
FLEAS

Integrated Pest Management In and Around the Home

Cat fleas, *Ctenocephalides felis*, are the most common ectoparasite on domestic cats and dogs (Fig. 1). Dog fleas, *C. canis*, look like cat fleas but are rare in California. Sticktight fleas, *Echidnophaga gallinacea*, are commonly found on ground squirrels and poultry; the females firmly attach themselves along the ears and eyes of their host (Fig. 2). They can become a problem with pets that roam. The ground squirrel flea, *Oropsylla montana*, is found on ground squirrels and is the vector of sylvatic plague in California. However, fleas on cats or dogs in California most likely are cat fleas.

IDENTIFICATION

Adult fleas are no larger than $\frac{1}{8}$ inch long, so it is difficult to see a number of the characteristics used to describe them. These reddish-brown, wingless insects are laterally compressed, so they look as if they are walking on edge. Cat fleas have both pronotal and genal combs. They have piercing-sucking mouthparts through which they obtain blood meals from their hosts.

LIFE CYCLE

Unlike most fleas, adult cat fleas remain on the host where feeding, mating, and egg laying occur. Females lay about 20 to 50 eggs per day. Cat flea eggs are pearly white, oval, and about $\frac{1}{32}$ inch long (Fig. 3). The eggs are smooth and readily fall from the pet and land on surfaces such as bedding and carpeting in the animal's environment. They hatch in about 2 to 5 days.

Flea larvae are no larger than $\frac{3}{16}$ inch long, hairy, and wormlike with a distinct, brownish head but no eyes or legs (Fig. 4). The larvae feed on dried blood

and excrement adult fleas produce while feeding on the pet. Larval development is restricted to protected places where there is at least 75% relative humidity. The larvae feed and crawl around for 8 to 15 days before building small, silken cocoons in which they pupate and develop into adults. Debris, such as pet hair or skin or carpet fibers, usually covers the pupae, providing visual camouflage.

Flea larvae develop more quickly at higher temperatures, preferring areas that are 70° to 90°F. At cool temperatures, fully formed fleas can remain in their cocoons for up to 12 months. Warm temperatures and mechanical pressure caused by walking on or vacuuming carpet stimulate emergence from the cocoon. At normal room temperatures, the entire life cycle can occur in about 18 days.

An adult cat flea generally lives about 30 to 40 days on the host. When normal grooming activity is restricted, 85% of adult females survived for 50 days. You can find fleas on pets throughout the year, but numbers tend to increase dramatically during spring and early summer when conditions favor larval development.

ASSOCIATED PROBLEMS

Recent advances in molecular research indicate cat fleas are capable of transmitting a murinelike typhus disease in humans, cat flea rickettsiosis. The symptoms are similar to murine typhus but less severe, including headaches, chills, fever, vomiting, and rash. This rickettsial agent is widely found in cats and cat fleas worldwide. It is likely that many previously diagnosed cases of murine typhus actually might have been cat flea rickettsiosis.



Figure 1. Adult cat flea.



Figure 2. Sticktight flea.



Figure 3. Cat flea eggs.



Figure 4. Cat flea larva.

PEST NOTES

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Fleabites consist of a small, central, red spot surrounded by a red halo, usually without excessive swelling. They usually cause minor itching but can become increasingly irritating to people with sensitive or reactive skin. Some people and pets suffer from fleabite allergic dermatitis, characterized by intense itching, hair loss, reddening of the skin, and secondary infection. Just one bite can initiate an allergic reaction, and itching can persist up to 5 days after the bite.

Cat fleas serve as intermediary hosts of dog and cat tapeworms. Cats or dogs can acquire this intestinal parasite while grooming themselves if they ingest adult fleas that contain a cyst of the tapeworm. Children occasionally can acquire these tapeworms too.

MANAGEMENT

New, safer, and more effective products aimed at controlling adult fleas on pets have made cat flea management without pesticide sprays, shampoos, and dusts feasible in most situations. Management of fleas on pets must occur in conjunction with regular, thorough cleaning of pet resting areas indoors and out. Once fleas infest a home, control will require a vigilant program that includes vacuuming, eliminating fleas on pets, and cleaning up and possibly treating shaded outdoor locations where pets rest.

On the Pet

Several types of products are available to control fleas on dogs and cats. The newer products are either applied topically to the body of the pet or provided orally (Table 1). Products containing fipronil, permethrin, or amitraz also are designed to control ticks. Products containing the insect growth regulators (IGRs) methoprene and pyriproxyfen are designed to provide long-term control of flea eggs and immatures in the environment.

If you administer oral or topical products early in the year before flea populations begin to build, the products can prevent fleas from establishing themselves in your home. Contact your veterinarian for advice in selecting the best flea-control product for your situa-

Table 1.

Active ingredients and some of the products available for on-animal control.

Active ingredient	Product	Application—oral or topical
Dinotefuran ¹	4.95% (w/v), Vectra 3D®, Summit VetPharm	topical
Fipronil	10% (w/v), Frontline® Plus, Merial Ltd	topical
Imidacloprid	9.1% (w/v), Advantage®, Bayer Animal Health	topical
Lufenuron ¹	90–205 mg/tablet, Program® Novartis Animal Health	oral
Nitenpyram ¹	11.4 or 57.0 mg/tablet, Capstar®, Novartis Animal Health	oral
Pyriprole ¹	12.5% (w/v), Prac-Tic®, Novartis Animal Health	topical
Selamectin ¹	7.4–14.2%, Stronghold®/Revolution™ Pfizer Animal Health	topical
Spinosad ¹	140–1620 mg/ tablet, Comfortis®, Elanco Animal Health	oral

¹These products are FDA-registered veterinary drugs, not pesticides, and require a prescription from a vet

tion. Supplement the use of these products with good housekeeping in areas where the pet rests.

On-pet Flea Treatment Products. New product innovations have made it possible to effectively, conveniently, and safely prevent flea populations from building up on pets. These products are more effective than the traditional insecticide collars, dusts, shampoos, and sprays. The spot-on formulations available from veterinarians or via the Internet are much easier to use than baths or sprays and are more acceptable to the animal and pet owner.

A few drops of the spot-on formula applied to the animal's shoulder blades move through the animal's coat or are absorbed into the animal's skin, providing whole-body treatment. These materials kill adult fleas within hours of the flea jumping on the animal. Also, these compounds have lower toxicity to mammals than traditionally used flea-control products containing carbamates such as carbaryl and propoxur and organophosphates such as chlorpyrifos, diazinon, and tetrachlorvinphos, making them safer to use on pets. Generally spot-on formulations can withstand bathing; check the label for specific instructions. There is no literature concerning the effectiveness of over-the-counter spot-on formulations.

With increased EPA concerns about adverse effects reported with the use of topical flea control products, it should

emphasized that not all products are safe for all animals. Products containing permethrin and amitraz never should be applied to cats. Be sure to read labels carefully.

Systemic Oral Treatments. Three flea-control products are internal medications administered as a pill or chewable food. The insect development inhibitor lufenuron (Program) can be given as a pill to dogs or as a food additive for cats once a month to suppress flea populations. It also can be administered as an injection every 6 months. While this compound doesn't kill adult fleas, it does prevent flea reproduction. Administration of nitenpyram (Capstar) provides rapid knockdown of the fleas on the host within 30 minutes. The effects last about 48 hours. A newer product for dogs containing spinosad (Comfortis) also is fast acting, providing protection for 60 days. These oral treatments are especially appropriate for animals that swim or take frequent baths.

Flea Collars. Flea collars typically contain the IGRs methoprene and pyriproxyfen and insecticides such as permethrin and tetrachlorvinphos. The collar releases the IGR, which then distributes itself throughout the pet's coat affecting eggs and female adult fleas. Very little information has been published concerning the efficacy of collars.

Traditional Insecticide Products.

Until recently, pet owners had to rely on products containing conventional insecticides (pyrethrins, permethrin,

d-limonene, chlorpyrifos, diazinon, carbaryl, and naled) to control fleas on their pets. These products were formulated as soaps, shampoos, powders, dusts, spray-on liquids, and dips. Although many of these products still are available, they aren't as effective to use as the on-animal treatments above. Some products aren't labeled for cats. Be sure to read all labels carefully.

Nonchemical Treatments. Special metal flea combs are available that help effectively remove adult fleas from the coat of pets. Removing fleas can provide comfort to the animal and reduce flea breeding. Combing pets at regular intervals also is a good way to monitor the flea population and help you decide when other control measures might be necessary.

Studies have shown that neither Vitamin B₁ (thiamine hydrochloride) supplements nor brewer's yeast prevents fleas from feeding. Herbal collars and ultrasonic devices aren't effective flea repellents either.

Environmental Treatments

Indoors. Controlling cat fleas in buildings requires a variety of approaches. Before starting a control program, look through each room to determine areas where larval development occurs. Flea populations are highest in places where dogs or cats regularly sleep. You usually won't find flea larvae in areas of heavy pedestrian traffic or locations that receive exposure to sunlight; they are likely to be present in areas where adult fleas have left dried blood and feces.

Sanitation. Thoroughly and regularly clean areas where you find adult fleas, flea larvae, and flea eggs. Vacuum floors, rugs, carpets, upholstered furniture, and crevices around baseboards and cabinets daily or every other day to remove flea eggs, larvae, and adults. Vacuuming is very effective in killing larvae in the carpet, picking up adults, and stimulating preemerged adults to leave their cocoons. Recent studies suggest that destroying the vacuum bags isn't necessary. Launder pet bedding in hot, soapy water at least once a week. Thoroughly clean items you bring into the building, such as used carpets or

upholstered furniture, to prevent these from being a source of flea infestation.

Insecticides. Several insecticides are registered for controlling fleas indoors. The most effective products also contain the IGR methoprene or pyriproxyfen. Use a hand sprayer or aerosol to apply insecticides directly to infested areas of carpets and furniture. Total release aerosols, or room foggers, don't provide the coverage and long-term effectiveness of direct sprays unless they contain methoprene or pyriproxyfen. Treatments with insecticides other than IGRs often fail to control flea larvae, because the treatment material fails to contact them at the base of carpet fibers where they develop.

Spray carpets, pet sleeping areas, carpeted areas beneath furniture, baseboards, windowsills, and other areas harboring adults or larvae. Fleas will continue to emerge for about 2 weeks after treatment, because the spray doesn't kill pupae. Continue to vacuum, and don't treat again for at least several weeks.

Outdoors. In California, outdoor flea populations are most prevalent in coastal localities and other places with moderate daytime temperatures and fairly high humidity levels. In Central Valley locations, populations can become very numerous in shaded and protected areas such as sheltered animal enclosures, crawl spaces under buildings where feral animals might sleep, and vegetated areas adjacent to buildings. Infested outdoor locations left untreated can lead to fleas reinfesting your pets. However, treating the pet with any of the preferred pet treatment products listed above normally will prevent reinfestation.

Outdoor sprays aren't necessary unless you detect significant numbers of adult fleas. One way to do this is to walk around pet resting areas wearing white socks pulled up to the knee. If fleas are present, they will jump onto socks and be readily visible.

Products for eliminating adult fleas outdoors are somewhat limited because many field populations of cat fleas are resistant to pyrethroids such

HANDLING A FLEA EMERGENCY

If your home is heavily infested with fleas, take these steps to get the situation under control.

Inside the Home

- Locate heavily infested areas, and concentrate efforts on these areas.
- Wash throw rugs and the pet's bedding.
- Vacuum upholstered furniture. Remove and vacuum beneath cushions and in cracks and crevices.
- Vacuum carpets, especially beneath furniture and in areas that pest frequent. Use a hand sprayer to treat all carpets with an insecticide that contains an insect growth regulator.
- Allow carpets to dry, then vacuum a second time to remove additional fleas the spray caused to emerge.
- Continue to vacuum for 10 days to 2 weeks to kill adult fleas that continue to emerge from pupal cocoons.

On the Pet

- Use a spot-on or a systemic oral treatment, which you can purchase from veterinarians or online.

Outside the Home

- If you treat your pets with spot-on or oral treatments, you'll rarely need to spray outdoors.

as permethrin. Apply sprays directly in locations where pets rest and sleep such as doghouse and kennel areas, beneath decks, and next to the foundation. It is seldom necessary to treat the entire yard or lawn areas. Flea larvae are unlikely to survive in areas with exposure to sunlight or substantial foot traffic.

SUGGESTED READING

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To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

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This and other Pest Notes are available at www.ipm.ucdavis.edu.

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WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original, labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Pesticides applied in your home and landscape can move and contaminate creeks, rivers, and oceans. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down the sink or toilet. Either use the pesticide according to the label, or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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