FLEAS: CONTROL AND COMPLIANCE METHODS IN COMPANION ANIMALS

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Adi Nell discusses approaches to getting these parasites to flee pets and their homes, and describes the treatments that can be used for such purposes

Summary

Flea-related irritation and allergy is the most common cause of skin disease in dogs and cats in the UK. A variety of products is available, and their methods of action and efficacy are briefly discussed. The critical factors in successful flea treatment are owner compliance and avoidance of operator error. Fact sheets can be extremely useful in improving compliance. Attention to detail and ensuring that any assumptions on the number of animals in the household, the owner's ability to administer the medications correctly, the weight of the animals involved, the number of rooms in the house and so on have been checked, will allow a greater success rate. Before commencing with a wider investigation of pruritus it is essential to have flea control thoroughly in place.

Key words

flea, allergy, compliance, strategies

Flea allergy dermatitis is the most common cause of pruritic skin disease in dogs and cats in the United Kingdom[1].

Fleas are ubiquitous in the British Isles and, with the possible exception of extreme northern

regions, are present all year round, especially in the domestic environment.

Our indoor lifestyles, the presence of central heating and reduced fresh airflow in modern homes provide the warm and relatively humid conditions fleas prefer. The cat flea, *Ctenocephalides felis*, is the most widespread flea species in the UK and worldwide[2].

Fleas are not obligate parasites of dogs and cats, but can persist on a wide range of alternative hosts[3]. This means there is little realistic prospect of entirely eliminating the flea challenge to any animal that spends even part of its time outdoors[4].

For indoors-only animals, total flea eradication might be possible.

The flea life cycle involves a number of stages: egg (Figure 1), three larval stages (called instars; Figure 2), pupa (Figure 3) and breeding adult[5] (Figure 4). It is only the adult stage that parasitises animals, and it is only this stage that is amenable to onanimal control.

While the larval stages can be targeted by environmental control and some products claim efficacy against the eggs, pupae appear highly resistant to any form of environmental control – short of incineration.

Most insecticidal sprays, topical treatments and growth regulators do not penetrate the tightly woven flea cocoon, which protects the developing adult flea until hatching.

Incineration is generally not acceptable to pet owners or their families. The only product that claimed efficacy against the pupal stage, which used a silicone derivative, was discontinued at the end of 2010.

Fleas are important, not only for the irritation or allergies they might cause, both in pets and their owners, but also for the diseases they can carry and, potentially, their direct anaemiainducing effects – especially on very small or young animals[1].

In the past few years there has been a dramatic increase in both the range of chemicals available and the number of alternative presentations of those chemicals. Some non-chemical control methods have also been marketed. This article will consider the relative merits of the various products, and the supporting material available in peerreviewed veterinary literature.

It must be remembered that any product is only as good as the person applying it, and the method of application used by that person. A perfectly good product will have precious little effect if given orally, as a dissatisfied client explained to me she had done. Client education is one of the keys to successful control of fleas or any other parasite, as the products themselves – while often highly effective – will not work as expected if applied by an inappropriate route, at the incorrect interval, at an inadequate dose or to the wrong species of animal. Dermatologists are often accused of

pedantry, but the range of mistakes and novel methods of “treatment” that we encounter is truly staggering, and most of us find it useful to check the facts very carefully.

The products can be grouped in a number of ways. Let’s examine them by mode of action.

Insecticides

This group includes some of the oldest and most effective means of flea control.

While these “grandfather” products are often highly effective, they can have adverse effects on the animal being treated, low safety margins or environmental properties (persistence, toxicity to watercourses, “bystander” killing of unintended species[6] and so on) that make them less desirable than some more modern products. The most commonly available form is permethrin, present in both on-animal and environmental treatments. These older products will not be discussed further. Newer insecticides generally have the advantage of enhanced efficacy against the target species, reduced toxicity and wide safety margins.

• **Fipronil**[7]

Launched as a flea treatment for UK domestic animals in 1995, fipronil has proved to be one of the safest and most effective of this newer class of insecticide. Fipronil is present as the main active ingredient in a number of presentations.

The product offers very high flea mortality within 24 hours of application, and persists for up to two months (spot-on) or three months (spray). The spray formulation can be used from two days of age in dogs and cats and the spot-on from eight weeks. Pyriprole is a related chemical – see below.

• **Imidacloprid**[8]

Imidacloprid is present in a variety of presentations, either as the sole ingredient or in combination with other insecticides (such as permethrins). This is a highly effective and widely employed insecticide. This chemical also has a wide margin of safety and yields similar kill rates to fipronil. It may be used monthly in dogs and cats from eight weeks of age.

• **Pyriprole**[9]

This insecticide and acaricide belongs to the phenylpyrazole class (the same class as fipronil, see the notes above on fipronil and phenylpyrazole) and is a more recent (2006) entrant to the market. It offers rapid flea killing and good persistence.

• **Nitenpyram**[10]

Chemically related to imidacloprid, nitenpyram has a very rapid knock-down effect (95 per cent within six hours) after oral administration. It is eliminated from the body fairly rapidly – usually within three days of dosing.

• **Metaflumizone**[11]

This novel insecticide is another newer entrant. It provides up to six weeks' protection and is available either on its own or combined with amitraz.

• **Selamectin**[12]

This is a macrocytic lactone – in effect, an avermectin/milbemycin chemical. Traditionally, these chemicals have not been particularly effective insecticides, but selamectin has a very good flea kill rate and persistence.

Data suggests that it achieves a 99 per cent flea kill within 24 hours of application and maintains more than 90 per cent efficacy over 30 days.

Insect growth regulators (IGRs)

This group acts by interfering with the hormonal control of growth in immature fleas, usually acting on the larval stages by preventing development from one larval stage (or instar) to the next. Flea larvae are kept in the immature stages for a prolonged period by these products, resulting in larval death. These products are not insecticides, but can be used in conjunction with them.

• **Lufenuron**[13]

This insect growth regulator prevents the immature stages of the flea from developing normally by interfering with chitin synthesis. Flea larvae are trapped in the immature state and die as a result.

• **Methoprene**[14]

This highly effective IGR is present in a number of products and combinations. It is also available under its synonym, precor.

• **Pyriproxyfen**[15]

Pyriproxyfen is added to the insecticide permethrin in a commercially available product.

Non-chemical flea control

• **Silicones**[16]

Contains cyclomethicone and dimethicone, which are designed to bind the flea eggs, larvae and adults and prevent them from hatching, moving or being able to jump on to pets. The sole manufacturer has withdrawn this product from the market (December 2010).

Product comparison

The questions that most readers will be asking at this point are “which product is the best?” and “how do I choose one product over another?”

It is the author’s view that all the previously listed products are effective in controlling flea infestations when used appropriately. A growing body of articles compare one product or a range of products with each other, each yielding a slightly different result[17],[18],[19],[20]. In the author’s opinion, any such studies should be interpreted cautiously, and a range of studies should be consulted before deciding that one product might be superior – or inferior – to another.

The generally accepted guidance when reading articles is to look for any conflict of author interest and treat such articles more cautiously than you might an article from a wholly independent source.

An article on a new “wonder drug” that cures retinal detachment, for example, would be read with a different emphasis depending on whether it was written by the manufacturer of that wonder drug, or by a panel of truly independent experts.

Look, too, at the number of animals in the study (more is usually better), and the structure of the trial – all these help the reader in deciding how much credence to give an individual article or trial report. It goes without saying that a peerreviewed journal is usually more rigorous in its acceptance criteria than conference proceedings or marketing material might be.

Control strategies

Flea control is very easy in theory, but real-life situations always throw up unexpected complications. As with all dermatology, it is vital to be absolutely certain that your trial or treatment has been carried out correctly before concluding that it hasn’t worked or that the problem lies elsewhere.

In flea control, the critical factors are the application of the product to the animal and the treatment of the animal’s usual environment (home, kennel, car etc). If those are performed correctly, the problem will resolve in time. It’s important to be patient: while the theory that a single flea bite is sufficient to maintain an allergy has come under review[21], there is no doubt that it can take many months for a flea allergy to resolve completely, even with perfectly adequate treatment.

Application to animal(s)

It is vital to ensure that whichever product has been selected, it is given at the correct dose rate, the correct dosing frequency and applied in the correct manner.

Giving a spot-on product per os isn't generally effective. The animal must also not be washed before or after topical application, as many products require the sebum layer on the skin to be intact to "stick" adequately and persist for the required duration[22]. It is amazing how often a small step is missed or incorrectly performed, leading to failure of the entire flea control strategy.

Additionally, all in-contact animals must also be appropriately treated.

Environmental treatment

The application of the environmental control is critical: the hiding places of the fleas must be treated adequately, as the majority of the flea population is not resident on the animal, but present in the environment[23]. Foggers are particularly ineffective – hand-directed spraying of the products is vital[1].

The home, car and kennel, as appropriate, must be thoroughly treated, including the entire floor surface area of every room the animal or in-contact animals ever enter. This includes the areas under beds and furniture. Flea control should be seen as a series of steps or procedures, each of which is critical to effective infestation removal.

When the eggs hatch, the larvae crawl towards gravity and away from light[24], so the protected areas must be reached to kill the larvae effectively. The author's advice to clients is to move all items of furniture that are moveable to expose the flea larvae hiding places.

Remember that, with all insecticides, birds and fish are generally exquisitely sensitive to these chemicals and you can easily end up with thousands of pounds worth of dead koi carp if you don't warn the owners to seal the tanks and turn off the air pumps. In the absence of clear data from the manufacturers, the usual advice is to air thoroughly the room that birds or fish are kept in after using the products and to keep any air pumps switched off for as long as possible afterwards.

Evaluating the effects of treatment

It takes time to kill all the fleas in a house. Pupae may not be killed by anything short of burning the house down, so fleas emerging from these cocoons usually have to contact an animal to encounter an effective insecticide.

No treatment kills fleas rapidly enough to prevent the first bite, and one bite, once a week, might be enough to keep an allergy going (although this is currently under review). Give the animal time to respond to your treatment and don't assume that failure to cure an animal after a single or a couple of treatments necessarily indicates that the problem lies elsewhere.

It is critical to ensure that your instructions are both accurate and accurately followed. Spend time making certain that all in-contacts have been treated, that the treatment applied to the animal was of the appropriate size or strength, that the treatment was applied correctly (to the correct area, animal not bathed and so on) and that the treatment was repeated at the correct frequency. Similarly, quiz the owners to make certain that the entire floor surface area of every room in the house that the animals ever enter has been treated. The author uses an instruction sheet that reiterates the key points of treatment and spells out exactly how the animals and house should be treated. Copies of this are available on request from adi.nell@medivet.co.uk

Flea control isn't difficult, but attention to detail is important. We are lucky to have a wide range of safe, effective treatments for the house and the animals, and correctly used, there is no reason not to be able to control a flea infestation or flea allergy.

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