Understanding how to prevent Flea Allergy Dermatitis and why fleas on dogs are also a winter concern.

Authors: G. Convert, DVM, L. Halos, DVM, PhD, Merial SAS
What is Flea Allergy Dermatitis?

Flea Allergy Dermatitis (FAD) or flea bite hypersensitivity is the most common pruritic dermatosis of dogs, the first of the allergic dermatoses to be reported in pets. It is caused by a specific reaction to allergenic proteins present in the flea saliva. It is characterized by an intense skin irritation and pruritus that can lead to dramatic skin and fur lesions such as alopecia and severe skin infections.

The Flea Life Cycle

The majority of fleas that infest cats and dogs is the “cat flea” Ctenocephalides felis.

The adults live for about 3 weeks and feed on the blood of their host. Females lay about 20 eggs each day. These eggs fall to the floor and hatch in 2 to 3 days. In areas that are humid and dark, the larvae emerge in 7 to 14 days. The final larval stage makes a sticky cocoon (pupa) which is very resistant. Inside the cocoon, the larva develops into a nymph, then into an adult, which may survive for 6 months before emerging. Stimuli from the pet cause the young adults to emerge and infest it.

A newly emerged cat flea can survive 24-72 hours before requiring a blood meal. It is the newly emerged unfed fleas that infest pets and bite people. Cat fleas that have found a preferred host (dog, cat, etc.) generally do not leave their host unless forced off by grooming or insecticides.
**DURATION OF THE FLEA LIFE CYCLE**

Depending on temperature and humidity, the entire life cycle of the cat flea can be completed in as little as 12-14 days or can be prolonged for up to 350 days. However, under most household conditions, cat fleas complete their life cycle in 3-6 weeks.

**DYNAMIC OF THE FLEA LIFE CYCLE**

Eggs are continously produced by the female. The eggs and the larvae develop quickly but have a high death rate. The number of viable pupae is far fewer than the number of eggs laid. The pupae develop slowly and they have a much lower death rate. They constitute the environmental reservoir.

- Strong and rapid increase of the pupae (pre-emerged flea) reservoir.
- Eggs are hatching continuously into larvae. Larvae are evolving but the mortality rate is naturally high.
- Pupae are the only reservoir with the capacity to hatch into new emerged fleas over 6 months to 1 year.
Is FAD an overestimated concern?

NO, FAD is recognized worldwide as a major skin disease and remains underdiagnosed.

Globally, **the most common allergic canine skin diseases** are, in frequency of occurrence, flea allergy dermatitis, atopic dermatitis and food allergy (adverse reactions to food). The reported frequency of occurrence of different allergic skin diseases varies widely from study to study and is highly controversial. Many dermatologists have expressed the opinion that in parts of the world where fleas are common, flea allergy dermatitis comprises between 50% and 80% of all allergic skin diseases.

Fleas parasitize animals in virtually every area on earth with the exception of locations above 1,500 meters elevation and regions such as deserts with very low humidity.

However, **flea allergy dermatitis commonly is underdiagnosed all over the world.**

Additionally, flea allergy still is seen relatively commonly in university dermatology clinics and dermatology specialty practices worldwide. This occurs despite modern advances in flea control, plus the fact that most small animal clinicians are quite cognizant of flea allergy dermatitis and routinely manage dogs and cats with flea allergy dermatitis (4).
Are the clinical features of FAD easy to identify?

- NO, clinical signs associated with FAD are variable and depend on frequency of flea exposure, duration of disease, presence of secondary or other concurrent skin disease, degree of hypersensitivity and effects of previous or current treatment.
- The pruritus is a constant symptom in dogs. Dorsal lumbosacral lesions of alopecia are very suggestive of canine FAD.
- In cats, pruritus can be absent and lesions are less suggestive.

In extremely hypersensitive dogs, extensive areas of alopecia, erythema and self-trauma are evident. Traumatic moist dermatitis (hot spots) can also occur. As the disease becomes chronic, the dog may develop generalized alopecia, severe seborrhea, hyperkeratosis and hyperpigmentation.

**CLINICAL SIGNS IN CATS**

In cats, clinical signs vary from minimal to severe depending on the degree of sensitivity. The primary dermatitis is a papule, which often becomes crusted. This miliary dermatitis is typically found on the back neck and face. The miliary lesions are not actual flea bites but a manifestation of a systemic allergic reaction that leads to generalized pruritus and an eczematous rash. Pruritus is not permanent but may be severe, evidenced by repeated licking, scratching and chewing. Cats with FAD can have alopecia, facial dermatitis, exfoliative dermatitis and “racing stripe” or dorsal dermatitis.

**CLINICAL SIGNS IN DOGS**

Affected dogs are likely to be restless and uncomfortable, spending much time scratching, licking, rubbing, chewing and even nibbling at the skin.

- **Pruritus**: It can be intense and may manifest over the entire body. The degree of pruritus is independent with the number of fleas present [1].
- **Lumbosacral location**: Distribution is very suggestive. Irritation often starts at the tail base, spreading to the dorsal lumbosacral region, perineum caudal thighs and abdomen [1].
- **Skin lesions**: Common skin lesions include erythema and papules followed rapidly by areas of alopecia, scaling, papules and reddish brown crusts.
Is a ready-to-use diagnostic test for FAD available?

> NO, diagnostic is based on history, clinical signs and response to well-conducted flea control.

**HISTORY**

- **The age of onset** has to be considered because FAD affects mainly young adults and does not ordinarily occur before 1 year of age. Any environment favorable to flea development increases the risk for FAD. The disease occurs more often during the spring, summer and autumn time.

- **Presence of flea**: Usually, diagnosis is made by visual observation of fleas on the infested pet. Demonstration to the owner of the presence of fleas or flea excrement is helpful. Slowly parting the hair against the normal lay often reveals flea excrement or the rapidly moving fleas. Flea excrement is reddish black, cylindrical and pellet or comma-shaped. Placed in water or on a damp paper towel and crushed, the excrement dissolves and produces a reddish brown color. Extremely hypersensitive animals are likely to be virtually free of fleas due to excessive self-grooming. In such cases, it is usually difficult to find evidence of fleas, thus making it more difficult to convince owners of the problem. Use of a fine-toothed flea comb (32 teeth/inch.) facilitates finding of fleas and their excrement.

Examination of the pet’s bedding for eggs, larvae and excrement is also useful.

**LABORATORY DIAGNOSTIC TOOLS**

- **Intradermal skin testing** may be used to support a presumptive diagnosis of FAD. Positive immediate reactions are characterized by a wheal 3-5 mm larger in diameter than the negative control. Alternatively, a positive wheal measurement can be defined as a response that is at least equal to the halfway point between the size of positive and negative control reactions. Observations for an immediate reaction (15-20 min) and, if negative, a 24-hr delayed reaction are recommended. The delayed reaction may not occur as a discrete wheal but rather as a diffuse erythematous reaction. A positive reaction does not conclusively indicate that the clinical condition is FAD — it indicates only that the animal is allergic to the flea antigen, either from present or past exposure. The reliability of intradermal skin testing in cats to diagnose FAD has been variable.

- **Serologic testing** of IgE directed against flea-specific salivary antigens can be used to aid in the diagnosis of FAD, as these IgE persist only 3 to 5 days after a flea bite, they are a relevant indicator of flea exposure.

FAD must be differentiated from other causes of dermatologic disease. The presence of fleas or a positive reaction to an intradermal test does not rule out the presence of another dermatologic disease responsible for the clinical signs.

In dogs, differential diagnoses include allergic inhalant dermatitis (atopy), food allergy dermatitis, sarcotic or demodectic mange, other ectoparasites and bacterial folliculitis.

In cats, other conditions that can result in miliary dermatitis include external parasites (cheyletiellosis, trombiculosis, notoedric mange and pediculosis), dermatophytosis, drug hypersensitivity, food allergy, atopy, bacterial folliculitis and idiopathic miliary dermatitis.
Flea control measures have changed dramatically in recent years.

**IS FAD ONLY A WARM SEASON DISEASE?**

NO, FAD should be considered all year round. Prevalence of the disease increases with the prevalence of fleas and is higher during the "flea" season from spring to autumn but flea infestation is seen all year long in many temperate areas (2).

Cat fleas survive winters in North temperate climates as adults on untreated pets or small wild mammals in the urban environment or as pre-emerged adults in environments protected from the cold, such as household. In warm climates, survival occurs also in the wild. The presence of fleas on pets remains important, generally 10% of dogs and 20% of cats remain infested during the winter season and FAD is to be included in differential diagnostic of skin conditions of pets even during winter.

**IS A SINGLE FLEA BITE ENOUGH TO GENERATE A FAD?**

NO, FAD expression is a dose dependent phenomenon and a threshold of contact with the antigen variable from one individual to another is needed to induce the disease.

FAD is a complex hypersensitivity phenomenon involving at least four immunologic processes: immediate hypersensitivity, late-onset immediate hypersensitivity, delayed hypersensitivity and cutaneous basophil hypersensitivity.

Formerly, flea allergy dermatitis was viewed as an "all-or-none phenomenon". Flea allergy is now recognized as a dose dependent hypersensitivity contingent on the dosage of antigen (flea salivary proteins) injected into the host. The severity of flea allergy is dependent on the magnitude of hypersensitivity elicited in that animal, the number of fleas successfully feeding, plus the amount of antigen injected by fleas during feeding (Ihrke, 2009).

**IS A GOOD FLEA CONTROL THE ESSENTIAL MEAN TO EFFECTIVELY PREVENT AND TREAT FAD?**

YES, treatment and prevention of FAD require rigorous flea control and failures in the management of flea allergy dermatitis correlate strongly with owner disbelief that fleas are the underlying problem.

The goals of flea control is the elimination of existing fleas on affected animals, continued elimination of fleas acquired from infested premises and the prevention of reinestation. In order to accomplish these goals, an integrated flea control plan must be instituted. Effective residual adulticides must be used to kill fleas plus provide residual killing activity. In addition, insect growth regulators allow the disruption of flea reproduction. Mechanical control procedures such as cleaning pet’s blankets, beds, pet carriers and throw rugs and vacuuming or removing furniture that can house pre-adult fleas should be instituted. Preventions of wild mammals that can carry fleas (rats, squirrels, feral cats, etc.) from entering crawl spaces, foundation vents, porches and garages also is important.

**Prevalence of pets infested during a year-long survey in Hungary (Farkas et al 2009)**

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<th>DOGS</th>
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<tr>
<td>Annual</td>
<td>16%</td>
<td>22%</td>
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<tr>
<td>Winter</td>
<td>11.5%</td>
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<td>Summer</td>
<td>22%</td>
<td>33%</td>
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**FRONTLINE Combo® contains an association of fipronil and (S)-methoprene which enable killing adult fleas within 24 hours as well as achieving flea control in the pet’s environment thank’s to the IGR (S)-methoprene.**

In case a flea survives more than 24 hours [when fipronil efficacy decreases at the end of the treatment period or in case the pet owner is late in applying the next treatment], eggs laid on the pet’s skin will be killed by the (S)-methoprene and pet’s environment will not be contaminated. This will break the flea cycle and avoid future pet’s reconinations. FRONTLINE has been sucessfully used for the treatment of FAD (5, 6, 8, 9, 10).
Supportive medical therapy may have to be instituted to control pruritus and secondary skin disease in hypersensitive animals. Systemic glucocorticoids are often needed to control inflammation and associated pruritus. Short-acting prednisone or prednisolone can be administered initially at a dosage of 0.5-1.0 mg/kg, tid, tapering the dosage and using alternate-day therapy until the lowest dose possible that still controls the pruritus is given. As soon as flea control is accomplished, the glucocorticoid can be discontinued.

Be careful! Steroid therapy should never be used as a substitute for flea control.

Secondary bacterial skin infection can be associated with FAD. Systemic antibiotics are commonly used to control the pruritus and thus reduce the associated inflammation and pruritus. Selection of an appropriate antibiotic should be based on bacterial cultures and results of antibiotic sensitivity tests.

Hyposensitization consists of administering allergens to a hypersensitive animal on a regular basis in an attempt to obtain a state of clinical non reactivity to flea bites. The effectiveness of currently available whole flea extracts is controversial.

REFERENCES


Available only for vets:

www.fleatickrisk.com
Frontline Combo Spot-On Dogs and Cats: Presentation: Spot-on solution. For Cats: Pipette of 0.5 ml spot on solution containing fipronil 50 mg, (S)-methoprene 80 mg. For dogs: Small: 1 pipette of 0.67 ml contains fipronil 67 mg, (S)-methoprene 60.30 mg. Medium: 1 pipette of 1.34 ml contains fipronil 134 mg, (S)-methoprene 120.60 mg. Large: 1 pipette of 2.68 ml contains fipronil 268 mg, (S)-methoprene 241.20 mg. XL: 1 pipette of 4.02 ml contains fipronil 402 mg, (S)-methoprene 361.80 mg. Uses: On cats: to be used against infestations with fleas, ticks and/or biting lice. Elimination of fleas (Ctenocephalides spp.) and insecticidal efficacy against new infestations with adult fleas persists for 4 weeks. Prevention of the multiplication of fleas by inhibiting the development of eggs (ovividal activity), larvae and pupae (larvicidal activity) originating from eggs laid by adult fleas for 6 weeks after application. Elimination of ticks (Ixodes ricinus, Dermacentor variabilis, Rhizophagus sanguineus). The product has a persistent acaricidal efficacy for up to 2 weeks against ticks (based on experimental data). Elimination of biting lice (Fellicola subrostratus). Can be used as part of a treatment strategy for the control of Flea Allergy Dermatitis (FAD). On dogs: To be used against infestations with fleas, ticks and/or biting lice. Elimination of fleas (Ctenocephalides spp.) and insecticidal efficacy against new infestations with adult fleas persists for 8 weeks. Prevention of the multiplication of fleas by inhibiting the development of eggs (ovividal activity) and larvae and pupae (larvicidal activity) originating from eggs laid by adult fleas for 8 weeks after application. Elimination of ticks (Ixodes ricinus, Dermacentor variabilis, Rhizophagus sanguineus). The product has persistent acaricidal efficacy for up to 4 weeks against ticks. Elimination of biting lice (Trichodectes canis). The product can be used as part of a treatment strategy for the control of Flea Allergy Dermatitis (FAD). Dosage: On cats: One pipette of 0.5 ml per cat, corresponding to a minimum recommended dose of 5 mg/kg for fipronil and 6 mg/kg for (S)-methoprene, by topical application to the skin. In the absence of safety studies, the minimum treatment interval is 4 weeks. On dogs: 1 pipette of 0.67 ml (S) per dog weighing over 2 and up to 10 kg; 1 pipette of 1.34 ml (M) per dog weighing over 10 kg and up to 20 kg; 1 pipette of 2.68 ml (L) per dog weighing over 20 kg and up to 40 kg; 1 pipette of 4.02 ml (XL) per dog weighing over 40 kg; corresponding to a minimum recommended dose of 6.7 mg/kg for fipronil and 6 mg/kg for (S)-methoprene, by topical application to the skin. In the absence of safety studies the minimum treatment interval is 4 weeks. Method of administration: Hold the pipette upright. Tap the narrow part of the pipette to ensure the contents remain within the main body of the pipette. Snap back the tip. Part the coat on the back of the animal at the base of the neck in front of the shoulder blades until the skin is visible. Place the tip of the pipette on the skin and squeeze the pipette several times to empty its contents completely and directly onto the skin in one spot. Contra-indications, warnings, etc: For animal treatment only. In the absence of available data, the product should not be used on puppies less than 8 weeks old and/or weighing less than 2 kg and on kittens less than 8 weeks old and/or weighing less than 1 kg. No adverse effects were observed in target animal safety studies in 8-week-old puppies, growing dogs and dogs weighing about 2 kg treated once at five times the recommended dose. No undesirable effects were observed in target animal safety studies in cats and kittens aged 8 weeks and older weighing about 1 kg treated once a month at five times the recommended dose for six consecutive months. The risk of experiencing adverse effects may however increase when overdosing, so animals should always be treated with the correct pipette size according to bodyweight. The product can be used during pregnancy and lactation. Do not use on sick (systemic diseases, fever...) or convalescent animals. Do not use in rabbits, as adverse reactions and even death could occur. Do not overdose. It is important to make sure that the product is applied to an area where the animal cannot lick it off and to make sure that animals do not lick each other following treatment. If licking occurs, a brief period of hypersalivation may be observed due mainly to the nature of the camphor. No data on the effect of bathing/shampooing on the efficacy of the product in cats are available. On dogs: bathing/shampooing in water within 2 days after application of the product and more frequent bathing than once a week should be avoided, as no study has been performed to investigate how this affects the efficacy of the product. Emollient shampoos can be used prior to treatment, but reduce the duration of protection against fleas to approximately 5 weeks when used weekly after application of the product. Weekly bathing with a 2% chlorhexidine medicated shampoo did not affect efficacy against fleas during a 6 week long study. Dogs should not be allowed to swim in watercourses for 2 days after application. There may be an attraction of single ticks. For this reason transmission of infectious diseases cannot be completely excluded if conditions are unfavorable. Fleas from pets often infest the animal's basket, bedding and regular resting areas such as carpets and soft furnishings which should be treated, in case of massive infestation and at the beginning of the control measures, with a suitable insecticide and vacuumed regularly. There are no known interactions with other medications. Among the extremely rare suspected adverse reactions, transient cutaneous reactions at the application site (skin discoloration, local alopecia, pruritus, erythema) and general pruritus or alopecia have been reported after use. Exceptionally, hypersalivation, reversible neurological signs (anxiety, tremors, depression, convulsions), vomiting or respiratory signs have been observed after use. Avoid contact with the animal's eyes. Animals with a known hypersensitivity to insecticides or alcohol should avoid contact with FRONTLINE Combo Spot On Dog or FRONTLINE Combo Spot On Cat. Operator safety: Operators with a known hypersensitivity to insecticides or alcohol should avoid contact with FRONTLINE Combo Spot On Dog or FRONTLINE Combo Spot On Cat. This product can cause mucous membrane and eye irritation. Therefore, contact of the product with mouth and eyes should be avoided. After accidental ocular exposure the eye should be rinsed carefully with plain water. Avoid contents coming into contact with the fingers. If this occurs, wash hands with soap and water. Treated animals should not be handled until the application site is dry, and children should not be allowed to play with treated animals until the application site is dry. It is therefore recommended that animals are not treated during the day, and should be treated during the early evening, and that recently treated animals are not allowed to sleep with owners, especially children. Wash hands after use. Do not smoke, drink or eat during application. Precautions for use: Keep out of reach of children. Do not store above 30°C. Store in the original package. Any unused product or waste material should be disposed of in accordance with guidance from the local waste regulation authority. Fipronil and (S)-methoprene may adversely affect aquatic organisms. Do not contaminate ponds, waterways or ditches with the product or empty containers. Packaging Quantities: Blister card of 1 x 0.67 ml (S) pipette with a scored tip. Box of 1 or 2 blister card(s) of 3 x 0.67 ml (S), 1.34 ml (M), 2.68 ml (L), 4.02 ml (XL) pipettes with a scored tip. Further information: The product is an insecticidal and acaricidal solution for topical use, containing an association of an antidepressant active ingredient, fipronil, in combination with an ovicidal and larvicidal active ingredient, (S)-methoprene. Fipronil is an insecticide and acaricide belonging to the phenylpyrazole family. It acts by interacting with ligand-gated chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA), thereby blocking pre- and post-synaptic transfer of chloride ions across cell membranes. This results in uncontrolled activity of the central nervous system and death of insects or arachnids. Fipronil kills fleas within 24 hours and ticks (Dermacentor variabilis, Rhizophagus sanguineus, Ixodes scapularis, Ixodes ricinus, Haemaphysalis longicornis, Haemaphysalis flava, Haemaphysalis campanulata) and lice within 48 hours post-exposure. (S)-Methoprene is an insect growth regulator (IGR) of the class of compounds known as juvenile hormone analogues that inhibit the development of immature stages of insects. This compound mimics the action of juvenile hormone and causes impaired development and death of the developing stages of fleas. The on-animal ovicidal activity of (S)-methoprene results from either direct penetration of the eggshell of newly laid eggs or from absorption through the cuticle of the adult fleas. (S)-methoprene is also effective in preventing flea larvae and pupae from developing, which prevents contamination of the environment of treated animals with the immature stages of fleas. Both (S)-methoprene...