A portion of a cross section of the female parasitic roundworm Ascaris.
Ward off worms

Internal parasites may take up residence in your pet’s intestines or other organs and cause serious health complications. We look at how deworming products are formulated and manufactured to provide a safe and effective way to control them.
Endoparasites or internal parasites live inside the body of the host and feed off partially digested food or blood. Most internal parasites, colloquially called worms, live in the host’s intestines, but some may migrate to other parts of the body.

Worms can pose a serious health risk to pets, either by stealing important nutrients from them or by causing life-threatening anaemia due to blood loss. Following a good deworming schedule is important for your pet’s good health – and your own. All animals as well as humans can get worms.

**Products available**

Dewormers, also called vermicides, anthelmintics or endoparasiticides, are medications used to kill worms. Anti-parasitic drugs which target both internal and external parasites are called endectocides. Some dewormers are formulated to target a specific type of worm, others are broad-spectrum dewormers. “This term implies efficacy against a wide variety of intestinal worms, including roundworms and tapeworms,” explains Dr Clint Austin of Bayer Animal Health. “By implication, this means that a broad-spectrum dewormer will contain at least two active ingredients, and sometimes more, since the active ingredients effective against roundworms are not necessarily effective against tapeworms and vice versa.”

**Deworming schedule**

**PUPPIES** – At two, four, six and eight weeks of age; then at three months and monthly up to six months.

**KITTENS** – At five to six weeks of age; then at eight weeks and monthly up to six months.

**ADULT DOGS AND CATS** – Three to four times per year, depending on the product you use. If pets are in contact with other animals or their faeces, deworm every three months.

**SOURCE:** DR H MCLEAN
Tablets and pastes were the first dewormers available to pet owners. Today this arsenal includes powders which are mixed in with food, liquids and more recently, spot-ons. “Liquids are sold in pump spray bottles where the correct volume of liquid is either dispensed directly into the animal’s mouth or is first put into a syringe and then dosed to the animal,” explains Dr Charles Gilfillan of Afrivet. “Pastes are thicker than a liquid and sold in a large syringe. The correct volume of paste is then dosed directly into the animal’s mouth.”

The ‘spot-on’ dewormers are ‘new technology’ in deworming medication and are very beneficial for deworming cats. Other developments include active ingredients that offer a safe and effective control of heartworm (not found in South Africa) and for *Spirocerca lupi*, a dangerous worm that is found here. Dogs have to be treated every month to prevent this potentially fatal parasite.

Your veterinarian can deworm your pet or you can purchase over-the-counter dewormers at your local supermarket. “The products available in the supermarket tend to contain the older deworming actives that have been around for many years whereas the veterinary products tend to contain the more modern deworming actives,” explains Dr Gilfillan. “The other difference is that pet owners who buy veterinary products will also have the technical backup from the vet and their staff at the vet clinic.”

**Development and formulation**

Like the development of a new active ingredient effective against ticks and fleas, the development of new actives for deworming products may take years to complete. An active ingredient must be identified, tested and deemed safe for the animal, as well as being effective against the parasite in question. “Only once the efficacy of the active ingredient is established are technical aspects such as cost of goods, product formulation and manufacturing costs calculated,” explains Dr Matthew Robertson of Novartis Animal Health. “If it is viable to take the product to market, this process will then be initiated if approved.”

A product may take four to nine years to reach the market. Tests and control measures must also be developed and implemented to ensure that the product is produced to the same quality standards each time it is manufactured. The development of new active ingredients is costly, but very necessary as parasites are known to build up a resistance against existing products.

---

**Rare tapeworm found in human brain**

In November 2014 a surgeon removed a rare tapeworm in the brain of a 50-year-old British man after he sought treatment for headaches, altered smell, memory difficulties and seizures. This rare species of tapeworm hails from Thailand, China, South Korea and Japan. Infection occurs after drinking contaminated water, eating uncooked frog or snake meat or using frog meat to treat open wounds.

At first the man’s symptoms baffled doctors. They noted a ring-like pattern moving about 5cm through the man’s brain in a series of scans taken over a four-year period. Surgeons decided to conduct a biopsy and found the 1cm tapeworm, which had likely been living off the fatty acids found in the brain. Only 300 previous cases of infection by this tapeworm in humans have been reported since 1953. Humans are considered a rare and accidental host.

**Sources:** The Guardian, Media 24 and Fox News
WORMS FOUND IN SOUTH AFRICA

TAPEWORMS A segmented flatworm that feeds off digested food in the small intestines of its host. Pets become infected when they ingest flea larvae that contain tapeworm eggs.

**SYMPTOMS OF INFESTATION**
Deprivation of important vitamins and minerals.

**LENGTH** Segments look like grains of rice; adult tapeworms measure 25mm to 3m. In humans tapeworms can reach 10m.

ROUNDWORMS The thin, spaghetti-like body of the roundworm is light brown or white in colour and easy to see in an infected dog’s faeces or vomit. Young animals may become infected in the womb or through their mothers’ milk. If your pet eats the faeces or the carcass of an infected animal, he may become infected.

**SYMPTOMS OF INFESTATION**
Diarrhoea or constipation, stunted growth, vomiting, dehydration and bloated belly.

**LENGTH** Very small to 10 to 15cm long.

WHIPWORMS Named for their whip-shaped body, a thick posterior end and thin anterior end, whipworms attach to the lining of the large intestine. The dog ingests whipworm eggs through infected faeces. Whipworms can be difficult to detect.

**SYMPTOMS OF INFESTATION**
Diarrhoea, anaemia and dehydration.

**LENGTH** 4.5 to 7cm.

HOOKWORMS A dangerous worm that hooks into the intestinal wall and sucks the host’s blood. Puppies and kittens may contract hookworm in the womb, but larvae may also penetrate through the skin and footpads of animals. The eggs can only be detected under a microscope.

**SYMPTOMS OF INFESTATION**
Bleeding, anaemia and diarrhoea.

**LENGTH** About 10mm.

SPIROCECA LUPI A reddish-pink nematode known as ‘the worm in the throat’ has become a serious threat in South Africa and other tropical and subtropical regions. An intermediate host, a type of dung beetle, ingests the eggs. The lifecycle will later continue in the dog, the definitive host, and takes about six months. Once ingested, the larvae penetrate the stomach wall and migrate up the arteries to the aorta where they develop further. The mature worms (about 4 to 8cm long) migrate across to the oesophagus where they mate and lay eggs, forming a nodule in the wall.

**SYMPTOMS OF INFESTATION**
Regurgitation, vomiting, nodule may become neoplastic (cancerous), and chest bleeding.

**LENGTH** 4 to 8cm.
Product registration

New deworming products which have been developed from scratch have to go through stringent testing before registration can take place. “Scientific trials have to be done and written up, animal ethics and welfare have to be taken into consideration and the tests have to abide by a protocol of strict minimum requirements, all costing a lot of money,” says Dr Glen Carlisle, a veterinarian in private practice.

The same registration process as required by products for ectoparasites are required for endoparasites. Registrations are done by the Department of Agriculture, Forestry and Fisheries (DAFF) under Act 36 of 1947.

“Look for proof of a G-registration number of pet products on the front panel of the product,” says Dr Glynn Catton, consultant veterinarian to Marltons Pets & Products. “All products that are registered for the treatment of worms have claims that they have been approved by the regulatory authority who checks on efficacy and safety.”

In order for a product to be successfully registered, companies have to provide evidence from local trials conducted in South Africa. “This repeats the work done elsewhere in the world and is to my mind totally unnecessary,” notes Dr Peter Oberem, managing director of Afrivet. “The costs of doing the work to prove efficacy against intestinal worms and the safety of the product in the target pet species are equally as expensive as doing the work on ticks and fleas. It does have a further big negative as the worms cannot be assessed and the trial protocols require the use and sacrifice of experimental

Lifecycle of the tapeworm

The adult tapeworm (*Dipylidium caninum*) lives in the small intestine of its definitive host (for our purposes - dogs and cats). It firmly attaches itself to the intestinal wall by means of suckers and a structure called the scolex. The tapeworm consists of a head and neck followed by many small tail segments that resemble grains of rice. It feeds on the partially digested food of the host, taking up nutrients through its integument or skin. New segments form at the neck area and older segments are nearer the tail. The last segment at the end of the tail is a sac of eggs called a proglottid. The sac breaks off and is passed out of the rectum with the host’s faeces or on its own. The proglottid is able to contract and expand – seemingly moving on its own. The sac dries and will later break open to release tapeworm eggs.

If your pet has a flea infestation, flea eggs will drop off the host once they are laid by the adult flea. The flea larvae (intermediate host) hatch and search for food, consuming anything from flea dirt and dust to tapeworm eggs. The tapeworm egg will hatch inside the flea larva and continue its development. By the time the flea reaches adulthood, the tapeworm cyst inside the flea will be mature. Animals with fleas will scratch or bite themselves and inevitably ingest fleas. The host’s body digests the flea, releasing the tapeworm cyst in the host’s intestine which develops into an adult tapeworm and the process begins again. Within three weeks, segments of the tapeworm will be seen in the animal’s faeces. Tapeworms are not digested in the harsh environment of the intestines as they are able to inhibit the digestive enzymes of the host.
The patent of registered products expires after a number of years and other manufacturers may then copy the original formula. “This obviously does not involve all the initial testing and trials and reduces the costs substantially, which is why generic products usually cost less,” explains Dr Carlisle. Registered generics are proven and accepted to be as effective and as safe as the older innovative product.

How dewormers work

Endoparasiticides target the adult worm. “Once the tablet is swallowed by the dog it dissolves in the stomach and intestines,” explains Dr Craig Mincher of Cipla Vet. “The active ingredient which kills roundworms does so by causing paralysis of the worm, which then is not able to maintain its grip on the intestine and the worm is passed out of the dog’s gastrointestinal system. Interestingly, the active ingredient which kills tapeworms does so by reducing the ability of the tapeworm to resist digestion by the host’s intestines. As a consequence the tapeworm is then killed by digestion and no dead worms are seen to be passed out of the dog’s system. ‘Spot-on’ products get into the blood stream through the skin and then work in a similar fashion to those given orally.”

If your pet is diagnosed with a worm infestation, always follow your veterinarian’s instructions on how to use the deworming product and adhere to recommended repeat doses.