’s point of view - with refugee dogs*. See additional notes on heartworm for further information and recommendations.
11. **Fecal exams:** ideally for all, but is this is impractical, at least for dogs with diarrhea. For dogs with diarrhea, this should include a fresh fecal smear and stained rectal swab. Look for white blood cells, *Campylobacter* (“gull” shaped bacteria), and *Clostridium spp* (“safety pins”). Ideally, fecal culture should be performed if a bacterial infection is suspected; if this is not practical, empirical treatment can be initiated targeted at the suspected pathogen.
 - a. Coccidia may be common in these stressed animals. Unthrifty young animals with persistent soft stools should be considered candidates for Coccidia even in the face of negative fecal exams and treated accordingly.

12. **A bath:** Animals should be bathed using Dawn® detergent or any mild animal shampoo. Bathing is particularly important for animals that may have been exposed to toxins or are showing signs of skin irritation.
13. **Additional testing:** All shelters receiving hurricane refugee dogs should be equipped with parvo snap tests, and any questionable case tested immediately.
14. **Quarantine period:** New intakes should be held for a minimum of 1 week prior to being mixed with the general population of the shelter or sent to foster homes to mingle with family pets. This allows time for deworming and exams to be completed, and at least a short period to monitor for signs of more severe disease such as parvo. If serious disease problems are identified in a group of dogs, the quarantine may need to be extended to two weeks or more.
15. **Behavioral/mental health care:** Dogs should be provided with soft bedding and toys that can be washed, discarded, or sent home with the dogs. A regular light/dark cycle should be maintained. Prior to releasing dogs to foster homes, dogs should receive a behavioral assessment as per the normal policy of the shelter.

Caretaker precautions (annotated version)

Depending on how much history is available, it may be necessary to assume that all animals are potentially harboring zoonotic infections and may have toxins contaminating their fur. Until exams, initial diagnostics, and baths have been completed, these animals should be handled with particular care. Saliva, feces, urine, and hair from these animals may all contain germs that can be transmitted to humans or other animals. Remember, protecting human health is the best way we can ensure the continued success of rescue/transport programs.

1. **Protective clothing:** Wear protective gear when handling new intakes, including gloves, long sleeved tops and pants. Change gloves between animals, and change tops after handling animals in which a contagious condition is suspected (e.g. ringworm, scabies, parvo). Wear goggles and surgical masks when bathing contaminated animals (or any animal that smells odd or is covered with feces). Make sure protective gear is readily available in a variety of sizes.
2. **Protective animal handling equipment:** Extra caution should be used when handling these dogs. Muzzles in a variety of sizes, sturdy leashes, and control poles should be available.
3. **Hand washing:** Make sure hand washing stations are as readily available as possible and are well stocked with liquid soap and paper towels. Even if gloves are worn, hands should be washed before and after handling animals, and before eating, taking breaks, smoking, or leaving the shelter.
4. **Hand sanitizer:** Although less ideal than gloves and/or handwashing, hand sanitizer is preferable to nothing. When hand washing is not available, hand sanitizer should be provided.
5. **Change of clothes:** Caretakers should change clothing before leaving the shelter OR before going to work with other animal populations within the shelter. If clothes are not going to be laundered at the shelter, they should be bagged and washed at home. No special laundry precautions are required, but hot water, soap and bleach are recommended.
6. **Non-contaminated area for breaks and snacks.** Do not allow eating or drinking in animal care areas. If separate refrigerators are not available, store food and beverages away from any drugs or vaccines. Do not store fecal or tissue specimens in the same refrigerator with food.
7. **Information:** Caretakers should be aware of the importance of zoonotic disease prevention, including means of transmission and signs of the most common or serious infections (including rabies). People at extra risk include pregnant women, children, the elderly, people suffering from immunosuppressive diseases or being treated with chemotherapy. Information should be provided verbally and via clearly visible posted signs.
8. **Rabies vaccination:** Ideally, caretakers should have received pre-exposure vaccination, particularly if working with bite-quarantine dogs or those showing evidence of open wounds and/or neurological disease.
9. **Professional medical attention** for wounds or other signs of illness. Do not self medicate. Minor scratches or bites can become infected or cause serious illness.

Special environmental precautions (annotated version)

Shelters are used to taking precautions to prevent spread of infectious disease, so caring for hurricane refugee animals should not present a terribly unusual challenge. For the most part, normal cleaning and disinfection procedures should be adequate. Because of the great concern about preventing spread of disease from refugee animals to local populations, an extra level of caution is warranted.

1. **Isolation:** Hurricane refugee dogs should be held in a separate area of the shelter for at least the first week of quarantine. This is important to limit public/staff access as well as to prevent spread of disease to other animals. Separate air supply is not required.
2. **Feces pick up:** Feces should be picked up as often as possible, and disposed of in such a way as to prevent contamination of drinking water and other animal areas.
3. **Designated garbage cans:** Plenty of trash cans available for disposal of feces, gloves, etc. Labeled if separate cans are to be used for separate purposes.
4. **Broad spectrum disinfectant and cleaner:** Animal housing areas should be cleaned with a detergent and disinfectant (or combination there-of) that will reliably inactivate all likely pathogens, including parvovirus. A quaternary ammonium disinfectant with good detergent activity, followed by application of bleach diluted at 1:32, represents one effective combination. Potassium peroxymonosulfate (Trifectant® or Virkon-S®) is another product that has good detergent activity and inactivates parvoviruses. Trifectant and company are particularly useful for areas contaminated by organic matter, such as play yards, foot baths, and mop water. *(2017 note: accelerated hydrogen peroxide is also a good choice and has superior action in the face of organic matter contamination.)*
5. **Foot baths:** Trifectant® foot baths should be placed at the entrance to all animal areas, and at the entrance to individual cages for dogs with diarrhea or other signs of infectious disease. Foot baths should be deep enough to cover shoe treads, and should be changed once daily. *(2017 note: footbaths are no longer considered reliable in preventing foot-borne spread of pathogens in a veterinary context; dedicated boots or shoe covers should be used if durable fecal pathogens are considered a risk.)*

Additional notes on heartworm¹:

- A. **Use of preventive products in heartworm negative dogs:** Some dogs may have been on heartworm preventive until the time of the hurricane, but probably missed treatment since being lost. Resuming preventive treatment [such as low-dose ivermectin (HeartGard® and related products), milbemycin (Interceptor® and related products) and selamectin (Revolution®)] now will ensure that a recently acquired infection will be eliminated before progressing. Retroactive efficacy ("Reach back") is assured for one month, and may be effective for as long as three or four months post-infection.
- B. **Suppression of microfilariae in dogs with heartworm infections:** Many of the hurricane refugee dogs already have well established heartworm infections and have circulating microfilariae. According to the guidelines of the American Heartworm Society, "preventive" therapy should be initiated as soon as a heartworm infection is diagnosed. There will be a gradual to precipitous drop in microfilariae in the blood of all the treated dogs within a few days of treatment (rate of decline depends on treatment used), but some dogs will still have circulating microfilaria even after treatment. All dogs treated with Heartgard or Milbemycin in the studies discussed below still had circulating microfilariae present in the blood following a single treatment, and almost all the dogs had circulating microfilariae present after 2 monthly treatments.²

An oral dose of 50 micrograms per kilogram ivermectin may effectively suppress microfilaremia in all dogs until the heartworms can be removed. This dose is based on post-treatment guidelines that were in place before the current monthly products were available. Although this regimen has not been tested like the above products for suppression of microfilaremiias, it is likely that the higher dose of ivermectin will induce clearance in more animals. However, the resulting massive die off of microfilaria is more likely to lead to adverse reactions than the low dose treatment, including potential anaphylaxis and death. This is particularly likely in dogs with high levels of circulating microfilaria. Neither clinical signs nor the strength of positive on a heartworm ELISA test can predict the degree of microfilaremia, but given the high level of endemic heartworm disease in the area where many of the rescued dogs originated, it is prudent to assume that high levels are common. Some people feel that milbemycin may also be a more effective microfilaricide and thus also carry a higher risk of inducing anaphylaxis, therefore selamectin or low dose ivermectin may be the safest choices in dogs suspected of having a high load of microfilaria.

- a. **Reasonable compromise for microfilaricidal treatment:** In most areas of the United States, temperatures will be low enough over the coming months that simply starting all dogs on preventive will likely be adequate (see note above re milbemycin). Detailed maps of transmission season in California can be found at <http://heartworm-hotline.org/>. For those areas

where transmission *is* a concern at this time of year, an approach which would minimize the risk of adverse reactions in the rescue dogs while providing a reasonably rapid clearance of microfilaremia would be to administer two doses of preventive level ivermectin (e.g. Heartgard®, 6 micrograms/kg) two weeks apart, followed two weeks after the second low dose with a higher dose of 50 micrograms/kg ivermectin PO.

- b. **Monitoring after microfilaricidal treatment:** Dogs should be monitored for at least 8 hours after treatment. Signs of adverse reactions include: lethargy, inappetence, salivation, retching, pale mucous membranes, tachycardia and acute circulatory collapse. Treatment of adverse reactions includes fluid support and 1-2 shock doses of steroids. Pretreatment with injectable prednisone 1 mg/kg and diphenhydramine 1 mg/kg may reduce the risk of adverse reactions.

C. **Adulticidal treatment:** All heartworm positive dogs should be treated with adulticidal therapy within 6 months of diagnosis. Although monthly treatment with preventive doses of ivermectin has been effective in clearing some early infections, this *can not be relied upon*. Many of these dogs will have much heavier infections than we are used to seeing in most parts of the United States, and are at consequently higher risk for pulmonary thromboembolism post-treatment. Full pre-treatment workup includes both antigen and microfilaria tests, chest radiographs, complete blood count, blood chemistry and urinalysis. Although individual adopters or foster parents may elect this route, it is likely financially prohibitive when treating large numbers of dogs with heartworm. The main purpose, aside from the prognostic value, is to determine whether a 2 versus 3 dose melarsomine (Immiticide®) treatment regimen is required. The cost of the additional treatment may be less than the pretreatment workup, and it is probable that many dogs will require the 3 treatments anyway. The American Heartworm Society recommends the 3 dose treatment regimen as the treatment of choice in *all* dogs due to increased safety and efficacy.

- a. **Reasonable compromise for adulticidal treatment:** Note that dogs heartworm positive dogs should ideally be confirmed using a different test type than was originally used prior to initiating adulticide treatment. A reasonable compromise when treating large numbers of dogs would be to forego the pretreatment workup and simply treat all dogs with a single dose of melarsomine followed 1 month later by 2 doses, 24 hours apart. The risk of thromboembolic disease may be reduced if dogs are treated with a preventive product for 3 months *prior* to adulticidal therapy. Treatment with a tapering dose of prednisone (0.5 mgs/kg BID x 1 week, SID x 1 week, then EOD x 1 week) *following* each injection of melarsomine may also be helpful. All dogs must be strictly cage rested between injections and for thirty days after the second set of injections. It should be recognized that many of these dogs are at very high risk, and some adverse reactions should be expected despite every precaution.

D. **Risk of infection to other dogs:** The concern has been raised that transport of heartworm positive dogs will introduce disease into non-endemic areas. It should be recognized that traffic of dogs in and out of endemic areas is a common occurrence in our highly mobile society, and heartworm disease is often recognized even in so called non-endemic areas. However, it is true that more dogs will not be on preventive products in areas normally considered low risk. If a suitable mosquito vector is present, has access to a heartworm infected dog with circulating microfilaria, and subsequently lives long enough to permit development of larvae to an infective stage, dogs not on preventive product would be vulnerable to infection.

Minimizing risk: In order for infection to be transmitted, a mosquito must bite a microfilaricidal dog, and then survive long enough for larvae to mature (at least 10-14 days at average temperatures of 80 degrees F). When temperatures drop below 60 degrees F for a few hours or more per 24 hour period, maturation of larvae may take even longer. Mosquito control and prompt administration of microfilaricidal treatment as described above will minimize any risk of transmission. As an additional precaution, all dogs housed in the same environment (foster home or shelter) should be on preventive treatment unless it is *certain* that no mosquitoes are present due to climatic considerations.

Overall recommended schedule for *minimum* treatment of heartworm positive dogs:

Microfilaricide:

Day 1: Low dose ivermectin (6 /kg, e.g. Heartgard ® or similar product)
Week 2: Low dose ivermectin (6 micrograms/kg, e.g. Heartgard ® or similar product)
Week 4: If concerned about transmission, ivermectin 50 micrograms/kg, monitor for the day (see notes above)
Continue monthly preventive for at least one year, or for life if at risk of re-infection

Adulticide:

3 months on preventive
Retest just to be sure, then at least three months after preventive has been started:
1 dose immiticide
1 month strict cage rest, then
2nd dose immiticide, wait 24 hours, then 3rd dose of immiticide, then
1 more month strict cage rest

¹Much of this information comes from the *American Heartworm Society 2005 Guidelines for the Diagnosis, Prevention and Management of Heartworm (Dirofilaria immitis) Infection in Dogs*, available at <http://www.heartwormsociety.org/CanineHeartwormInfo.htm>

²Bowman *et al.* Effects of long-term administration of ivermectin and milbemycin oxime on circulating microfilariae and parasite antigenemia in dogs with patent heartworm infections. Heartworm Symposium, '92 [Trial 3 below has not been published]

Treatment of dogs with naturally acquired infections:² Trial 1: In 6 dogs treated with HeartGard, one dog had circulating microfilariae 301 days after the beginning of treatment. In 6 dogs receiving Interceptor, none of the dogs had circulating microfilariae after 6 months. In 6 dogs that received Interceptor for only 6 months, one dog had intermittent low levels of microfilariae in its blood throughout the study, and in one dog, microfilariae appeared again in the blood at the end of a year. In a second Trial, of 10 dogs treated with Heartgard for a year, one dog had levels that fluctuated to levels over 4,000 microfilariae per milliliter, and it was never cleared of its microfilariae. A second dog became negative after the second treatment, but recrudesced after the sixth and remained positive. Eight of the dogs became virtually negative after anywhere from 2 to 8 months of treatment, but 2 of these dogs did continue to have sporadic microfilariae detected in the blood. In a third Trial, 8 dogs with natural heartworm infections were treated with Interceptor for over six months, and three of these dogs still had circulating microfilariae.