

SECTION 2  
CHAPTER  
**10**

# FLEAS

## LEARNING OBJECTIVES

After completely studying this chapter, you should:

- Understand the cat flea life cycle and how it contributes to flea problems.
- Be able to discuss habitat alterations and why they are needed.
- Be able to identify pesticide application methods for flea control.
- Understand when, how, and why insect growth regulators (IGRs) are helpful.

The secret to flea population management is the flea's life cycle. The adult must contribute timely nourishment for larvae under special conditions, or the young will not survive. No longer a regional problem, today fleas are common in all parts of the country except very dry areas.

The most important species that pest control technicians must manage is the **cat flea**, which feeds on a variety of hosts, including cats, dogs, rodents, foxes, opossums and humans. This flea prefers pets and will not affect humans unless populations are excessive or the pet is removed from its resting areas. It is not uncommon for families to remove their pets while on vacation and then return home to find ravenous fleas.

An outline of the sequence of events:

- A summertime vacation assures good flea-growing conditions (temperature and humidity).
- Taking the pet removes the main host.

- While the family is away, larvae continue to develop, feeding on dried blood. Pupae complete their cycle and are ready to emerge.
- The family returns to the newly emerged adult fleas—ready to feed and accept ALL available warm-blooded hosts.

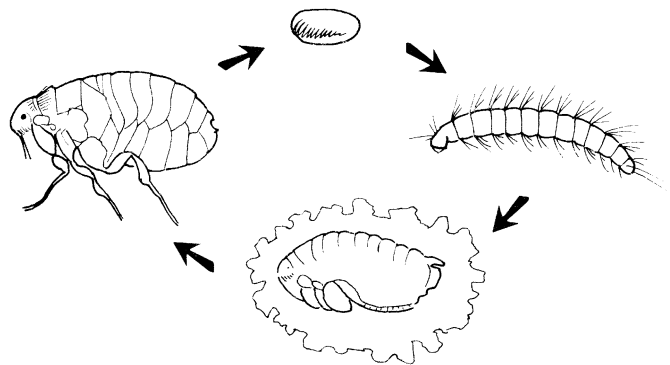


Figure 10.1. Fleas undergo complete metamorphosis through egg, larval, pupal, and adult stages.

## CAT FLEA (*Ctenocephalides felis*)

### Eggs

After feeding on blood, an adult female flea will lay up to several hundred eggs within three weeks. Flea eggs develop in pet resting areas in warm, humid climates. The tiny flea eggs are very smooth and rounded. They do not stick to pet hair and are easily scratched or shaken off. When they fall on pet bedding, furniture, carpets, etc., they shake down to the same level as the pepper-like dried blood (see larvae and adults). These eggs will hatch in one week to ten days.



Figure 10.2. Cat flea—egg, larvae, adult, and feces.

### Larvae

Larvae are tiny, worm-like, whitish (almost transparent) insects with small brown heads. When larval fleas hatch, they are only  $\frac{1}{16}$  inch long. After three molts, they grow to near  $\frac{1}{4}$  inch but are still difficult to see. The entire larval stage may take only one week under favorable conditions, or it may be prolonged over several months.

The legless larvae can disappear with remarkable speed (into carpets, pet bedding, etc.) moving by using a pair of spines at their rear and long (but nearly invisible) hairs on each segment. Larval fleas are scavengers and do not suck the host's blood or live on hosts. Cat flea larvae have chewing mouthparts that they use to eat specks of dried blood (see adults). When they are full, the blood turns them to a near-purple color.

Like many insects that live in large populations (e.g., pantry pests), mature flea larvae crawl away from the area where they developed and work their way into cracks or under the edge of pet beds, rugs, or carpeting. These mature larvae spin a loose, white, silken cocoon in which to pupate. The cocoon often gets covered with dirt particles and other detritus during its construction.



Figure 10.3. Cat flea larva.

### Pupae

Shortly after making the cocoon the larva molts and forms a white pupa. The pupa becomes an adult but does not emerge immediately. Rather, it remains immobile in a form called the "pre-adult" until stimulated to leave the cocoon. This pupal stage is completed within seven to ten days, but the pre-adult form may remain in the cocoon for months.

Various stimuli guarantee the flea will leave the cocoon only at a favorable time: being stepped on by the pet, carbon dioxide being exhaled by a host, or encountering a sufficient number of warm, humid days. The adult flea is ready to feed as soon as it leaves the cocoon.

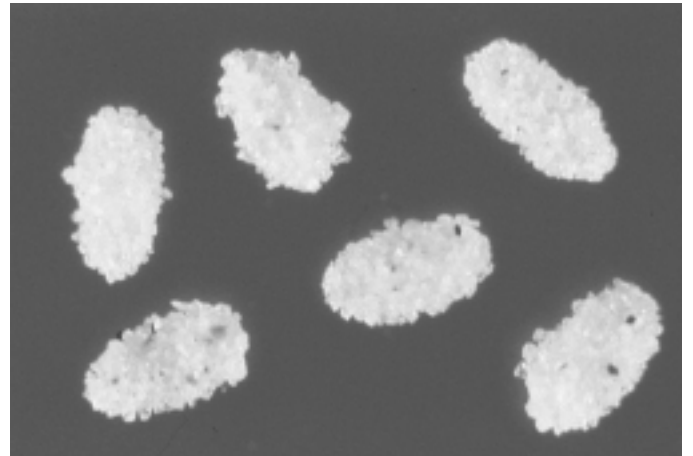


Figure 10.4. When immature fleas complete the larval stage, they pupate inside silken cocoons.

### Adults

Adult fleas live on the pet and in the pet's sleeping or resting area. Adult fleas are parasites—they obtain their nourishment from a host animal, usually a mammal. They feed by biting and sucking blood, sometimes daily, for two or three weeks. Most feeding takes place while the pet is sleeping or at rest.

Fleas inject irritating saliva when they feed. The bite irritation causes the host to scratch and shake, dislodging the eggs. The females digest the host's blood and excrete

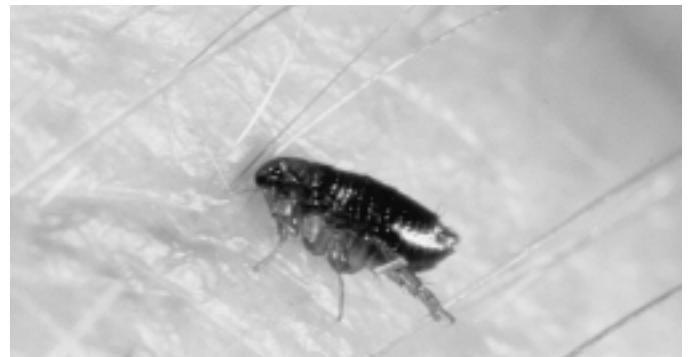


Figure 10.5. Only adult fleas feed on blood. A blood meal from a warm-blooded animal is necessary for females to produce eggs.

a corkscrew-shaped string of black, nearly dry blood. This fecal blood breaks up into pepper-like specks that are also scratched off into the pet sleeping or resting areas. Cat flea larvae cannot live without dried blood from the adults, so fleas are not evenly distributed throughout a home or building. The larvae use this dried blood as a food source.

## **Fleabite and Flea Allergy**

The fleabite is accompanied by secretions of saliva that prevent the host's blood from coagulating. The saliva contains several chemicals that cause irritant reactions, sometimes including hypersensitivity to subsequent fleabites. This sensitivity often results in flea allergy dermatitis, expressed by hair loss, excessive scratching, skin inflammation, etc.

The bite distribution pattern in dogs and cats begins across the hips near the tail and narrows along the back. An area between the hind legs and on the belly can also be affected. Cats are less affected on the belly than dogs, but often have problems on the neck or collar. Once the allergy is activated, reaction is quick with few subsequent bites. Flea allergy also seems to be hereditary.

## **Range**

In the past, flea control in the northern United States consisted of a summer spray inside and treatment of the pet because reinfestations from outside were not common. In the southern states where outside infestations were common, treatment in the yard was also needed. Today flea infestations and reinfestations are common in all parts of the country except very dry areas.

# **CONTROL AND MANAGEMENT OF FLEAS**

## **Inspection**

**Indoor.** A close inspection of a home or building will principally involve finding the "hot spots" or areas of high flea development. Pet bedding or sleeping areas should be identified first. Pets do not sleep or rest indiscriminately or randomly in a building. They have favorite places and move among them throughout the day. Where they habitually stop and rest, flea eggs and dried blood accumulate. These are spots where they habitually scratch, bite, or shake (e.g., immediately after leaving a resting spot). Spots where cats land as they jump down from a high resting or feeding area are also places where eggs and dried blood fall.

**Outdoor.** Kennels and doghouses are obvious places where fleas build up. But there are other places where pets prefer to sleep or rest at certain times of the day. Examples are under particular bushes, under porches, or in crawl spaces. If a pet roams the perimeter fence, points of infestation might be located there.

Outdoor flea infestations rely on dependable hosts and warm, humid climatic conditions. Flea larvae require moisture because they easily dry out and die. Neither can they tolerate free water (such as rainwater), or they drown. Therefore, infestations are not found in unprotected or undrained situations.

**Reinfestation from outside.** Some species of urban wildlife harbor cat flea populations. When urban neighborhoods mature, their habitat for wildlife increases. Raccoons have long been prominent and, in fact, have overpopulated some urban areas. They live in chimneys, large trees and storm sewers. Chipmunks, ground squirrels, and domestic rodents have also found habitat in ivy terraces, rock walls, soil berms, and underground drainage areas. The opossum has extended its range or has been introduced over most of the United States. It is one of the most common urban wildlife species found today.

Pets are always aware of the locations of wildlife habitat in their own backyard. As soon as they are released, they run to these places to investigate, even if they can't get at the animals. This behavior ideally facilitates flea reinfestation of clean pets.

## **Habitat Alteration**

**Indoor.** Flea populations build up in the warm, humid weather of spring and summer and drop to low levels in cool or dry winter weather. Inside air with low humidity will hold back the buildup of flea populations.

When focus areas of flea populations are identified, these and other potential harborage sites should be vacuumed as thoroughly as possible. Except for flea allergy dermatitis, which can be initiated with very few fleabites, a moderate flea population can be kept at a tolerable level by vacuuming alone. This vacuuming **MUST** be performed daily and must always be thorough—an alternative very few pet owners would choose when other safe and effective options are available. If vacuuming is augmented by use of growth regulators, better success can be predicted.

Reduction of clutter facilitates inspection and permits effective pesticide application and vacuuming. Pets and feral animals should be kept out of crawl spaces, areas under porches, and outbuildings. Eliminating the wildlife habitat where fleas are harbored, and trapping or killing animals responsible for reinfestations may become essential in stopping difficult flea infestations. Care should be taken, however, not to rely on wild animal elimination alone. These animals are usually replaced by others moving in from adjacent range (see outside treatment). Consult local restrictions when dealing with wild mammals.

## **Pesticide Application**

**Treatment of Pets.** Pets should be treated by the pet owner or a veterinarian. Where flea allergy dermatitis is involved, pets must be treated by veterinarians or recovery will be slow at best. Pet bedding should be washed once a week. The pet kennel or pet box should also be cleaned and washed each week. The weekly schedule kills eggs and larvae and eliminates the dried blood essential for complete larval nourishment. Pet owners can purchase pesticide powders and sprays and they should be used according to label information. "Dipping" pets is done most effectively by veterinarians. Flea collars may help with some flea infestations, but they are generally the least effective treatment.

Treatment of puppies and kittens with dusts and sprays can be hazardous. These small pets should be moved out of infested areas into clean bedding and their mothers carefully treated. Children should not fondle pets treated with pesticides. Medicated ointments can be used on pets, especially dogs, with severe flea allergy dermatitis.

**Indoor.** Never apply pesticides until thorough vacuuming has been completed.

Insect growth regulators (IGR) have proven very efficacious in flea control. Growth regulators interfere with or replace natural hormones essential for the flea larvae to change into pupae. IGRs have long residues and a good margin of safety for humans. IGRs do not affect the pupae or adults, so fleas that have reached those stages complete their development.

Spot treatments with pesticides are applied to kill flea larvae and adults that come in contact with the sprays. These pesticides (e.g., microencapsulated pesticides, emulsifiable concentrates, dusts, and space sprays) have varied residual periods. The “pre-adult” under adverse conditions (cool or dry weather) may not leave the pupal cocoon for a period of weeks, even months. This means that some fleas will be able to “dodge” treatments and expose themselves after pesticides have lost their effectiveness.

Carpet staining or color alteration can occur from pesticide use. The sprays should be applied as even, fine overlapping fan sprays under low pressure. Avoid overwetting carpets. During very humid weather, carpets dry slowly and ventilation or dehumidifying is necessary. Sprays will not reach larvae or adults deep down in the carpet, but they will come into contact with the pesticide residue when they move up or out of the nap. Some fumigant action may kill pests as the pesticide dries. Do not allow pets or children on the treated carpet while it is wet. Contact with the treated carpet will also help kill adult fleas on an infested pet.

**Preventive treatment.** Preventive treatment is critical, especially where flea infestations were particularly severe the previous year, where flea allergy dermatitis must be avoided, where animals are in poor health, and where outside infestations can be predicted. If IGRs are to be used alone, they should be applied before spring flea activity gets underway—at least one month before flea problems even begin to be noticed (depending on the local climate). IGR application can be repeated according to predicted need.

When summer visitors bring their infested pets, a flea infestation can be anticipated. Thorough vacuuming is recommended, but where previously uninfested pets are involved, preventive treatment with an IGR might be indicated.

**Outside.** Where pet reinfestation brings on repeated inside infestations, the outside environment should be treated. Random outside treatment or full lawn cover sprays are not as effective as careful treatment of pet resting areas and wild animal habitat.

Kennels, dog runs, and doghouses are obvious areas to treat. Perimeter fences where pets and wild hosts roam may be the pest interface between one yard and another.

Crawl spaces, areas under porches, and openings into basements and attics where pets or wild animals nest should not be closed off until the animals are removed and the area adequately treated.

Emulsifiable concentrates or microencapsulated insecticides can be applied as spot treatments where labels permit. Emulsifiable concentrates of many pesticides have a short residual when exposed to outside light and weather fluctuations.

Where they can be applied, dusts are often more effective. Take care not to overapply dusts. Dusting burrows or the protected nesting areas of wild animals can be very effective and might eliminate the need for trapping or killing these animals.

Pesticides should be reapplied when rainy weather follows pesticide application.

**Ultrasonic devices.** Clients have been led to believe that ultrasonic devices are effective flea deterrents. Cat fleas have NOT been shown to react to a broad spectrum of ultrasound; consequently, there is no utility for ultrasonic devices in a flea-management program.

## Follow-up

Thorough client education is essential both before and after flea management programs are conducted. Clients must be well informed or they will not be motivated to carry through with the steps they alone can do. Flea infestations often bring about emotionally charged situations—especially when anxieties prevail, such as when children are involved or the infestation is long term.

Pest management technicians must be able to clearly and patiently explain the flea life cycle and how each stage is important. They must clarify how infestations can persist and that there may be no easy or quick solution. Where infestations are severe or where management procedures may not be completely carried out, a reinspection and possible retreatment should be scheduled before a rebounding population cancels out all of the previous work and cooperative effort.

## SUMMARY

Fleas are mainly parasites of mammals and birds. They undergo a complete metamorphosis. The eggs drop off of the host where the female deposits them during feeding periods. Larvae with chewing mouthparts hatch and feed on dried host blood provided by the feeding female flea. Prior to pupating, the larva spins a small, loose, white, silk cocoon. The pupa molts to an adult inside the cocoon. Adults emerge from the pupal cocoon, find the host, feed by sucking blood, mate, and produce eggs. The cat flea is the most common flea infesting dogs and cats in the United States.

Understanding the life cycle of the flea, the dependence of this pest on its host, and the importance of the dried host blood is essential to flea control. Removing dried blood and adult fleas by vacuuming, killing the adult fleas, and using an insect growth regulator to keep the larvae from pupating will control most flea populations.

# Review Questions

## Chapter 10: Fleas

Write the answers to the following questions and then check your answers with those in Appendix A in the back of this manual.

- The food of flea larvae is principally:
  - Blood they suck from the host.
  - Dried blood from the female flea.
  - Fur from the host.
  - Starch.
- Adult fleas obtain blood by:
  - Sucking.
  - Chewing.
  - Absorbing.
  - Lapping.
- Pupal “pre-adult” fleas may remain in a cocoon for months.
  - True
  - False
- The pepper-like specks observed falling from a pet after scratching are:
  - Adult fleas.
  - Larval fleas.
  - Fecal blood.
  - Cast skins.
- Flea larvae:
  - Need moisture.
  - Need free-standing water.
  - Crawl away into cracks, carpets, etc.
  - Attach themselves to hosts.
  - A & C
- Pets that are flea hosts sleep and loaf in particular places rather than randomly lying down when they are tired.
  - True
  - False
- Dogs can become allergic to fleabites.
  - True
  - False
- For control of fleas, it is NOT important for the pet owner to:
  - Remove the pet.
  - Vacuum pet resting spots.
  - Treat the pet.
  - Clean pet bedding.
- A homeowner complains that a family pet is constantly scratching and is losing patches of hair, and its skin appears to be red and inflamed. You should:
  - Advise homeowner to treat the pet with over-the-counter powders/sprays.
  - Advise homeowner to have veterinarian treat pet.
  - Treat the pet yourself with powders/sprays.
  - Advise homeowner to place flea collar on pet.
  - Dust and spray the pet’s bed and kennel.
- Which non-toxic alternative (habitat alteration) is the MOST effective at controlling fleas?
  - Thorough vacuuming
  - Reducing vegetative cover around home
  - Reducing clutter
  - Decreasing household temperature
- Application of an IGR will:
  - Kill adults.
  - Immunize the pet.
  - Keep larvae from developing into pupae.
  - Keep eggs from hatching.
- IGRs:
  - Should be used one month before flea activity is usually noticed.
  - Can be used in combination with ultrasonic devices.
  - Are effective at retarding the growth of adult fleas.
  - Can be used in combination with spot treatments.
  - A & D
- Thorough vacuuming along with use of IGRs will control most flea populations.
  - True
  - False

