



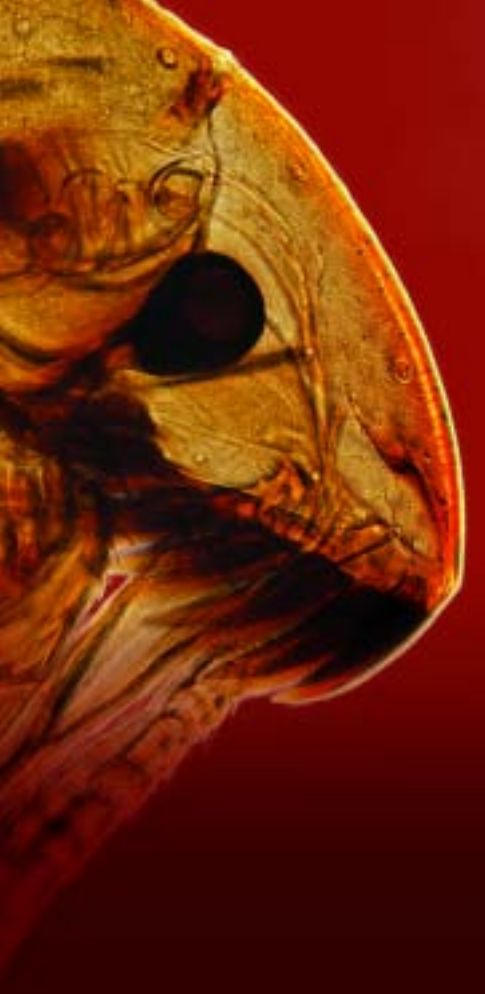
FLEA BITE FACTS

Q&A



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Fleas aren't just a nuisance to pets and their owners. With each bite, flea salivary antigens are deposited into the pet's skin, which can lead to flea allergy dermatitis and complicate other dermatologic problems.

Female fleas must also feed before producing viable eggs on the host.

With those facts in mind, this publication brings together leading parasitology and dermatology experts to examine the importance of a rapid kill time in flea control products.

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Flea Trax

- Adult fleas begin to feed immediately after accessing a new host.
- Female fleas feed for longer periods of time at one location, and male fleas feed for shorter periods of time and move frequently.
- Female cat fleas can consume up to 15 times their body weight in blood daily.
- Fleas begin defecating partially digested blood two to six minutes after feeding.
- Female cat fleas must feed before producing viable eggs.

1 What should practitioners know about new findings on flea feeding behavior?

Dr. Byron Blagburn: When and under what circumstances adult fleas feed has been widely debated. The reality is that fleas feed immediately upon accessing a canine or feline host.

Dr. Michael Dryden: When cat fleas (*Ctenocephalides felis*) infest a dog or cat, most begin feeding within seconds to minutes, with upwards of 89% being blood fed within five minutes.¹

Dr. Peter Ihrke: Both male and female fleas require a blood meal before mating, and mating of the cat flea virtually always occurs on the host animal. Female fleas feed intermittently for about 25 minutes, and males feed in less than half this time. Therefore, to be effective, especially in animals with flea allergy dermatitis, both systemic and topical flea control products must work very rapidly to prevent or diminish feeding.

Blagburn: Female fleas feed for longer periods at one location, while males tend to feed for shorter periods and move frequently.

Dryden: Unfed, newly emerged male and female cat fleas are quite similar in size, approximately 0.4 mg.² Once feeding is initiated, size discrepancies become rapidly apparent with females increasing their body weight 140% within two days, while males increase their body weight less than 20%.² Female cat fleas can consume up to 15 times their body weight (13 μ l) in blood daily, while male fleas con-

sume less than their body weight.³ The blood passage through the flea is so rapid that fleas begin defecating partially digested blood within two to six minutes. After rapid transit through the flea, the excreted blood dries within minutes into reddish-black fecal pellets or long tubular coils (flea dirt).

Blagburn: It is necessary for female cat fleas to feed before viable eggs are produced. Eggs are first laid by female fleas about 24 hours after they commence feeding and are produced in greatest number commencing about 48 hours after initiation of feeding.

Dr. Craig Griffin: Adult fleas do not live in the environment, and once on a pet they try to stay on that pet. The pupal stage in the environment is the main source of juvenile fleas that jump onto dogs and cats. Once on a pet, they rapidly begin to feed, particularly female fleas. Female fleas take more blood meals than male fleas, especially once gravid. It takes generally more than 24 hours for a juvenile flea that jumps onto a dog to become gravid and lay eggs.

As long as fleas are killed within 24 hours in a controlled environment, such as an indoor pet's house, environmental flea infestation will be prevented. However, the dog may still experience flea bites when it is exposed to juvenile fleas from outside the controlled environment.

2 How is flea biting and feeding influenced by the use of systemic or topical flea control products?

Griffin: The issue related to rapidity of flea feeding is how rapidly a product, whether systemic or

topical, prevents feeding. The effect may be by repelling, incapacitating, or killing the fleas. The preferred product is the one that limits flea feeding the most, especially for flea allergic pets.

Ihrke: Preventing feeding is crucial for flea allergic animals because flea salivary antigens are deposited into the skin each time a flea feeds.

Dryden: The feeding activity of fleas is so rapid that for years I was doubtful that any insecticide could stop flea bites. Studies have now demonstrated that neither topical nor systemic insecticides can stop this initial biting and feeding.^{4,6} But systemically active insecticides appear to decrease blood feeding more rapidly and more profoundly than topically active insecticides.⁶

Blagburn: Both topical and systemic flea control products can affect flea feeding quickly and dramatically. However, neither will inhibit feeding altogether. Some systemic products can achieve greater than 90% flea control within three to four hours. Some topicals take a bit longer, achieving 80% to 90% efficacy within six to 12 hours.

Studies demonstrate that the size of the blood meal taken by fleas is greatly reduced by both systemic and topical products. A corollary to reduced feeding is the introduction of less flea salivary antigen into the host. This reduces the likelihood of allergic reactions to fleas.

3 How long do flea products maintain efficacy in heavy flea infestations? How

“When cat fleas infest a dog or cat, most begin feeding within seconds to minutes, with upwards of 89% being blood fed within five minutes.”
—Dr. Michael Dryden

does this issue affect your recommendations regarding application frequency?

Dryden: This is difficult to answer. There are many possible variables, such as the level of infestation, hair coat length and density, where the pet’s weight falls within the unit dosing range, and exposure to water or bathing. However, given all these variables, it has been my perception that heavy flea infestations can impact the performance of topical flea products. This may be real or perceived, but I often recommend either increasing the frequency of application from four weeks to three weeks or administering short-acting nitenpyram. The orally administered and systemically active nitenpyram does not seem to be affected by flea numbers.

Blagburn: I agree that this is a difficult question because efficacy and residual activity of topical products vary. In the laboratory, efficacies of 100% can usually be achieved in 12 to 24 hours and usually maintained above 90% for 28 days. In reality, wetting, bathing, the types of shampoos used in bathing, the weight of the animal, and chemistry of the active ingredient and formulation can all affect

Flea Trax

- Each time a flea feeds, flea salivary antigens are deposited into the skin.
- Preventing feeding is critical for all flea-infested dogs and cats, especially those with flea allergy dermatitis.
- Systemic products appear to decrease feeding more rapidly than topical products.
- The size of the blood meal taken is greatly reduced by both systemic and topical products.

Flea Trax

■ Efficacy and residual activity of topical products can depend on:

- Level of infestation
- Hair coat length and density
- Where the pet's weight falls within the unit dosing range
- Exposure to water
- Active ingredient's chemistry and formulation.

■ If the above variables are present, veterinarians often increase the frequency of topical product application or combine different products.

efficacy and residual activity during product use by clients.

Efficacy and perception of product performance are also affected by challenge rates. Heavier environmental infestations result in higher numbers of fleas challenging the animal and a greater likelihood that fleas will survive the effects of the flea control products. Veterinarians often recommend increasing the frequency of application of topical products if one or more of the above variables might be affecting efficacy and residual activity. Veterinarians and clients should be aware that certain product labels prohibit deviation from the recommended frequency of application. Orally administered products that work via systemic routes are unaffected by wetting and bathing of pets.

Dr. Terese DeManuelle: From a clinical perspective, it appears that in heavy flea burdens, the flea treatment needs to be applied more frequently than the label instructions indicate. Usually, I recommend a topical flea medication twice monthly rather than monthly for my patients. In addition, for dogs with severe flea loads, I may also utilize a permethrin flea spray with an insect growth regulator that has a repellent effect (*e.g.*, Knockout—Virbac; dogs only) combined with a similar environmental treatment.

Ihrke: In northern California, the Sacramento Valley, and the San Francisco Bay area, we find that monthly topical spot-on products seem to lose their efficacy after the first three weeks of application. Consequently, we commonly use these products in an off-label manner, recommending their reapplication every three weeks. In my

experience, all of these spot-on products tend to have diminished efficacy if the dog is bathed or swims. Medicated shampoos are more likely to strip these spot-on products off an animal and diminish efficacy considerably.

Griffin: The efficacy of flea products is determined by the product's ability to kill fleas, which generally happens within 24 hours. The reported efficacy is generally lower the more time passes after application.

For heavy infestations, a product with 100% efficacy from Day 1 to 21 following treatment and 97% efficacy at Day 30 allows 3% of fleas to survive for greater than 24 hours at Day 28. If the dog is exposed to 10 fleas on Day 30, that may not be enough to cause a break in flea control or the dog's clinical signs. But the same dog exposed to 1,000 fleas now has 30 fleas survive for more than 24 hours, potentially biting the dog repeatedly over that time and laying eggs, so a break in the flea control is realized.

In addition, for flea allergic dogs, even 100% efficacy at 24 hours may allow too many flea bites if the dogs are exposed to a heavily infested environment. Obviously, it is best to reapply products so that efficacy is still 100% in areas with heavy flea infestations that cannot be avoided.

4 What determines the severity of flea allergy dermatitis in affected patients? Do flea numbers and speed of flea kill affect the severity?

Blagburn: The severity of flea allergy dermatitis is affected by the number and frequency of fleas feeding, individual pet responses to flea allergens, other concurrent allergic responses,

and the types and frequency of flea control products used.

Dryden: I agree. The severity of clinical flea allergy dermatitis is due to a variety of factors, such as numbers of fleas, prior exposure, individual hypersensitivity, and other accompanying pruritic skin disease. So yes, flea numbers and speed of flea kill should have a major impact on flea allergy dermatitis.

Because flea allergy dermatitis is the result of injection of salivary proteins by feeding fleas into hypersensitive animals, it is my opinion that a few fleas feeding for prolonged periods or many fleas feeding for shorter periods of time are potentially equally important.

DeManuelle: The number of fleas seems to increase the severity of flea allergy dermatitis in most patients. However, I may only find one flea on patients that exhibit severe flea allergy dermatitis after a thorough physical examination. The flea control medication dispensed also seems to affect the severity, especially with products that possess a longer lag phase to kill the flea.

Griffin: Not all dogs visibly react to flea bites, nor is the degree or duration of a reaction the same from dog to dog. This is further complicated when microscopic changes are considered. Multiple allergic mechanisms have been described in flea allergic animals, including cutaneous basophil hypersensitivity reactions, IgE mediated type I hypersensitivity reactions, late phase allergic reactions, and delayed hypersensitivity reactions. Combinations of mechanisms are usually involved.

In allergic dogs, it appears clinically that the more allergens they

are exposed to, the more severe the disease becomes. The number of bites likely correlates to the severity as each bite is a site for a reaction. The clinically relevant translation is that the more fleas there are and the longer time fleas remain on the host and are biting, the more damage will be done. Therefore, products that kill fleas faster are more beneficial than those that are slow and allow fleas more time to feed before dying.

5 What characteristics would be ideal in choosing a flea control product for pets with flea allergy dermatitis?

DeManuelle: My dream flea control product has not changed over the past decade. It must be extremely quick to kill and repel fleas, unaffected by adjunctive topical therapy, nontoxic, environmentally safe, and economical.

Blagburn: Allergic responses to flea allergens can be reduced by using products that control fleas, especially products that quickly interfere with flea feeding and the pet's exposure to flea salivary antigens. The ideal flea control product would interrupt feeding before introduction of demonstrable amounts of flea allergen; break the flea life cycle by eliminating adult fleas from the host; and aid in the reduction of viable eggs, larvae, and pupae in the environment. Flea control products that are less affected by exposure to water and shampoos would further enhance their potential to reduce the severity of flea allergy dermatitis.

Griffin: The ideal flea product for flea allergic dogs would be a repellent that is 100% efficacious in



- The severity of flea allergy dermatitis is affected by:
 - The number and frequency of fleas feeding
 - Prior flea exposure
 - Individual pet responses to flea allergy
 - Concurrent allergic responses or skin disease
 - Types and frequency of flea control products used.

- A combination of multiple allergic mechanisms can affect flea allergic animals, including:
 - Cutaneous basophil hypersensitivity reactions
 - IgE mediated type I hypersensitivity reactions
 - Late phase allergic reactions
 - Delayed hypersensitivity reactions.

Flea Trax

■ It's important for flea control products to be:

- Extremely quick to control fleas
- Able to eliminate adult fleas from the host and reduce viable eggs, larvae, and pupae in the environment
- Unaffected by water, adjunctive topical therapy, and shampooing
- Nontoxic and environmentally safe.

preventing fleas from jumping on the treated dog. The next best would be a product that prevents all flea bites, even if a flea jumps on the dog. Unfortunately, neither product exists.

Ihrke: In the past, dermatologists viewed flea allergy dermatitis as more of an all-or-none phenomenon. However, clinical experience with a very rapid acting chloronicotinyl insecticide, nitenpyram, has taught us that the more rapidly fleas are killed, the fewer salivary antigens will be deposited in the skin and the less severe the allergic reaction to flea antigen in the flea saliva will be in the dog or cat. This has revolutionized our thinking because we now view flea allergy as a dose-dependent disease similar to other hypersensitivities. However, this product must be given every day or every other day to maintain good efficacy.

6 Should flea control be a part of any dermatologic disorder management plan?

Griffin: Yes, absolutely. In dogs with concurrent flea allergy and other allergic skin diseases, the aggravation of the flea allergy often causes a subsequent aggravation of the other allergies as well. Even when dogs are not allergic, flea bites can contribute to skin damage and secondary infections, and, therefore, flea control is beneficial in dogs with any skin disease but especially critical in dogs with allergic skin disease. Aggressive flea control may not always be critical, but consistent flea control and prevention of flea infestation in a pet's normal home environment is beneficial.

Dryden: Yes, I believe that flea control is important when trying to manage skin disease. It appears that pruritic skin disease has an additive component; therefore, any disease that can add to the pruritus must be controlled to manage the patient's skin disease.

Blagburn: There's no doubt that we should incorporate flea control into the management of any dermatologic disorder. A successful flea control strategy is a necessity in most regions of the United States. In certain geographic regions (*e.g.*, southeastern United States), flea-associated dermatitis either accounts for or contributes to a very high percentage of small animal dermatologic disease cases. It is also important to note that flea-associated disease may result from a small number of fleas in an exceptionally sensitive animal.

Pet owners may be unaware that the skin problem their pet is experiencing is actually caused by fleas if they do not see fleas in the pet's hair coat. Dermatologists can often rule out flea-associated disease by placing pets on an effective flea control program. Many veterinary professional groups such as the Companion Animal Parasite Council, the American Animal Hospital Association, and the American Association of Feline Practitioners recommend year-round use of flea and tick control products because of potential dermatitis and flea- or tick-associated disease.

DeManuelle: I ask my clients who own pets with atopic dermatitis and food allergy to use continuous flea control. Our flea season in the Pacific Northwest is July through October. However, many of my patients

frequent doggie day care, agility events, dog parks, you-bathe dog facilities, boarding establishments, groomers, and hotels allowing pets. All these facilities allow for pets to be exposed to fleas year-round, and we now see fleas in January in Portland on very well cared for pets!

Pets with immune-mediated dermatoses, cutaneous neoplasia, and endocrine disease may also benefit from flea control to provide optimum management of the patient's dermatologic disease.

Ihrke: *Threshold phenomenon* and *summation of effect* are very important concepts in dermatology and allergy. The *threshold phenomenon* states that itching or pruritus caused by a skin disease is additive, and clinically apparent pruritus does not occur until the animal has reached its individual threshold for itch. *Summation of effect* indicates that the pruritus initiated by each separate individual skin disease is additive in bringing an animal above its own individual pruritic threshold. Stringent and regular flea control should be part of the regular regimen in managing any animal with skin disease. This is especially important if the dog is pruritic from other coexistent skin diseases.

Allergic skin diseases, such as flea allergy dermatitis, do not exist in a vacuum. Dogs or cats with one allergic skin disease are more likely to have additional allergic skin diseases, all summing in increased pruritus. Many dogs with canine atopic dermatitis or an adverse reaction to food (food allergy) also have coexistent flea allergy skin disease. It makes sense to recommend vigorous flea control for any animal with other allergic or pruritic skin diseases.

“Even when dogs are not allergic, flea bites can contribute to skin damage and secondary infections.”

—Dr. Craig Griffin

7 How do you balance the need for topical therapy, such as shampoos, and the need for aggressive treatment of flea infestation in dogs?

Ihrke: Unfortunately, this is a difficult balance to achieve. In my experience, all of the current topical products utilized are affected adversely by bathing. With the products currently available, I generally recommend using the newer veterinary-dispensed spot-on flea products every three weeks on other dogs and cats living in the household of the dog requiring frequent shampooing. In general, cats do not seem to see the humor in regular bathing, so I am addressing predominantly dogs with chronic skin disease. If vigorous and frequent shampooing and other topical therapy is necessary for managing other skin diseases in severely affected dogs, I use oral treatment with nitenpyram daily or every other day while frequent shampooing is required. This certainly adds expense to the therapeutic regimen but remains our current best therapeutic alternative.

Griffin: Unfortunately, these two aspects of managing dermatologic cases conflict somewhat because the majority of long-lasting effective flea products are topical. Even



Flea Trax

- Many veterinary groups recommend the year-round use of flea and tick control products, including the:
 - Companion Animal Parasite Council
 - American Animal Hospital Association
 - American Association of Feline Practitioners.

- Doggie day cares, agility events, dog parks, boarders, groomers, and pet-friendly hotels allow pets to be exposed to fleas year-round.

- Dogs or cats with one allergic skin disease are more likely to have additional allergic skin diseases.



Flea Trax

■ Water immersion and bathing with shampoos can affect both the efficacy and residual activity of all topical flea control products.

selamectin, which is topical but then systemically absorbed, is again at least partly effective from being secreted with the sebum, which bathing temporarily decreases. Therefore, the decision relates to how important the flea control is and what the owners are willing to do.

Generally if flea control is critical, then bathing may have to be somewhat limited, at least until some degree of flea control has been achieved and fleas are not in the dog's immediate environment, especially if it's an indoor pet. If the home environment is not the main source of fleas but outside areas are (*e.g.*, trips to the park or beach and long walks), then those areas should be avoided during flea season while frequent bathing is being utilized. Systemic flea products may still offer benefit if the mechanism is not secretion in the skin lipids. Topical flea products may still have good efficacy when bathing is limited to once or twice weekly at most and the flea products are applied at biweekly intervals.

Blagburn: In my opinion, frequent water immersion and bathing with shampoos have the potential to affect both the efficacy and residual activity of all topical flea control products. The interplay between topical therapy (*e.g.*, shampoos or rinses) and topical flea control is

real and will likely require adjustment of one or both to maintain control of both fleas and dermatitis. Adjusting the frequency of use of both flea control agents and topical therapeutic agents to achieve a compromise in product performance may require some trial and error. More frequent application of flea control products (if product labels allow it) can compensate for moderate use of other topical therapies. Successful balance of product use will vary from pet to pet and will be affected by the severity of disease, type of flea products used, and other kinds of necessary therapies. In some situations, using systemic flea control products while using other dermatologic therapies can be a viable option.

DeManuelle: If a patient requires aggressive shampoo therapy (*i.e.*, twice weekly or greater), I use oral flea control (*e.g.*, nitenpyram) or a permethrin-based flea spray with an insect growth regulator on dogs after each bath. If the shampoo therapy is weekly or biweekly, I usually increase the topical flea medication used monthly to weekly or biweekly, depending on flea exposure and the type of shampoo used.

Ihrke: An additional problem is that clients often attempt to substitute over-the-counter topical spot-on products for the veterinary-dispensed products. The prime advertisement thrust of these products is that they are just as good as the veterinary products but less expensive. These over-the-counter products do tend to be less expensive but are markedly less effective and less safe for the animal and owner. This is especially a problem with cats because over-the-counter

“In some situations, using systemic flea control products while using other dermatologic therapies can be a viable option.”

—Dr. Byron Blagburn

products listed as dog-only products can be quite dangerous if used on cats.

8 What percentage of patients with a dermatologic disorder are treated with topical therapeutics, such as shampoos? How does this affect the type of flea control that should be recommended?

Griffin: The majority of dermatologic cases in dogs can benefit from routine bathing. This is again especially true in atopic dermatitis cases and dogs with secondary pyoderma or *Malassezia* dermatitis. In those cases, virtually all dogs benefit from bathing—the more the better (up to daily). Whether the dog is bathed depends on the pet's disease, but it also depends on the owner's willingness to incorporate this into a treatment plan. It also relates to what treatments are used and how effective they are with or without the bathing.

Frequent bathing means topical flea products are applied more frequently or combinations of products are utilized, so biweekly therapy may be recommended.

Blagburn: In the southeastern United States, flea allergy is often seen concurrently with atopic dermatitis and pyoderma (in more severe cases). Consequently, it is necessary to treat the atopic and infectious component of the dermatitis and to eliminate fleas. Dermatologists often refer to the pet's allergic response threshold and state that severe skin allergies result from potential synergism between two or more environmental allergens in forcing the pet to its allergic response threshold more

quickly. Fleas and flea allergy can be effectively controlled in most situations using several available flea control agents. Control of the flea component of the allergic response may help keep the pet below its allergic response threshold.

DeManuelle: The majority (about 85%) of my clients with dogs use a medicated shampoo. The frequency of bathing varies from three times weekly to monthly. Flea medication is adjusted as described previously. It is rare for my feline patients to be bathed, so altering flea medication for cats is not relevant.

Ihrke: This is a difficult question to answer because I would use shampoo therapy more frequently in flea allergic dogs if shampooing did not diminish the efficacy of spot-on flea product formulations. We probably recommend shampoo therapy in 25% to 50% of our cases. If flea allergy were not a coexistent skin disease, we probably would use adjunctive shampoo therapy even more frequently than we do now.

9 What problems or issues do clients have complying with topical therapy recommendations?

Dryden: As with many medications that have to be applied frequently and for prolonged periods of time, compliance is a major issue. Trying to get clients to administer topical products, oral medications, or shampoos frequently or for prolonged periods can be difficult because of the time commitment and the expense. In addition, when dealing with flea allergic pets, you also need to get pet owners to apply or administer flea products in a preventive manner, often year-round.

Flea Trax

■ Most dogs with dermatoses can benefit from routine bathing, especially dogs with:

- Atopic dermatitis
- Secondary pyoderma
- *Malassezia* dermatitis.

Flea Trax

■ Getting clients to comply with administering topical therapy can be difficult because:

- It requires a time commitment
- It can be labor-intensive
- It can be expensive
- The animal may resist the application
- The client may not understand how to properly administer the product.

Ihrke: Clients often don't comply with bathing pets using medicated shampoos that require a minimum of 10 minutes of contact time. This is time consuming and labor intensive. Medicated leave-on rinses may be used after shampoos. Creams and ointments are less commonly used in animals because many skin diseases are generalized and the application of these products to animals with a hair coat is messy and expensive.

We identify compliance problems with the application of any topical products. An animal may resist application. With small volume products, such as prescription spot-on products, owners may be unsure if they have applied the product properly so that spreading on the skin surface occurs.

Blagburn: In my opinion, compliance is among the greater threats that we face in the veterinary-patient relationship. Data from the AAHA compliance study and other industry surveys indicate that pet owners either do not administer products correctly or perform recommended care procedures regularly or as prescribed by their veterinarian.⁷ Recommended topical therapies for dermal disease, such as shampoos and rinses or other adjunct therapies (*e.g.*, antibiotics and anti-inflammatory agents, such as cyclosporine), place an immense burden of compliance on the pet owner, particularly when multiple therapies are required or multiple pets in the household require treatment. Certain product formulations or procedures may be difficult for compromised or elderly clients to administer or perform.

Certainly, a preventive ap-

proach to management of potential skin diseases caused by fleas and other ectoparasites remains much easier than the often complex mix of therapies necessary to treat established skin disease. We now have both the products and the knowledge to prevent skin disease associated with fleas and other parasites.

Griffin: Generally, topical products seem to be easy to administer, though some clients do have concerns about getting the medication to the skin in thick-coated dogs. Often owners do not like the focal area where the hair remains matted or treatment spots remain visible. The most concerned comment from clients is about their children being exposed to a topical product that is permeated throughout the dog's hair. Interestingly, I only occasionally meet owners who mention the same concern for their own exposure.

DeManuelle: Multiple issues exist for owners in order for them to adequately comply with prescribed shampoo therapy. I have many elderly clients with back and knee disorders that make bathing a medium- to large-breed dog problematic. Other owners have small children, are single parents, travel frequently, or are dual-career couples and simply do not have the time to bathe their pet as frequently as recommended. The weather in the Pacific Northwest is not conducive six months of the year for outdoor bathing.

10 What are the advantages and disadvantages of topical vs. systemic flea

treatment, including the following characteristics?

■ RAPIDITY OF FLEA KILL

Dryden: While it appears that topical flea products should be able to kill fleas before they have the chance to bite or feed, this does not appear to be the case.^{4,6} This may be due to the decreasing activity of the residual insecticides over time after treatment. In fact, with most residual topical insecticides, residual activity often declines sufficiently before the next application for some fleas to live long enough (at least 24 hours) to produce eggs. That is why some manufacturers have added insect growth regulators to the formulations to kill the eggs that are produced.

Blagburn: As mentioned previously, preventing fleas from biting and feeding serves two very useful purposes: it helps prevent the introduction of flea salivary antigens that can lead to flea bite hypersensitivity, and it prevents female fleas from consuming enough blood to commence egg production. The first is important in skin disease prevention, and the second helps break the life cycle and prevents the accumulation of environmental flea eggs, larvae, and pupae. Both topical and systemic flea treatments interfere with feeding and can, therefore, help achieve these goals if applied properly and regularly.

Ihrke: Personally, I do not see this as an issue because the killing speed is a characteristic of each different insecticide. We need both topical and systemic flea control products that work rapidly enough to limit flea biting (and, thus, diminish the antigen load) and also

prevent mating and egg production. However, a systemically administered product may offer better total body dispersal of the active agent.

Griffin: Kill time depends on the product because each one varies in how fast it works and its efficacy over the labeled time to reapplication. Also, focal topical products take time to diffuse over the whole body, so they have a window before providing complete body protection.

■ WATER RESISTANCE

Dryden: In my opinion, the residual activity of most topical insecticides can be compromised to some degree by bathing or repeated water exposure. Most of that effect likely occurs during the third or fourth week following application when insecticide residues are naturally at their lowest. The more lipophilic compounds, such as fipronil, appear to be the least affected by such exposure. An assumption could be made that compounds that act almost exclusively by systemic action would be minimally affected by bathing or water exposure.

DeManuelle: Monthly topical flea control offers mild to moderate diminished efficacy for patients that require intensive bathing with a strong shampoo. Most of these products do not offer significant flea repellent activity.

Griffin: Systemic products that work when fleas bite the pet are unaffected by bathing, rain, or swimming. Topical products raise some concern in how well they withstand frequent shampooing. This may also be true for systemic products that work by excretion



Flea Trax

■ Systemic products may offer better total body dispersal of the active agent.

■ Stopping fleas from biting prevents the introduction of flea salivary antigens into the pet and it prevents female fleas from consuming enough blood to begin producing eggs.

onto the skin. In general, the popular topical products have been shown to remain effective with swimming or rain exposure. The other consideration is the requirement for time separation between bathing and the application of topical products.

Blagburn: Systemic products can reduce the concerns about the effects that water immersion and topical skin disease therapies may have on efficacy and residual activity of topical flea control products.

Ihrke: A water-resistant product is highly desirable as many of our allergic dogs in northern California like to swim. Labrador retrievers are a common allergic breed here. A timed-release systemic product would offer the substantial benefit of replenishing the skin with the insecticide after swimming or bathing, thus obviating the need for reapplication of a topical product.

■ EFFECTIVENESS WITH TOPICAL THERAPEUTIC PRODUCTS

Ihrke: A systemically administered product would offer the major advantage of concomitant topical therapy not diminishing the efficacy of adjunctive flea control.

■ DOSING CONVENIENCE

DeManuelle: The advantage of topical products is safety, prevention of flea infestation, and ease of application, which increases owner compliance. Systemic flea control is safe and unaffected by topical therapy, fairly easy to administer for owners who are comfortable with giving oral medications, and has a rapid kill time. However, it can create a problem for owners who have difficulty administering oral medications.

Griffin: The ability to administer an effective agent infrequently, such as once monthly, is of main importance. Then it depends on the pet and owner's preference. I find some clients prefer topical and some prefer oral administration; this is an individual variation.

Ihrke: Convenience is in the eyes of the beholder. While many or most owners might find an easily administered and safe systemic product more convenient, other owners may prefer topical treatment. Personally, I would prefer a systemically administered product for my own dogs if it had an excellent safety and efficacy profile.

■ ENVIRONMENTAL CONCERNS

Blagburn: Also, pet owners occasionally question veterinarians about environmental exposure to topical products, particularly when the household includes very small children. Although topical flea control products are safe, even around small children, some pet owners remain cautious about their use.

Ihrke: Certainly, a growing percentage of our clients would feel more comfortable environmentally with a systemic product. This would be especially true for owners who are pregnant or have crawling infants in the household.

Dryden: Pet owners come with a variety of preconceived opinions concerning risks to themselves and the environment from insecticides. While it is understood that topically active compounds have been approved by the EPA (Environmental Protection Agency) and the risk from exposure to people or the environment is minimal to nonexistent,

stacks of data often will not dissuade many. Orally administered, systemically active compounds often can alleviate many concerns of pet owners.

Griffin: If a systemic product is confined to the internal tissues and not secreted onto the skin or hair, then the drug does not enter the environment on hair or skin. Topical acting insecticides have an environmental impact because hair and skin with the drug are shed into the environment.

■ FDA vs. EPA

Blagburn: Flea control products are subjected to rigorous manufacturer testing to comply with approval policies and procedures mandated by the EPA or the Food and Drug Administration (FDA). Topical products that are not absorbed and exert their effects after application to the skin surface are approved under EPA guidelines. Topical, oral, or injectable products that exert their effects systemically are approved under FDA guidelines. FDA-approved veterinary products are usually prescription products and can only be purchased and dispensed by a licensed veterinarian.

Griffin: In general, the EPA is mainly concerned about the impact the drug has on the environment and not the safety or efficacy for the pet. Also, the EPA rules for use are not recommendations—they're rules. It is illegal to alter EPA rules of use to improve efficacy of a product in treating a pet's disease.

The FDA requires more testing to document safety and efficacy and requires strict labeling to follow their rules for not misrepresenting the

“I would prefer a systemically administered product for my own dogs if it had an excellent safety and efficacy profile.”

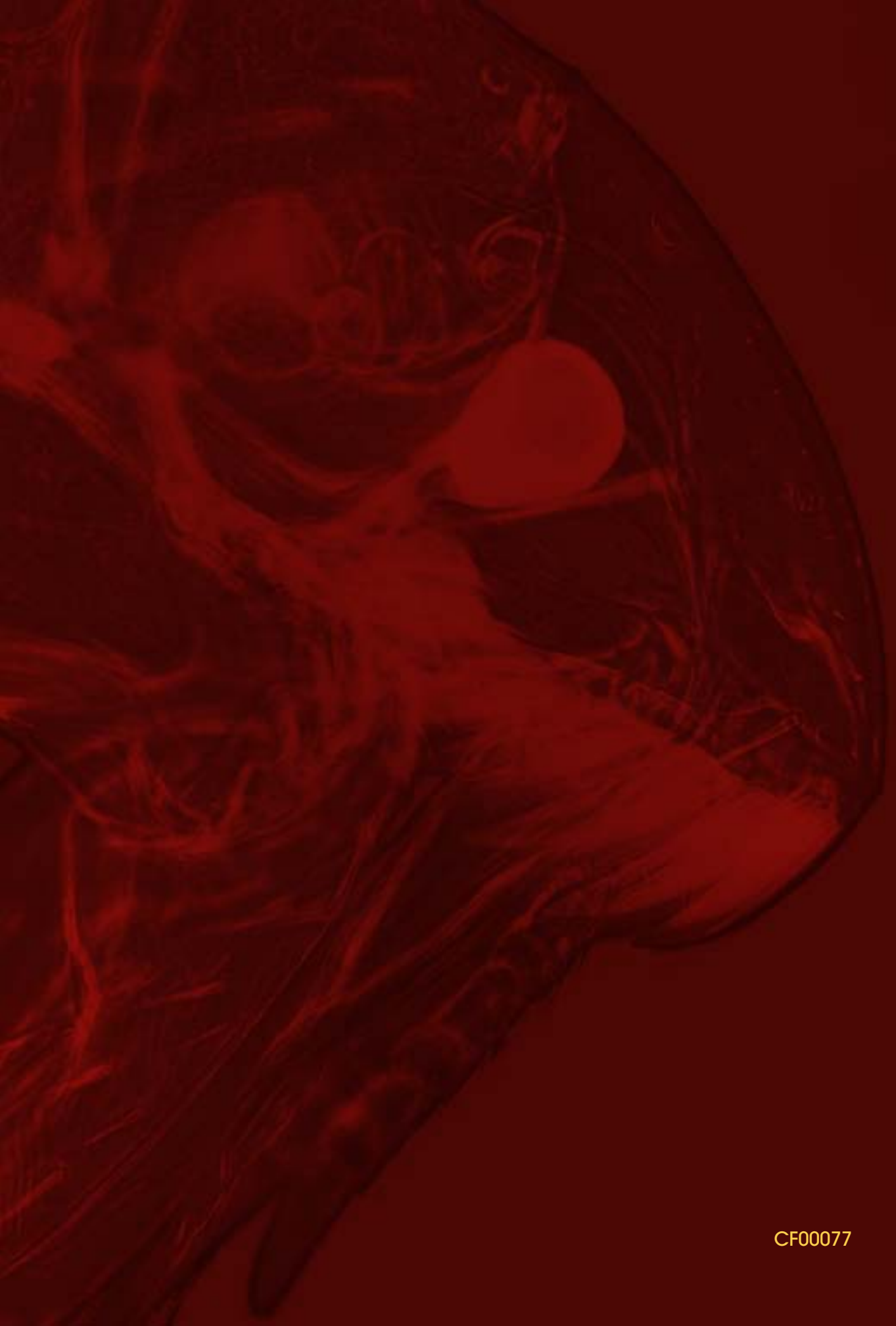
—Dr. Peter J. Ihrke

product. The FDA use guidelines can be altered if required to improve efficacy when done in a way accepted by the profession.

Ihrke: FDA approval is perhaps viewed as being held to a higher standard than an EPA-approved product only. This would afford some owners a greater comfort index in using an FDA-approved systemic product.

References

1. McCoy CM, Dryden MW, Broce AB. Blood feeding dynamics of cat fleas in flea feeding chambers attached to cats, in *Proceedings*. 48th Annu Meet Am Assoc Vet Parasitol 2003:32.
2. Rust W, Dryden M. The biology, ecology and management of the cat flea. *Ann Rev Entomol* 1997;42:451-473.
3. Dryden M, Gaafar S. Blood consumption by the cat flea, *Ctenocephalides felis* (Siphonaptera: Pulicidae). *J Med Entomol* 1991;28:394-400.
4. Dryden M. Laboratory and field evaluations of topical flea control products, in *Proceedings*. British Veterinary Dermatology Study Group, Birmingham, England; April 1998:14-17.
5. Franc M, Cadiergues MC. Antifeeding effect of several insecticidal formulations against *Ctenocephalides felis* on cats. *Parasite* 1998;5:83-86.
6. McCoy CM. Blood feeding dynamics of newly emerged cat fleas, *Ctenocephalides felis* (Bouché) (Siphonaptera: Pulicidae) in chambers attached to insecticide-treated and untreated cats. MS thesis. Kansas State University, April 17, 2006.
7. *Path to high-quality care: Practical tips for improving compliance*. Lakewood, Colo: AAHA Press, 2003.



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