Making sense of flea and tick products

There are dozens of products, containing over 20 different active ingredients, on the UK market for treating or preventing flea and tick infestations in cats and dogs. Some are available only on prescription (POM-V), some can be bought from pharmacies and suitably qualified sellers (NFA-VPS) and others are on general sale (AVM-GSL). Here, we look at the features of the products, and explain how they are tested, so we know what to expect of them. We have produced a product guide to accompany this article to help with the choice of product.

Click the Ectoparasiticide Guide button on the left to access the online product guide. You will need to subscribe to Veterinary Prescriber in order to use the guide. Subscription costs £9.95 per month after an initial 30-day free trial. For terms and conditions click here.
What do the products do?

Flea and tick products are used to treat infestation to alleviate discomfort in affected animals. They are also used prophylactically to prevent infestation.

Products usually contain an insecticide (to kill fleas) and/or an acaricide (to kill ticks). These are intended to kill parasites already present on the animal at the time of treatment. Insecticides and acaricides work by interacting with the nerve cell receptors of parasites, so disrupting central nervous system activity, leading to death. The products usually remain on, or in, the body of the animal for several weeks and so can kill parasites newly acquired by the host and prevent infestation over a period of time.\(^1\) Although insecticides have been in common use since about the 1990s, it is not clear what effect their use has had on the prevalence of flea infestation.\(^2\)

Some products contain pyrethroids which have a tick-repellent as well as insecticide and acaricide effects. The repellent effect prevents ticks from taking a blood meal.\(^3\)

Some products contain an insect growth regulator alone or together with an insecticide. Insect growth regulators prevent female insects from laying viable eggs and/or prevent the larvae from developing into adults. When used on their own, these products have a preventive effect only.

Active ingredients in flea and tick products

**insecticide**
- dinotefuran, imidacloprid, indoxacarb, metaflumizone, nitenpyram, propoxur, pyrethrins, selamectin, spinosad

**acaricide**
- amitraz

**insecticide and acaricide**
- afoxolaner, bendiocarb, dimpylate, fipronil, fluralaner, pyriprole

**insecticide, acaricide and tick repellent**
- pyrethroids (deltamethrin, flumethrin and permethrin)

**insect growth regulator**
- (S)-methoprene, lufenuron, pyriproxyfen

**synergist**
- piperonyl butoxide, which has no pesticidal activity, is used as a synergist to extend the duration of the insecticidal effects of pyrethrins.


Formulations

There are several ways of using ectoparasiticides.

Impregnated collars. The active ingredients are slowly and continuously released in low concentrations, spreading from the site of contact over the entire skin surface. Impregnated collars have a long residual effect (usually several months).

Spot-on solutions are applied to the skin on one to four spots or in a continuous line (depending on the product) on the back of the neck of the animal. The product distributes across the skin and hair of the animal over the following days. For most of the products, there is only limited absorption through the skin into the bloodstream, which is not relevant for the clinical effects. Exceptions are products containing pyriproxifen (Prac-tic spot-on) and selamectin (Stronghold spot-on), which are absorbed through the skin.

Indoxacarb (which is applied as a spot-on solution) is a pro-drug that needs to be converted to the active form by enzymes in the mid-gut of susceptible insect species; it enters the insect primarily through ingestion, but is also absorbed to a lesser degree through the insect’s cuticle.

Sprays are used to dampen the hair down to the skin and leave a film on the coat. The product persists on the hair for several weeks.

Oral formulations. Afoxolaner, fluralaner, lufenuron, nitenpyram and spinosad are available as tablets. After swallowing, the active ingredient is absorbed from the gut, distributed in the animal’s body and ingested by the parasites when they take a blood meal.

Feed mix. A preparation of pyriproxyfen is available as a powder for mixing with dog feed.
How is efficacy measured?

In order to get a marketing licence, products for treating and preventing flea and tick infestation need to have demonstrated efficacy according to certain standards set by the European Medicines Agency. Laboratory tests are first used to establish efficacy, followed by field studies to confirm efficacy and safety under conditions representing practical use.

Against fleas
For insecticides, demonstration of immediate efficacy usually requires that adult flea count (following deliberate infestation) must have been reduced by at least 95% within 48 hours of applying the treatment. To show short-term residual efficacy (up to 4 weeks), the same reduction in count needs to be shown at weekly intervals; and for long-term efficacy (more than 4 weeks) at 4-weekly intervals (2-weekly in the last month of the claimed effectiveness period).

Products containing an insect growth regulator need to show an effect on flea metamorphosis (sterilisation of eggs, or inhibition of egg hatching and the formation of cocoons).

Against ticks
A repellent effect means that no tick will attach to the animal, and ticks already on the animal will leave the animal soon after treatment. In general, no ticks should be detectable on the animal after 24 hours following administration of the product. The presence of ticks is tested 24 hours after treatment followed by a 4-weekly challenge to test for long-term persistent efficacy (2-weekly in the last month of the claimed period of effectiveness).

For acaricides, demonstration of immediate efficacy usually requires that tick count (following deliberate infestation) must have been reduced by at least 90% within 48 hours of applying the treatment. To show long-term efficacy (more than 4 weeks) a 90% reduction in tick count needs to be shown through 4-weekly testing (2-weekly in the last month of the claimed effectiveness period).

Efficacy parameters for products applied to the skin allow for the presence of a single live attached engorged or unengorged tick, or a killed attached engorged tick. This is why the summaries of product characteristics (SPCs) for acaricides that are applied to the skin include a warning that “there may be an attachment of single ticks” so “transmission of infectious disease by ticks cannot be completely excluded if conditions are unfavourable”. It is therefore important to continue to check for, and remove, ticks while using these products. For an acaricide that is given as a tablet, a tick needs to have started feeding on the animal in order for the product to work, and so it is not possible to rule out the possibility of transmission of diseases carried by ticks.

Light and water stability
Products applied to the skin are also tested for photostability and water stability. The product information includes information on what is known about the effects of bathing and swimming on the product’s efficacy.
Choosing a product

Various factors can affect the choice of product, including duration of effect, ease of use of the formulation and adverse effect profile. For example, spot-on products for dogs containing permethrin (which is toxic to cats) are best avoided if the dog shares a home with cats. Some products are also indicated for the treatment or prevention of other conditions which the animal might also have or be at risk of contracting (such as biting lice, mange and heartworm disease, or sandfly, for instance, if travelling abroad).

Water stability is an important consideration if the animal swims or is bathed regularly. Information on the features of the products available in the UK can be found in the summaries of products characteristics (SPCs), all of which are in the product information database on the Veterinary Medicines Directorate website. Veterinary Prescriber has produced an independent guide that is designed to help with the choice of flea and tick products.
Subscribe to Veterinary Prescriber

Veterinary Prescriber is an essential resource for veterinary professionals who want impartial, evaluated and practical information on veterinary medicines. The succinct articles are clearly referenced, make a distinction between evidence and opinion, and are easy to read on computer, tablet or smartphone. The practical “what to say to clients” advice in some articles, and unique product guides, help support veterinary professionals in consultations. We aim to make the information easy-to-read and convenient.

£9.95 per month
Free 30-day trial
Rolling monthly subscription
Cancel at any time

How to navigate the article
Use the contents list on the first page to get to the parts of the article you want to read; use the forward and back arrows to move from page to page; and click the Veterinary Prescriber logo in the top left hand corner to get back to the first page.

What you get

• access to the leading source of independent veterinary medicines information
• a practical new article/product guide every month
• access to the library of existing articles and product guides
• free access to the Veterinary Prescriber drug information service
• regular news and updates about veterinary medicines
• a CPD resource