



module 244

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Welcome to the two hundred and forty fourth module in our Continuing Professional Development Programme, which looks at parasiticides for cats and dogs, and is aimed at pharmacists interested in pet health.

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for this module

GOAL

To provide an overview of the common parasitic diseases that affect cats and dogs and the parasiticides used in their management.

OBJECTIVES

- After studying this module you should be aware of:
- Common parasitic diseases affecting cats and dogs
 - The treatments available for fleas, ticks and roundworm infestations
 - Sources of information on parasite management in companion animals.

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Parasiticides for cats and dogs

Author: Andrea Tarr, pharmacist and founder of Veterinary Prescriber

Introduction

Management of parasites in companion animals is crucial to the health of pets, animal-human relationships and for the protection of public health. There are over 100 products available for treating and preventing parasitic infections in cats and dogs, which can make this a confusing area for pet owners.

With many community pharmacies now stocking a limited range of parasiticides, the aim of this module is to help pharmacy teams understand the products they sell, be aware of the full range of parasiticide products available on the market, be able to advise customers about their use in cats and dogs, and know where to find more information on parasites and parasiticides.

Cats and dogs are susceptible to infection by internal and external parasites. These can cause discomfort and disease in the animal, may interfere with the human-animal bond and, in some cases, cause disease in humans (zoonosis). Control of parasites is crucial in maintaining healthy pets and for



protecting public health. Environmental and hygiene measures (e.g. handwashing, disposal of dog faeces, checking for ticks) are important in controlling parasites, but medication also plays a key role. The main development in the past few years regarding medication has been the availability on veterinary prescription of broad spectrum products that cover a wide range of parasites.

External parasites (ectoparasites)

Fleas and ticks are the commonest external parasites that affect cats and dogs in the UK. Other important ectoparasites include lice and mites and, for dogs travelling outside the UK, mosquitoes and sandflies.

Fleas

Fleas cause discomfort to the animal and can result in an allergic dermatitis, but they can also transmit tapeworm infection. Signs of flea infestation might not be obvious in a non-allergic animal. The commonest flea species found on dogs and cats are *Ctenocephalides felis* (the cat flea), followed by *C. canis* (the dog flea) and *Archaeopsylla erinacei* (the hedgehog flea).

Flea lifecycle

After emerging from the pupa, adult male and female fleas start to seek a host – without one they can only survive a few days. After biting and taking the first blood meal, they need daily blood meals for survival and usually stay on the same host for the rest of their lives (usually about one to three weeks). If there are male and female fleas on the animal, egg laying may start within 48 hours of infestation at an average rate of 20 eggs per day. Once laid, the pearly white eggs (0.5mm in length) fall off the animal.

After a few days under ideal conditions, the larvae hatch and feed on debris such as animal dander and flea faeces. Developing larvae tend to hide deep in carpets and under furniture where vacuum cleaner access is difficult. When fully grown, the larvae pupate. Adult fleas emerge soon or after a delay of six months or more (e.g. during cold weather). Well insulated and heated homes encourage flea development all year round, but prevalence can increase in the warmer months due to outdoor multiplication.

Cats and dogs most often become infested with newly emerged fleas from the environment, but can also pick up fleas from close contact with other infested animals. Combing is the best way of detecting fleas. If an animal has an infestation, an insecticide can be used to kill the fleas.

Treatment may need to be repeated until the problem is controlled. It is also important to treat other pets living in the same house. The adult fleas on the animal are only part of the problem – it is also crucial to eliminate the immature stages in the environment. Regular use of insecticides will contribute to the reduction of immature stages, but environmental measures are also needed, including vacuuming carpets, washing the animal's bedding and using products to kill at the developmental stages in the home.

A lack of understanding of the need to attend to the environment may underlie pet owners' frustration about the apparent lack of effect of flea treatments used on pets. Regular flea prophylaxis is recommended for most cats and dogs.

Ticks

Ticks are endemic throughout most of Europe. While there are more than 12 different species that have been identified, ticks that attach to cats and dogs belong to the *Ixodidae* family. They can be found anywhere on the body, but prefer non-hairy and thin-skinned sites, such as on the face and ears, between the toes, and in the axillae and perianal areas.

Ticks are important vectors of bacteria, viruses, protozoa and nematodes, which can cause tick-borne diseases. In the UK, the main pathogen transmitted to dogs and humans is the bacteria *Borrelia burgdorferi*, the cause of Lyme disease (borreliosis).

Tick lifecycle

The lifecycle of ticks involves several larval stages and several hosts. Larvae hatch from eggs in the environment and feed for two to three days on a suitable host (e.g. a rodent). The larvae return to the environment to moult into eight-legged nymphs, which then feed for four to six days on a suitable host (e.g. a rodent) before returning to the environment and moulting to become adults. The adults mainly remain in the environment.

Adult female ticks seek a large mammalian host (e.g. a dog, cow or deer) to take a large blood meal over five to 14 days before laying eggs in the environment.

When fully engorged, a tick can increase in size to around 1cm in length and can be seen easily. A tick infestation is usually seasonal, peaking in March-June and again in August-November. Visible ticks should be removed as soon as possible to avoid the potential transmission of any disease that the tick might



Otherwise healthy pets are still susceptible to infection by internal and external parasites

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be carrying. Purpose-made tools are available for tick removal. These grip the head of the tick without squashing the body (and so potentially encouraging the release of any more saliva or stomach contents – and any pathogens – from the tick). Alternatively, pointed tweezers or a single loop of cotton can be used to grasp the tick as close as possible to the skin, and then pull outwards and upwards without twisting.

An ectoparasiticide that kills and/or repels ticks is recommended for animals on which a tick has previously been found and for dogs walked in areas with tall grass and deer or livestock.

The risk of tick attachment and transmission of infection can be reduced by avoiding or limiting access to areas with known high tick density or at times of the year when ticks are most active, and by inspecting animals daily and removing any ticks.

Internal parasites (endoparasites)

The internal parasites that commonly affect cats and dogs in the UK are roundworm (*Toxocara* spp), tapeworm and lungworm.

Roundworm

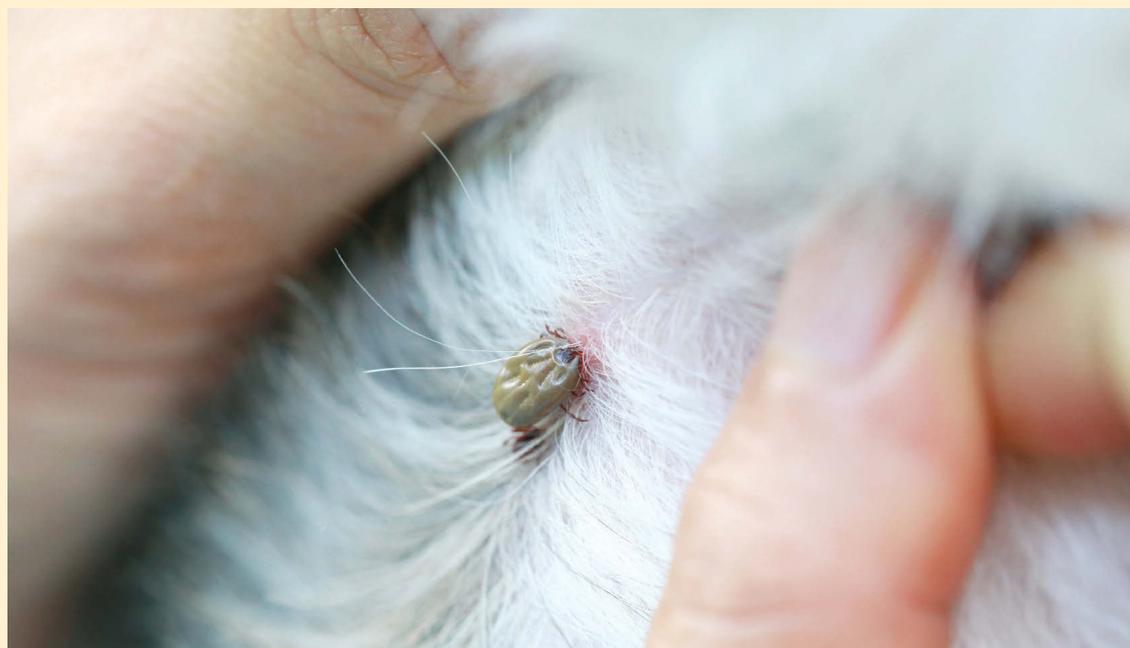
Puppies can be heavily infected by roundworm (*T. canis*) before birth or via lactation and can develop serious illness. They are therefore normally treated with a dewormer (anthelmintic) at two weeks of age, continuing fortnightly until two weeks after weaning, and then monthly until they are six months old.

Kittens are not infected with *T. cati* before birth and so are usually wormed from three weeks of age, fortnightly until two weeks after weaning, then monthly for six months.

Roundworm infection can occur in older dogs and cats but is not usually associated with clinical signs, so it is difficult to know if they are infected without regular examination of the faeces.

Roundworm lifecycle

Eggs produced by the worms are released in the faeces and contaminate the environment (e.g. soil or sand). There is no immediate risk of infection from contact with fresh faeces because eggs need two to four weeks in the environment to develop to the infective stage.



Tick infestation in animals is usually seasonal

The rationale for immediate disposal of dog faeces is to remove potentially infectious eggs from the environment.

Roundworm can be spread to humans through ingestion of contaminated soil, sand or faeces. Once hatched in the bowel, the larvae can travel to other parts of the body including the eyes. This can then result in a loss of vision for the person infected.

A few roundworms produce a large number of eggs and it is therefore usually recommended to continue regular (at least four times a year) deworming in adult cats and dogs.

More frequent worming (monthly) is recommended for animals that live in households in which there are people who might be particularly susceptible to disease if infected (e.g. young children or people with immunosuppression).

Tapeworm

The *Echinococcus granulosus* tapeworm, which can cause hydatid disease in humans, is endemic in some parts of the UK. Dogs are at risk of infection with this tapeworm if they have a raw meat diet or hunt, or otherwise have access to raw offal and carcasses.

Other tapeworms that infect dogs are *Dipylidium caninum*, which is spread by fleas

and biting lice as a result of ingesting infected insects, and *Taenia* species, which dogs and cats may ingest when they eat tissues or viscera of infected animals. *D. caninum* and *Taenia* spp. rarely cause clinical problems in dogs.

Lungworm

The worm *Angiostrongylus vasorum* can infect the pulmonary arteries and the right side of the heart in dogs. This can cause serious disease. Dogs may acquire the infection through ingestion of slugs, snails, frogs and other amphibians. Drugs for treating and preventing lungworm are only available on veterinary prescription.

Other worms

Other worms that can affect pets in the UK are hookworm (*Ancylostoma* spp; *Uncinaria stenocephala*) [cats and dogs] and whipworm (*Trichuris vulpis*) [dogs]. The treatments available for roundworm generally are also effective against these worms.

Heartworm (*Dirofilaria immitis*), which is endemic in many southern and eastern European countries, can cause serious disease in cats and dogs. Products effective against heartworm are only available on veterinary prescription.



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Assessing the need for parasiticides

The risk of infection to the animal and need for parasiticide therapy depends on various factors including the age of the animal, its lifestyle (e.g. access to offal or molluscs), location (which determines which parasites are endemic), and whether the animal lives with susceptible humans (such as young children or people with immunosuppression). Animals therefore require tailored therapy to manage parasites but the choice of formulation also depends on factors such as whether the animal is bathed or swims, or reacts to topical products (in which case an oral product is more suitable).

In general, cats and dogs in the UK need routine cover for fleas and roundworm. Depending on the animal's lifestyle, it may also need cover for ticks and/or tapeworm and/or lungworm (as mentioned, medication for the latter is only available on veterinary prescription). Broader parasite cover is needed for animals travelling outside the UK.

Specialist advice on parasitology

Parasitology is a large and complex topic. It is important to be aware that some parasites are spreading across Europe due to increased travel and climate change, bringing with them the risk of new diseases.

The European Scientific Counsel for Companion Animal Parasites (ESCCAP) is an independent organisation comprising experts in the field of parasitology and public health from across Europe.

ESCCAP's role is to develop guidelines for the control of parasites in pet animals to protect the health of pets, enhance the safety of the public and preserve the bond between pets and people. ESCCAP produces information on the geographical location of parasites in Europe.

The UK and Ireland branch of the organisation provides practical advice to veterinary professionals and pet owners on protecting companion animals from parasitic diseases. The organisation's website (www.esccapuk.org.uk) has separate areas for professionals and



Pets require tailored treatment to effectively manage parasites

pet owners. It contains helpful and clear information about parasites, and guidelines and information leaflets on protecting pets at home and abroad (including information on pet travel regulations).

Legal classification of veterinary medicines

Parasiticide medicines for animals belong to one of three supply categories:

- POM-V: available only on veterinary prescription
- NFA-VPS (non-farm animal – veterinary, pharmacy, suitably-qualified person [SQP]): these can be supplied from pharmacies and suitably qualified sellers
- AVM-GSL (authorised veterinary medicine – general sales list): these can be sold from any retail outlet.

Parasiticide products for cats and dogs

Flea and tick products

Most flea and tick products (ectoparasiticides) contain one or more ingredients that have insecticide (flea killing) and/or acaricide (tick-killing) effects.

Insecticides and acaricides work by interacting with the nerve cell receptors of



Table 1: Active ingredients in OTC flea and tick products

Insecticide: imidacloprid, nitenpyram, propoxur, pyrethrins

Insecticide and acaricide: bendiocarb, dimpylate, fipronil, pyrethrins, pyriprole

Insecticide, acaricide and tick repellent: pyrethroids (deltamethrin and permethrin)

Insect growth regulator: lufenuron, pyriproxyfen

Synergist: piperonyl butoxide has no parasitocidal activity. It is used as a synergist to extend the duration of the effects of pyrethrins

parasites, disrupting central nervous system activity and leading to death. The products can be used to kill fleas already on the animal's body but most (apart from shampoos and powders and certain tablets) will remain on, or in, the body of the animal for several weeks and can kill parasites newly acquired by the host, preventing infestation over a period of time (usually one month).

Some products contain an insect growth regulator (alone or together with an insecticide) to prevent female insects from laying viable eggs and/or prevent the larvae from developing into



Reflection exercise 1

With your team, discuss the role of pharmacy staff in giving advice on animal medicines.

adults. When used on their own, these products have a preventive effect only.

Table 1 shows the ingredients in OTC parasiticides and their effects. For example, Frontline, a parasiticide brand commonly stocked in pharmacies, contains fipronil, which kills fleas and ticks. It is available as a spot-on (topical) formulation and its effects last for up to four weeks.

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

What's the difference?

It is important to know the difference between pyrethrins and pyrethroids:

- Pyrethrins are naturally occurring compounds from the *Crysanthemum* plant that have both insecticidal properties and a repellent effect. Pyrethrins are a common ingredient in products on general sale
- Pyrethroids (e.g. deltamethrin and permethrin) are synthetic versions of pyrethrins.

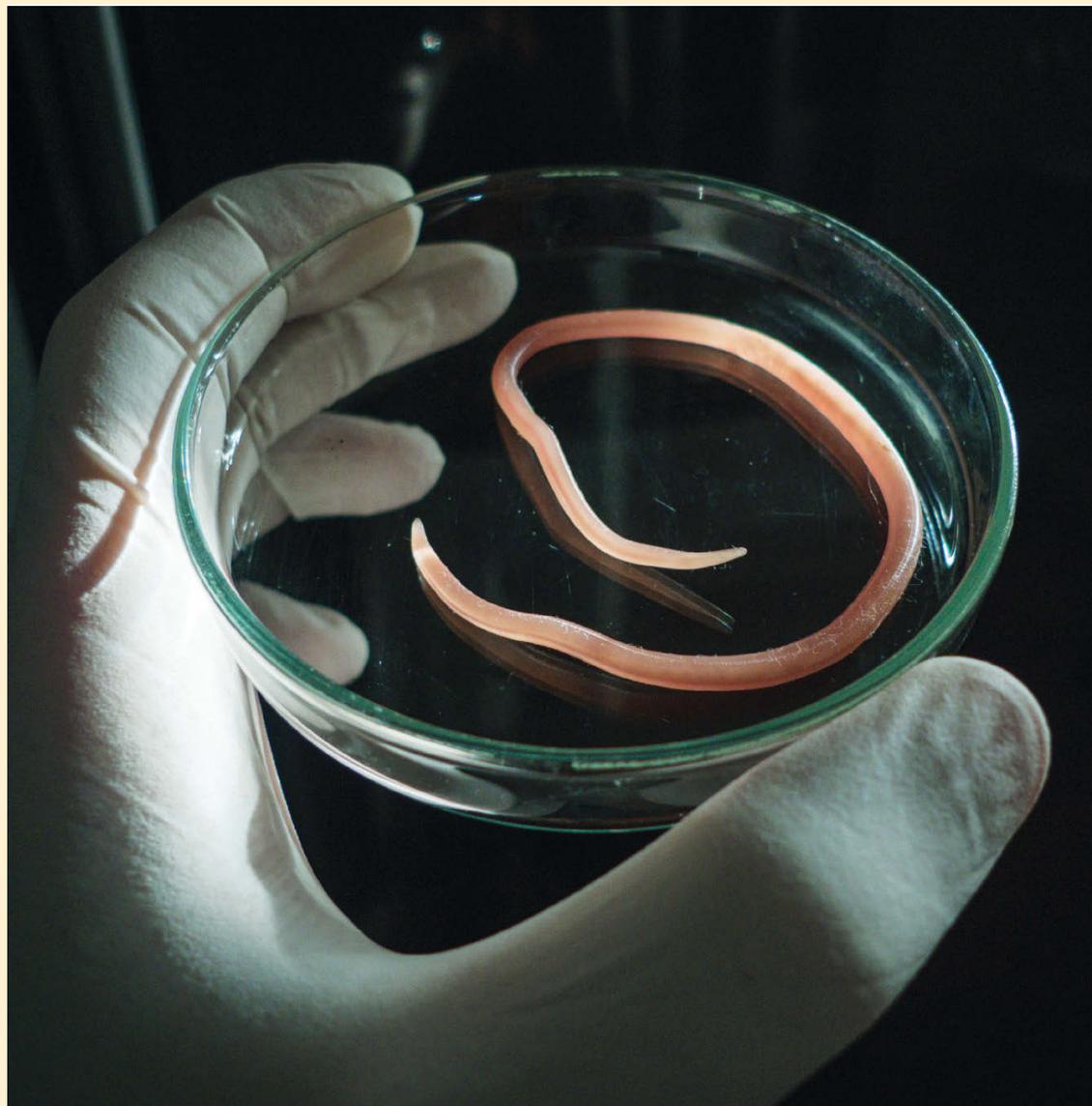
Topical products (spot-ons) for dogs containing high concentrations of permethrin are dangerous for cats. This is because cats metabolise permethrin less well than dogs and can develop toxicity if a canine permethrin product is applied inappropriately or via secondary contact with a dog treated with a spot-on product containing permethrin. For this reason it is best to avoid use of permethrin-containing products on a dog that shares a home with a cat. Collars containing small amounts of permethrin are appropriate for use on cats.

Endoparasiticides

There are dozens of endoparasiticide (worming) products on the market, most of which work by paralysing the worms by effecting the nervous system. Table 2 shows the active ingredients in OTC parasiticides and the worms that they are used to treat. Drontal tablets, a brand commonly stocked in pharmacies, contains praziquantel and pyrantel, and is used to treat roundworm and tapeworm.

How is efficacy assessed?

In order to get a marketing licence, parasiticide products need to have demonstrated efficacy



Cats and dogs in the UK need routine cover to protect against roundworm

according to certain standards set by the European Medicines Agency (CPMP 2008; EMA 2002 canines; EMA 2002 felines).

Laboratory tests are first used to establish efficacy, followed by field studies to confirm the efficacy and safety under conditions representing practical use. Products applied topically are also tested for photostability and water stability.

Flea and ticks

For insecticides, demonstration of immediate efficacy usually requires that the adult flea count (following deliberate infestation) is



Table 2: Active ingredients in OTC worming products

Dichlorophen: tapeworm (not <i>Echinococcus</i>)
Benzimidazoles (febantel and fenbendazole): roundworm, tapeworm (not <i>Dipylidium</i>)
Nitroscanate: roundworm, tapeworm (not <i>Echinococcus</i>)
Piperazine: roundworm
Tetrahydropyrimidines (pyrantel, oxantel): roundworm, hookworm, whipworm
Praziquantel: tapeworm (including <i>Echinococcus</i>)



reduced by at least 95 per cent within 48 hours of applying the treatment. To show short-term residual efficacy (up to four weeks), the same reduction in count needs to be shown at weekly intervals; and for long-term efficacy (more than four weeks) at four-weekly intervals (two-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).

For tick products, demonstration of immediate killing effects usually requires that the tick count (following deliberate infestation) must have been reduced by at least 90 per cent within 48 hours of applying the treatment. Long-term efficacy (more than four weeks) requires a 90 per cent reduction in tick count through four-weekly testing (two-weekly in the last month of the claimed effectiveness period).

A tick repellent effect means that no tick will attach to the animal, and ticks already on the animal will leave it soon after treatment and should not be detectable on the animal 24 hours after administering the product.

The presence of ticks is tested for 24 hours after treatment followed by a four-weekly challenge to test for long-term persistent efficacy (two-weekly in the last month of the claimed period of effectiveness). No products are guaranteed to prevent the attachment of ticks or transmission of disease, so pet owners should check the animal's coat for ticks every 24 hours and remove immediately any found.

Worms

For endoparasitides, two dose confirmation studies are required involving a minimum of six treated animals and six controls. The difference in parasite counts between those treated and controls should be statistically significant ($p < 0.05$) and effectiveness should be 90 per cent or higher. For parasites with implications for public health (e.g. *Echinococcus* spp.) the efficacy standard may be higher (i.e. up to 100 per cent). Field studies are not usually required for such parasites.



Reflection exercise 2

How familiar are you and your team with the parasitides you stock? What active ingredients do they contain, what are they indicated for and how should they be used?



Pet owners should be advised to check regularly for signs of infestation

Authorised indications

The authorised indications of commercial products depend not only on the spectrum of activity of the active ingredient(s), but also on what effects have been demonstrated for the product to obtain a marketing authorisation. As a result, different products with identical ingredients can have a different range of authorised indications, which can be found in the product's summary of product characteristics.

Formulations: OTC products

There are several ways of using parasitides: as impregnated collars, spot-ons, shampoos and sprays, and as oral formulations.

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 an effect that lasts several months.

Spot-on

These 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 animal's neck. The solution is distributed across the skin and hair of the animal over the following days. Spot-ons are convenient and easy to use but the effects can be reduced by bathing and swimming.

Reflection exercise 3

Review the range of parasiticide products that your pharmacy stocks. Are any changes needed?

Shampoos and sprays

Shampoos and sprays that are available OTC have no residual effect. Spray formulations of fipronil are available on prescription. These leave a film on the coat that persists for several weeks.

Oral formulations

Flea/tick and worming products are available OTC as tablets. A few roundworm products are available as granules, paste, syrup and suspension.

What is different about POM-Vs?

The products that can be sold OTC are aimed at controlling flea, tick, roundworm and tapeworm infestations. Some POM-V products have the same ingredients as products available OTC but those products that are available only on veterinary prescription are different from OTC preparations in the following respects:

- Different formulations (e.g. fipronil as a spray; injectable products)
- Certain combination products (e.g. fipronil plus s-methoprene, an insect growth regulator [Frontline Combi])
- Different active ingredients (e.g. moxidectin; milbemycin)
- Combination products with broader parasite coverage (e.g. including heartworm and lungworm).

Pet owners should consult their veterinary surgeon for a full parasite risk assessment, particularly if the pet is taken abroad.

Adverse effects

Parasiticides can cause adverse effects in the animals on which they are used and, through handling, in the animal owners. The SPC will list product-specific adverse effects.

The Veterinary Medicines Directorate's Pharmacovigilance Unit collects information from veterinary professionals and the general public on suspected adverse reactions and lack of efficacy to veterinary medicines. Reports can be made via its website (vmd.defra.gov.uk/adversereactionreporting).

Resistance

There are anecdotal reports of a lack of effect of flea products. This is often assumed to be due to resistance of the fleas to the product but there is no robust evidence of a resistance problem.

Lack of efficacy is most likely to be due to incorrect use of the product and a lack of understanding of the need to break the flea reproduction cycle (i.e. the need to treat the environment).

Eliminating an established flea infestation takes time and perseverance. There is a need to treat the environment to eliminate larval stages as well as the adult fleas that live on the animal, which might require several treatments.

If a customer complains that a product is not working, it is worth checking the following:

- Was the product used correctly according to the instructions?
- Has the animal been shampooed or does it swim?
- Has the environment been cleaned? (There can be areas that are not so obvious, such as garden sheds)
- Were all animals in the house treated?

More information

- Information about companion animal parasites and risk assessment is available from the European Scientific Counsel for Companion Animal Parasites (escapuk.org.uk). The website has a section aimed at pet owners and includes downloadable fact sheets
- SPCs for all authorised veterinary medicines, including parasiticides, can be found on the Veterinary Medicines Directorate product database (vmd.defra.gov.uk/ProductInformationDatabase)
- Most SPCs or data sheets (which contain the same information as SPCs but in a slightly different format) can also be found on the website of the National Office of Animal Health (NOAH), a membership organisation for veterinary pharmaceutical companies (noahcompendium.co.uk/Compendium-datasheets_A-Z/Datasheets/-23637.html)
- Veterinary Prescriber is an independent online source of information on veterinary medicines (veterinaryprescriber.org), which has a unique searchable Parasiticide Guide that is designed to help with the choice of flea and tick products. It includes all parasiticide products authorised in the UK for cats and dogs, ferrets and rabbits. It can be searched by species, parasite(s), formulation and active ingredient(s). A search result lists all the products, together with information on treatment interval, effect on flea larvae, suitability for use in pregnancy and supply category. A two-minute video shows how to use the guide (veterinaryprescriber.org/free-articles/2015/4/16/how-to-use-the-ectoparasiticide-guide).

Reviewing your product range and advice

It might be helpful to find out about your local veterinary surgeries' policies on parasiticide use in cats and dogs and what products local pet stores stock. Some pet stores employ a suitably qualified person (SQP), who is entitled to prescribe and/or supply certain veterinary medicines in the UK.

SQPs are regulated by the Animal Medicines Training Regulatory Authority (AMTRA). Stores that employ a SQP can, like pharmacies, stock NFA-VPS and AVM-GSL products.

You might consider arranging for your team to participate in a short training course or webinar, such as those offered by Harper Adams University (harper-adams.ac.uk/short-courses/201054/veterinary-pharmacy-cpd), or SQP webinars (sqpwebinars.com).

Useful resources & information

- CVMP. Guideline for the testing and evaluation of the efficacy of antiparasitic substances for the treatment and prevention of tick and flea infestation in dogs and cats. Available: ema.europa.eu/docs/en_GB/document_library/Scientific_guideline/2009/10/WC500004596.pdf
- EMA. Step 7 Consensus Guideline, 2002. Efficacy of anthelmintics: specific recommendations for felines. Available: ema.europa.eu/docs/en_GB/document_library/Scientific_guideline/2009/10/WC500004586.pdf
- EMA. Step 7 Consensus Guideline, 2002. Efficacy of anthelmintics: specific recommendations for canines. Available: ema.europa.eu/docs/en_GB/document_library/Scientific_guideline/2009/10/WC500004580.pdf
- ESCCAP. Ectoparasites Part 1: control of parasitic insect and ticks in dogs and cats. Guideline 3, March 2009. Available: esccapuk.org.uk/professionals/guidelines/GL3%20Ecto%20Part%201.pdf
- ESCCAP. Worm control in dogs and cats. ESCCAP guideline O1 second edition, September 2010. Available: esccapuk.org.uk/professionals/guidelines/GL1%20Endo%20v2.pdf

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PARASITICIDES FOR CATS AND DOGS

assessment questions

1. Which parasites cannot be treated with OTC products?

- a. Fleas
- b. Ticks
- c. Lungworm
- d. Roundworm

2. Which statement is TRUE?

- a. Cats and dogs most often become infested with newly emerged fleas from the environment
- b. Cats and dogs most commonly become infested by picking up fleas from close contact with other infested animals
- c. Fleas are not a problem during the winter months
- d. A single treatment with an effective flea product will usually cure a flea infestation

3. Which of the following is FALSE?

- a. Tick infestation is usually seasonal, peaking in March-June and again in August-November
- b. Adult female ticks take a blood meal from a large mammal before laying eggs in the environment
- c. A tick found on the skin should be removed immediately
- d. Regular use of a tick product will prevent ticks from attaching and biting

4. Which is TRUE?

- a. Kittens can be infected with roundworm before birth
- b. Dogs infected with roundworm usually have distinctive clinical signs, including diarrhoea
- c. It is possible to become infected with roundworm

through contact with fresh dog faeces

- d. Monthly worming is recommended for animals in households with young children

5. What action does fipronil have?

- a. Insecticide, acaricide and tick repellent
- b. Insecticide and acaricide
- c. Acaricide only
- d. Insecticide only

6. Which statement about permethrin is TRUE?

- a. It is a natural product derived from the Crysanthemum plant
- b. It is an insect growth regulator
- c. It is not used in cat products
- d. Permethrin in spot-ons for dogs can kill cats

7. In clinical trials a flea product must demonstrate that it reduces the adult flea count:

- a. By at least 95 per cent within 48 hours of application
- b. To zero within 48 hours of application
- c. By at least 95 per cent within 24 hours of application
- d. By at least 95 per cent within four hours of application

8. Which is NOT a likely reason for failure of a flea treatment?

- a. Incorrect use of the product
- b. Failure to treat the environment
- c. Resistance of fleas to the treatment
- d. Failure to treat other animals in the house

Use this form to record your learning and action points from this module on **Parasiticides for cats and dogs** or record on your personal learning log at pharmacymagazine.co.uk. You must be registered on the site to do this. Any training, learning or development activities that you undertake for CPD can also be recorded as evidence as part of your RPS Faculty practice-based portfolio when preparing for Faculty membership. So start your RPS Faculty journey today by accessing the portfolio and tools at www.rpharms.com/Faculty.

Activity completed. (Describe what you did to increase your learning. Be specific) *(ACT)*

Date:

Time taken to complete activity:

What did I learn that was new in terms of developing my skills, knowledge and behaviours? Have my learning objectives been met? *(EVALUATE)*

How have I put this into practice? (Give an example of how you applied your learning). Why did it benefit my practice? (How did your learning affect outcomes?) *(EVALUATE)*

Do I need to learn anything else in this area? (List your learning action points. How do you intend to meet these action points?) *(REFLECT & PLAN)*

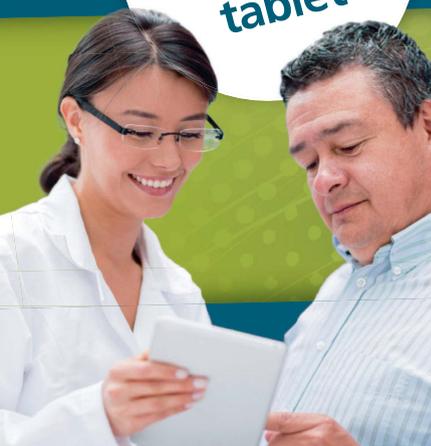
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* If as a result of completing your evaluation you have identified another new learning objective, start a new cycle. This will enable you to start at Reflect and then go on to Plan, Act and Evaluate. This form can be photocopied to avoid having to cut this page out of the module. You can also complete the module at www.pharmacymagazine.co.uk and record on your personal learning log

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