

NEW OPPORTUNITIES IN VETERINARY PHARMACY

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If the Government accepts the recommendations of the Marsh Report that veterinary surgeons should write prescriptions for the animals under their care, owners are likely become more aware of pharmacies as a source of both advice and products. This article, therefore, aims to bring pharmacists up to date on the more common conditions suffered by pets and companion animals

Most pharmacists in the United Kingdom restrict their veterinary activities to the pet market, although there are some highly successful large farm suppliers. According to one manufacturer, the pet care market is large (see Panel 1). It was worth just under £1.5bn in 1998 and is rising by approximately £10m annually. The market for products, such as toys, collars, chews and confectionery is worth around £150m.

Until recently, over 90 per cent of certain veterinary products, (eg, companion animal anthelmintics, which alone have a market value of £10m) were sold by pet shops and supermarkets, with veterinary surgeons, agricultural merchants and pharmacies accounting for the balance.

However, since the Government commissioned a report recently on veterinary prescribing, the profile of pharmacies as a source of veterinary medicines has risen considerably. Although the investigation into veterinary surgeons' practice was initially an attempt to force down costs for farmers, medicines for companion animals were also drawn into the net. Consequently, there are opportunities for pharmacists to become more involved in the veterinary sector. This will be even more the case if the Government accepts the recommendation of the Marsh Report (*Pf*, 26 May, p700) that veterinary surgeons must issue prescriptions for items that they deem necessary to treat the animals under their care. This will make animal owners more aware of pharmacies as a source both of advice and of products.

Pharmacists are probably the only people in most high streets who are knowledgeable about parasitic life cycles and disease transmission. Information about animal medicines is available to pharmacists in

many publications on the subject or from the Royal Pharmaceutical Society (see the Resources panel on p149).

Medication for routine treatment of conditions that do not require diagnosis by a veterinary surgeon can be supplied by pharmacists, together with general advice about the choice of drugs available, frequency of treatment and the way in which resistance can be minimised (see Panel 2).

Companion and farm animals can affect human health, which gives pharmacists' involvement in pet care a whole new dimension. Such involvement could be considered as an extension of the existing counselling and information role associated with pharmaceutical care. However, provided nutrition, care, prophylactic treatment of infections and good personal hygiene are all observed correctly, health hazards arising from keeping pets can be minimised.

HEALTH BENEFITS OF PET OWNERSHIP

Keeping companion animals can be of substantial therapeutic benefit to people. As a group, pet owners are said to have lower blood pressure and lower cholesterol levels than those without pets. A 10-month

prospective study to examine the behaviour and health status of 71 adults following the acquisition of dogs or cats found that there was a highly significant reduction in minor health problems during the first month compared with a non-pet-owning group. This effect was sustained in dog owners to the end of the study.³

Another study has shown that people who suffer heart attacks are likely to make a swifter recovery if they have a pet.³ In addition, walking a dog is a compelling stimulus to patients requiring exercise, for example those needing cardiac rehabilitation and people with diabetes mellitus. Some patients have claimed that contact with animals has reduced pain levels.³

Research undertaken in this area has spawned a variety of pet therapy schemes in

Panel 1: The size of the pet population

Just over half of all households in the United Kingdom are thought to own at least one pet.

There are thought to be around 8 million cats and just under 7 million dogs in the UK.¹ However, these figures take no account of stray or feral animals. Horses, cage birds, ornamental fish and exotic pets are also popular.

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children's hospitals and nursing homes in the United States, such as Pet-a-Pet and Caring Canines. The UK is now following suit — the Children in Hospital and Animal Therapy Association (CHATA) was founded six years ago. CHATA works principally with terminally ill children in London hospitals.

HEALTH HAZARDS OF PET OWNERSHIP

Infectious animal-associated diseases (zoonoses) can be contracted from bites, scratches, saliva and inhalation of airborne agents. Zoonoses are defined by the World Health Organisation as “those diseases and infections which are naturally transmitted between vertebrate animals and man”. Companion animals can carry a variety of diseases that, if uncontrolled, can pose a risk to humans.⁴

People who work with, or who come into contact with, agricultural animals will be exposed to a wider spectrum of zoonoses than those associated with domestic pets but this range of conditions is outside the scope of this article. Although these diseases pose a risk to all humans, healthy individuals are likely to be more resistant than individuals who are considered to be in high-risk categories. Such people include animal handlers, animal welfare workers, neonates and children, the elderly and infirm, agricultural and food industry workers, pregnant women and people who are immunocompromised. The risk of zoonoses is considered to be additive across these groups of people. In other words, an individual who works in the agricultural industry, is immunocompromised and is elderly would have a high cumulative risk of contracting a zoonosis. Pharmacists have a role to play in reducing the harm from zoonotic diseases in at-risk groups. This is an important area of health promotion, in which pharmacists are uniquely placed to be effective advocates for both patients and pets.

Non-infectious disease can be caused by exposure to ectoparasites, direct contact with an animal or by contact with animals' secretions. Infectious zoonotic disease can be transmitted directly through animal bites, by arthropod vectors (especially fleas, mosquitoes and ticks), by direct physical contact with animals, indirectly through ingestion of contamination of food or environment, and through contact with contaminated hides, wool, fur or feathers.⁵

Apart from disease, humans can also be affected by involuntary contact, bites, falling off horses, tripping over small pets and direct contact with toxic secretions and venoms.

ASSESSMENT OF RISK TO HUMANS

In both primary and secondary care, pharmacists often have knowledge relating to the medication, physical condition and domestic situation of patients, especially when domiciliary visits are undertaken. The presence of a companion animal and a basic knowledge of the likely zoonotic conditions associated with the species can help

Panel 2: Legal issues associated with giving advice about pet health care

Much pet care, and some large animal care, too, is of a prophylactic nature and it is possible for pharmacists to satisfy requests for assistance without contravening the Veterinary Surgeons' Act 1966.

This Act effectively restricts the diagnosis and treatment of animal diseases to veterinary surgeons or to owners. Pharmacists are able to advise on the availability of medicines when directly asked (eg, “My dog has XYZ, what is available to treat it?”) provided the owner makes the final choice of treatment. However, pharmacists cannot suggest cures when asked (eg, “Can you tell me what's wrong with my dog and give me something to help?”). It is sometimes difficult to avoid being drawn into a conversation that unwittingly leads to a diagnosis. It is also illegal, for anyone other than a veterinary surgeon, to authorise the use of a product outside its licence.

Fish are excluded from the requirements of the Veterinary Surgeon's Act, so pharmacists are free to treat them. However, there are few licensed medicines available.²

to reduce risk (see Table 1, although this list is not exhaustive).^{6,7}

We recently heard of a situation in which such knowledge helped. An elderly woman had been treated for a prolonged period for recurrent chest infection and persistent dry cough. She became acutely ill and, on examination, was found to have a severe pulmonary infection again. It was only as the GP prepared to leave that the woman said that her cockatoo had been off-colour for a while and that the veterinary surgeon was treating it for wheeze. Serological tests showed that the woman was suffering from psittacosis, which resolved after a long course of antibiotics.

The moral of this story for pharmacists is that it is necessary to apply knowledge gained about patients' lifestyles and circumstances, and not just regard the individual as a body with an interesting condition attached to it.

HEALTH PROMOTION AND EDUCATION

In general, a companion animal that is regularly wormed, properly fed, and correctly accommodated will be less likely to harbour infection. Control of ectoparasites, regular veterinary care, domestic hygiene with the use of disinfectants, protective gloves when handling faecal matter, as well as prevention of the animal biting, licking or scratching its owner, go a long way towards reducing infection rates.^{4,8}

CATS AND DOGS

Community pharmacists are most likely to encounter infection of pets with ectoparasites (eg, fleas, ticks and lice) and endoparasites (eg, worms). Control of ectoparasites and endoparasites is important, not just for the welfare of the pet but also because they can act as vectors in the transmission of disease and thus pose a zoonotic risk. For example, cat and dog fleas can act as intermediate hosts for tapeworm, and animal-borne ticks are implicated in the spread of Lyme disease.

Ectoparasitic infection Fleas are by far the most troublesome infection, as far as most

pharmacy clients are concerned, although ticks can be a nuisance in rural areas.

Fleas have been harassing humans and animals since prehistoric times. There are about 2,000 species and they exist on every continent. Their legs are strong and adapted to leaping, which they do with great efficiency (they can jump more than 100 times their own body length). More than one species of flea can exist on an animal at any one time; for example, *Ctenocephalides felix*, *C. canis* or *Pulex irritans* (the human flea) can be dominant on a dog. Both cats and dogs can pick up fleas from rabbits, hedgehogs and squirrels, but these fleas tend to be host-specific and do not remain for long. Cat fleas are less specific than dog fleas but tend to be the only species found on cats.

Adult fleas must obtain a blood meal to become sexually mature and to reproduce. At the anterior of the body, they have two pairs of palps that allow them to feel the skin surface and two lance-like blades bearing rows of “teeth” with which they puncture the skin. Saliva is injected into the host to prevent blood from clotting and it is this saliva that causes hypersensitivity in animals.

The female flea lays up to 20 eggs at a time and 400 to 500 in a lifetime. The eggs are about 0.5mm in length and are pearly white. The creamy-yellow larvae hatch within two to 16 days.

Over 99 per cent of fleas live in animal bedding and other soft furnishings around the house. The comfortable furnishings, increased living temperatures and draught-free conditions of modern houses encourage the development of virulent strains. There is evidence that such strains are becoming increasingly resistant to common organophosphate anti-flea preparations. Even non-pet-owning households can become infected by people unwittingly transferring flea eggs to furnishings after patting a neighbour's pet.

When infection gets out of control, hungry fleas might bite pet owners and can cause a range of allergies and skin conditions (including eczema) in humans. In addition, fleas can often act as intermediaries in other endoparasitic life cycles, facilitating the transfer of worm infection from one animal

to another.

The most usual clinical symptoms of infection in animals are:

- 1 Scratching and pruritus
- 1 Alopecia
- 1 Inflammation and skin conditions brought on by hypersensitivity to flea saliva during warm weather
- 1 Excessive grooming
- 1 Visual evidence, such as fleas and flea faeces in the fur

Pet owners who seek advice from pharmacists about flea infections should be advised that cats are a major source of infection to dogs. In some cases, a cat living in the same household as a dog can provide a reservoir of fleas for the latter, but is apparently unaffected itself.

Animals should be treated according to the instructions provided with the product chosen. To obtain effective flea control, both the animal and its surrounding environment must be treated. Careful attention should be given to the animal's bedding, which might have to be destroyed to prevent reinfection.

The animal should be washed with an insecticidal shampoo to kill any fleas and to clean its coat. A topical insecticidal agent should then be applied. Sprays are the most popular form of medication, probably because they are easy to use, followed by powders. Flea collars are useful but although they provide insecticidal protection, they can cause an allergic reaction in the animal because they are in constant contact with the skin. The ingredients used in flea collars are mainly based on pyrethrum and permethrin, although some "natural" products are available (eg, oil of citronella and oil of lime). These products have become popular and a wide range of different types of natural flea collar is available, including some herbal varieties.

Some of the more common topical anti-flea products are listed in Panel 3. The list is not exhaustive — it represents brands that are widely available from pharmaceutical wholesalers in the UK. Other products are available from specialist suppliers. Care must be taken when treating nursing bitches to avoid toxicity in puppies.

Systemic treatments are restricted to veterinary prescription but can be useful when resistant strains of fleas do not respond to topical treatments.

Endoparasitic infection Endoparasitic infection is of major importance in farm animals (eg, cattle, sheep and pigs) because it has welfare implications and can lead to economic loss. In companion animals, the issue is mainly one of public health.

Worms, the most common endoparasitic infection, are specific to particular animals. The three main groups are:

- 1 Round worms (nematodes)
- 1 Tapeworms (cestodes)
- 1 Flukes (trematodes)

Many different types can infect one animal at the same time. However, in dogs and cats, it is the first two groups — roundworms and tapeworms — that are the most important and that pose a zoonotic risk to humans. Roundworms occur most commonly in puppies and kittens through pre- or postnatal infection. Tapeworms are usually acquired later in life.

Roundworms Roundworms usually have a direct life cycle, with a free-living development phase in the animal environment, a parasitic development phase and an adult phase in the host. Infection of the host generally occurs through ingestion of the larvae.

Tapeworms The most common tapeworms that exist in the UK are *Dipylidium caninum* and *Echinococcus granulosus*. Tapeworms are most common in adult dogs and cats, with about 10 per cent of animals being infected at any one time. Tapeworms require a two-host system — the developmental stages occur in an intermediate host, and the final development and adult stages occur in the definitive host. Infection is by ingestion of eggs, and transmission relates to the carnivorous eating habits of dogs and cats. Rabbits, mice, birds and large herbivores (eg, cattle and sheep) are necessary for the completion of the life cycle. Most commonly, and especially in urban family pets, the main vector of tapeworms is the flea.

Anthelmintics can be used to break the life cycle of worms, to eliminate adults from the intestine and to kill larvae in tissues. A variety of anthelmintics is available and is summarised in Panel 4, which includes those brands most usually available from pharmaceutical wholesalers.

Piperazine is usually the drug of choice for treating roundworms. The drug is well tolerated by dogs and cats and can be given to young animals, either over a period of five days or as a single dose. Adult dogs should be wormed every six months.

Lactating bitches and puppies are vital to the roundworm's life cycle and treating them can be an effective method of control. Treatment eliminates successive waves of prenatal transmission, transmammmary transfer of larvae, and ingestion of infected puppy faeces by the bitch. Bitches should be wormed with high daily doses of a broad-spectrum preparation, such as fenbendazole or mebendazole, from about days 45 to 50 of pregnancy to day 21 after whelping. This has been shown to kill migrating larvae in the bitch and to minimise transmission of infection to her puppies. To control infection adequately, the puppies should be treated at two, four, eight and 12 weeks of age. Regular dosing at three-month intervals is

TABLE 1: ZOONOSES ASSOCIATED WITH PARTICULAR COMPANION ANIMALS AND THE MAIN HUMAN AT-RISK GROUPS

Pet	Zoonosis	Main risk group
Birds	<i>Mycobacterium avium</i> complex	Immunocompromised
	Psittacosis	Immunocompromised, elderly, children
Cats	Cat scratch disease	Immunocompromised
	Hookworm	Children
	<i>Salmonella</i>	Immunocompromised, elderly
	Toxocara	Children
Dogs	Toxoplasmosis	Immunocompromised, elderly, pregnant women
	<i>Salmonella</i>	Immunocompromised, elderly
	Toxocara	Children

Panel 3: Cat and dog flea products available generally from pharmaceutical wholesalers

FLEA POWDERS AND SPRAYS

Flea powder	Cats and dogs	Bob Martin
Flea killing powder (natural)	Cats and dogs	Bob Martin
Flea powder	Dogs	Johnson's Veterinary
Flea and tick powder (permethrin)	Dogs	Johnson's Veterinary
Flea powder	Cats and dogs	Secto
Permethrin flea spray	Cats and dogs	Sherley's
Flea spray	Dogs	Bob Martin
Flea spray	Cats and dogs	Secto
Flea control kit	Cats and dogs*	Secto
Vetzyme flea spray	Cats and dogs	Seven Seas Vet
Bid Red Flea Spray	Cats and dogs	Sherley's

FLEA COLLARS

Flea collars	Cats and dogs*	Bob Martin
Natural flea collars	Cats and dogs	Bob Martin
Flea collar	Cats	Johnson's Veterinary
Flea and tick collar	Dogs	Johnson's Veterinary
Herbal flea collars	Cats and dogs*	Johnson's Veterinary
Herbal flea collar	Cats and puppies*	Secto
Reflective flea collar	Cats	Secto
Vetzyme flea collar	Cats and dogs	Seven Seas Vet
Flea collar	Cats and dogs*	Sherley's

POUR-ON AND SOLUTIONS

Flea and tick spot on	Large and small dogs*	Bob Martin
Flea spot on	Cats	Bob Martin
Flea and tick solution	Cats and dogs	Bob Martin
Herbal flea drops	Cats and dogs	Johnson's Veterinary

FLEA REPELLENTS

Flea repellent (natural)	Small cats and dogs	Bob Martin
Flea repellent spray (citrus)	Cats and dogs	Johnson's veterinary
Flea repellent shampoo	Cats and dogs*	Johnson's Veterinary

* Denotes separate versions available

recommended for the treatment of tapeworm in older animals.

Tapeworm infection is often treated with diclorophen but new drugs are being developed that offer a broader spectrum of activity.

When recommending anthelmintics to pet owners, resistance, spectrum of effectiveness, safety in young animals, dosage form (tablets, granules, powders, pastes or liquids) and cost should be considered. For maximum effectiveness at eliminating intestinal worms and preventing excretion of eggs, the correct therapeutic dose of the selected drug should be given at appropriate intervals. If uncertainty exists as to which type of helminth exists, or if both round- and tapeworms are likely to be present, dual-purpose wormers should be used.

When calculating the dose of anthelmintic to use, it is important that the manufacturer's instructions are followed carefully. These are usually based on the animal's weight, and pet owners might also require help when estimating the size of their animal.

Other types of worm Other rare sources of helminth infection in the UK include dog hookworm and dog heartworm. The heartworm (*Dirofilaris immitis*) is normally restricted to hot climates, but if environmental warming occurs in southern England, it could occur in the future.⁹

INFECTIONS OF EQUINES

With over 850,000 horses and ponies in the UK, most of which are for riding, it is understandable that equines are now considered to be companion animals or pets.

Horses harbour a wider variety of nematodes than any other domesticated animal. Thus, a worm control programme is essential, especially since many suburban horses are limited to shared grazing. Livery stables and riding schools will usually have suppliers of horse wormers already and are only likely to change if dissatisfied. However, horse and pony owners whose animals are not stabled at livery have the option of obtaining supplies of Pharmacy and Merchants List (PML) wormers from a pharmacy, a

veterinary surgeon, a merchant or a saddler. Convenient location and long opening hours are an advantage that pharmacies have over other suppliers.

Worms The principal worms that infect horses are referred to in the data sheets of anthelmintic products and are well summarised in the Royal Pharmaceutical Society's Veterinary Pharmacists' Group leaflet entitled "Ask your pharmacist for advice on worming your horse". A properly planned and recorded worm-control programme can provide comprehensive treatment. It is important to treat horses for worms because a heavy infection can affect their performance, growth and general health (thrift), and a severe infection can be fatal. In addition, worm infection can put equines under stress, making them more vulnerable to other diseases. Diarrhoea and colic can occur and require veterinary advice, although these symptoms might result from other causes.

Foals Foals are defined as young equines of either sex, aged up to one year. They usually start to eat grass when they are aged between three and four weeks and are weaned at four to six months. They are most commonly infected by large roundworms (ascarids) and threadworms, although adult equines can also be infected with these worms.

Foals can be hosts to roundworms (*Parascaris equorum*) at certain stages of the life cycle. Large roundworms can be over 30cm (12 inches) long. One female parasite can lay up to 200,000 eggs a day. These have a sticky outer coating that enables them to stick to most surfaces, including feeding bowls and stable walls. The eggs are resistant to disinfectants and can survive for years outside the horse. Foals can carry over 1,000 adult roundworms, resulting in severe ill thrift. Fenbendazole, ivermectin and oxbendazole are suitable drugs for worm control in foals.

Threadworms (*Strongyloides westeri*) only affect young foals. Infective larvae can be passed to the foal via the mare's milk and can cause diarrhoea. Foals kept in unhygienic conditions can also be infected via the skin.

Adults Large and small redworms, pinworms and lungworms are the most important endoparasites that infect adult equines.

Large redworms (*Strongylus vulgaris*) are the most serious worm infection in older horses. They are a common cause of recurring bouts of spasmodic colic, which can be debilitating and can kill an apparently healthy horse. An unwormed horse can pass up to 30 million eggs a day in faeces and these contaminate pastureland. Infective larvae develop on grass and are ingested by grazing horses. They then penetrate the gut wall of the horse and migrate to the cranial mesenteric artery, causing damage and the formation of blood clots. If these clots break off and obstruct a major artery to the gut, irreversible damage can ensue and the horse can die. Mature larvae return to the gut and

Panel 4: Cat and dog anthelmintics generally available from pharmaceutical wholesalers

ROUNDWORM ANTHELMINTICS

Roundworm tablets	Dogs and puppies (96 weeks and over)	Bob Martin
Tibs roundworm tablets	Cats and kittens (6 weeks and over)	Bob Martin
Easy wormer (roundworms)	Cats and dogs (2 months and over)*	Johnson's Veterinary
Easy worm syrup	Kittens and puppies	Johnson's Veterinary
Palatable roundworm tablets	Cats and dogs	Johnson's Veterinary
Worming cream and syrup	All	Sherley's

TAPEWORM ANTHELMINTICS

Tapeworm tablets	Dogs and puppies (6 weeks and over)	Bob Martin
Tibs tapeworm tablets	Cats and kittens (6 months and over)	Bob Martin
Easy tapewormer tablets	Cats and dogs*	Johnson's Veterinary
Flavoured tapeworm tablets	Cats and dogs	Johnson's Veterinary

DUAL ANTHELMINTICS

All-in-one wormer	Dogs and puppies*	Bob Martin
Dual wormer tablets	Dogs	Bob Martin
Tibs dual wormer tablets	Cats and kittens (6 months and over)	Bob Martin
Panacur (granules, liquid, paste, tablets)	All	Hoechst Roussel Vet
Telmin KH	Cats and dogs	Jansson-Cilag
Twin wormer tablets	Cats and dogs*	Johnson's Vet
Vetzyme combined wormer	All	Seven Seas Vet
Multiwormer	Cats and dogs and large breeds*	Sherley's
One dose wormer	Dogs and puppies*	Sherley's

* Denotes separate versions available

develop into egg-producing adults, which then attach themselves to the gut lining, causing blood loss. Early winter is the best time to treat equines for migrating large redworms with a five-day course of fenbendazole or ivermectin.

The life cycle of small redworms (cyathostomes) differs from that of large redworms. Ingested infective larvae pass to the large intestine forming nodules in the gut wall. The time taken by these larvae to develop into adults varies greatly from less than three months to much longer. Significant infection results in ill thrift, anaemia and sometimes diarrhoea alternating with constipation.

Routine anthelmintic dosing can control small and large redworms. Over 80 per cent of larvae can be removed either by use of increased doses in accordance with product data sheet guidance or by use of the routine dose for five consecutive days within an overall control programme.

Adult pinworms or seatworms (*Oxyuris equi*) live in the large intestine. The female lays cream-coloured eggs on the skin around the anus, which cause intense itching, and the animal will rub its tail area. Routine worming can control these helminths, so they are not usually a serious problem.

Lungworms (*Dictyocaulus arnfieldi*) can grow up to 6cm long. The larvae migrate to the lungs where they mature. Infection with these worms frequently causes coughing. However, cough can also be caused by bacterial or viral infections and requires veterinary attention. Up to 90 per cent of donkeys can be infected with lungworms but often do not suffer any ill effects. It is good practice, therefore, to graze horses and donkeys separately.

Formulations containing ivermectin or mebendazole are licensed for the control of lungworms.

Gastrointestinal nematodes can be controlled by treating newly acquired equines with a broad spectrum anthelmintic followed by regular dosing of all ponies, horses and donkeys at six- to eight-week intervals throughout the grazing season. During the winter, the frequency of worming can be reduced to three-monthly doses but advice given in product literature should be taken into account. Risk factors are variable and include the a tendency to graze large numbers of horses on limited areas of land in suburban areas. Reliance on anthelmintics can be reduced by frequent removal of faeces from paddocks.

It is of increasing importance to rotate

the anthelmintics used during the grazing season on an annual basis, to minimise the development of drug resistance. Here, pharmacists' knowledge can be applied to ensure that the annual rotation is based on the use of different drug groups and not just of a product name.

Pyrantel is the drug of choice for routine tapeworm treatment. It should be given twice a year and at twice the dose rate for strongyles. Table 2 summarises the drug groups of licensed parasiticides and their mode of action.

It is important that groups of horses living together should all be treated with anthelmintics at the same time. Repeated treatment at regular intervals is essential, because not all worms are killed by one treatment and animals are constantly subject to reinfection in both pasture and stable.

Overgrazing of pasture should be avoided and the level of pasture contamination reduced by removal of dung. Where possible, grazing areas should be rotated.

The dosage of anthelmintic used is given in data sheets and product leaflets and is related to the weight of the animal. Dosage by oral syringe or dosing gun is preferable to in-feed dosing because this ensures that the full dose is received by the horse. The Veterinary Pharmacists' Group leaflet "Ask your pharmacist for advice on worming your horse" provides a ready reckoner that allows the approximate weight in kilograms of a horse to be calculated from its height in hands. A hand is four inches (about 10cm) and the height of a horse is measured from the ground to the withers (the ridge between the shoulder bones).

It is important for horse owners to keep an up-to-date worming record sheet. Record sheets can be obtained from worming product manufacturers or in "Ask your pharmacist for advice on worming your horse".

Bots Bots (*Gasterophilus equi* and *G. nasalis*) are not worms; they are gadfly larvae and are an important internal parasite of horses. Gadflies are airborne between June and October and lay eggs on horses' hair, especially around the legs and belly. The horse licks the area, hatching the eggs and taking larvae into the mouth. The larvae develop in the stomach, where they remain for eight to 10 months before being expelled in dung in the spring. After pupating, the adult flies develop and lay eggs, and the cycle continues.

Bots cause pain and gastritis, and can result in mechanical obstruction of the gut. Products containing ivermectin or haloxon control bots, and grooming can remove the eggs.

Fly repellents are frequently used with horse-wormers to control gadflies. They also control stable and nuisance flies. Fly repellent preparations include citronella oil, diethyltoluamide and dimethyl phthalate and are available as gels, liquids, creams and aerosol sprays. Licensed products include Coopers Fly Repellent Plus for Horses (Schering-Plough) a pour-on preparation containing permethrin and citronellol, Deosan Deosect (Fort Dodge), a topical prepa-

TABLE 2: MODE OF ACTION AND CHEMICAL GROUP OF SOME ENDOPARASITICIDES USED IN EQUINES

Chemical group	Endoparasiticide	Mode of action
Benzimidazoles	Febantel	Disrupt metabolism of parasite by binding to proteins required for nutrient uptake
	Fenbendazole	
	Mebendazole	
	Oxibendazole	
Tetrahydropyrimidines	Pyrantel	Cholinergic stimulants that cause paralysis by interfering with nerve transmission
Avermectins	Ivermectin	Interfere with nerve transmission by opening chloride channels in the postsynaptic membrane
Organophosphates	Haloxon	Cholinesterase inhibitors that interfere with neuromuscular transmission

ration containing cypermethrin, and Switch (Day Son & Hewitt) a topical preparation containing permethrin.

Other conditions *Sweet itch* "Sweet itch" is a dermatitis that results from hypersensitivity to saliva from the bites of midges (*Culicoides* species). Susceptible horses should be housed overnight during the midge season. Benzyl benzoate lotion is licensed for use on sweet itch in horses, or Sweet Itch lotion (Day, Son & Hewitt), which is a general sale list (GSL) product and contains piperonyl butoxide and pyrethrum extract, can be used.

Most other conditions to which equines are subject are best managed by a veterinary surgeon. Cough treatments and liniments that ease muscle strain and rheumatism are available but can delay the use of more appropriate treatment. Horses' hooves require regular attention and hoof oils, together with a wide range of grooming aids, represent a large and expanding market from which some pharmacies could benefit.

It should be emphasised that the product literature for medicinal products used in animals gives precise details as to which animal species and indications the licence applies.

PIGEONS AND BEES

Few medicinal products are licensed for use in birds, fishes, rabbits, rodents, ferrets, invertebrates, amphibians, reptiles and numerous other exotic pets. This is a major handicap for all people, including veterinary surgeons, who are involved with unusual pets.

However, pigeons and bees are two species for which some important medicinal products are licensed. Guidance is given in the Veterinary Formulary for prescribing of drugs in these animals.¹⁰ Prescribing is normally undertaken by veterinary surgeons who specialise in this area of practice and who have to follow the "cascade" arrangements and the associated professional liability they entail. Cascade arrangements allow veterinary surgeons to prescribe or administer a prescription-only medicine to an animal under their care for an indication or to a species that falls outside of the marketing authorisation.¹¹

Pigeons An estimated 10 million pigeons are

kept for racing and showing in the UK, in addition to those bred for their meat. About one million birds are raced each weekend during the season (from Easter to mid-September). Pigeon fanciers (owners) are more geographically scattered than is generally realised and are not confined to former mining areas of Northern England. Many will devote much care and attention to their birds, especially champion racers or breeding stock, each of which can be worth several thousand pounds. The value of the medicines, equipment and feed market for pigeons is conservatively estimated to be in excess of £20m a year.

Diagnosis and treatment of pigeons by a veterinary surgeon is dependent upon the birds being officially under his care and requires specialist interest and knowledge. Pigeon clubs (found in the Yellow Pages) act as an important focus of knowledge and experience, because pigeon fanciers tend to be acute observers of their birds.

A typical loft will contain 30 to 100 birds and individual treatment for control of parasite infections might be neither practical nor

appropriate, so the loft is treated as a group. Most group medication is given in drinking water. The volume of water consumed daily by a bird can vary depending on the season, its clinical condition and whether it is feeding nestlings. However, a typical pigeon drinks about 50ml per day.

Pharmacists should advise pigeon fanciers that oral powders that are to be added to drinking water should be measured carefully, that galvanised drinkers (drinking water dispensers) are unsuitable for preparations containing substances such as citric acid or copper sulphate, and that unused medicated water must not be allowed to contaminate water courses, ditches or drains.

There are three pigeon parasites for which routine prevention is necessary — coccidiosis, trichomoniasis (canker), and roundworms. Several pharmacy-only (P) and GSL products are available for routine administration to pigeons, details of which are included in the Veterinary Formulary and the Veterinary Data Sheet Compendium.^{10,12}

All pigeons entered for races or shows must be vaccinated against pigeon paramyxovirus-1 (PMV-1), which is a notifiable disease. PMV-1 can cause profuse green diarrhoea, marked nervous signs and mortality, especially in young birds. It is one of a group of closely related avian viruses that cause Newcastle disease (also known as fowl pest), which is a notifiable disease of viral origin. Newcastle disease is an acute, febrile condition that can result in high death rates. Three inactivated vaccines are currently available as P medicines: Colombovac PMV, Colombovac PMV/Pox (both from Fort Dodge) and Nobivac Paramyxo (Intervet UK). A booster vaccination should be given every 12 months. Pharmacists are in a posi-

tion to supply vaccination record cards, advice to owners and information about the appropriate injection site and age for primary vaccination. Pigeon fanciers should also be warned to avoid putting their fingers anywhere near their eyes when handling live vaccine or sick birds, to avoid the risk of conjunctivitis.

Protection against pigeon pox also requires an annual vaccination using one of two P products, Colombovac PMV/Pox or Nobivac Pigeon Pox (Intervet UK). These should be given during the three months outside the racing season (30 September to 31 December).

Interested pharmacists should acquaint themselves with the pigeon "year". This includes a planned programme for the medication, vaccination and use of food supplements required by breeding birds, racing birds (old and young) and moulting birds.

Bees Bees are susceptible to viral, bacterial, protozoal, fungal and mite (acarine) infections. The few drugs that are licensed for use in bees can be administered as a powder, syrup, aerosol, in smoke or by contact with a medicated strip.

Of particular concern is *Varroa jacobsoni*, a mite that can have devastating effects on a hive. The need to control *Varroa jacobsoni* mites has increased because they have invaded the UK from mainland Europe and are spreading northwards up to Scotland. Flumethrin-impregnated strips are licensed in the UK as Bayvarol (Bayer) and have been reclassified from PML to GSL medicines, to allow concerted, collective administration by beekeepers throughout a wide area. Unfortunately, resistance to flumethrin has been reported and can be aggravated by failure to remove exhausted strips from hives. Guidance given in the manufacturer's data sheet states that the strips can be used for 24 hours for diagnosis of mites and for a maximum of six weeks for therapy. Fresh strips must be used for each treatment. Fluvalinate has now been licensed in the UK as Apistan (Vita) for treating *Varroa jacobsoni* and is an alternative to flumethrin that could reduce the development of resistance.

Various other chemical substances have been used to maintain the health of bees in a hive. Mites other than *Varroa jacobsoni* have traditionally been controlled using lactic

acid, formic acid, menthol and methyl salicylate. Wax moths and larvae can be treated with acetic acid, formaldehyde solution and paradichlorobenzene. However, these substances are not licensed for such indications.

FISH

Farming of fish for human food, for restocking angling waters or as bait is big business but pharmacists are unlikely to gain access to this market, because supply of products is restricted to a few expert outlets in certain areas of the country. It is in the treatment of ornamental fish that a realistic opportunity exists for community pharmacists to get involved, although the majority of therapies are unlicensed as medicines.

The health of fish is greatly influenced by any alterations in their aqueous surroundings. Fish slime or mucus is a vital component of the skin/water interface. It has fungicidal and bactericidal properties and any damage to it can make the fish vulnerable to skin infection. Many potential fish pathogens are a constant and natural part of the environment that under normal circumstances do not cause disease. For example, fish often carry protozoan parasites that feed mainly off surplus tissue and are kept under control by the fish's immune system. However, if there is a change in temperature or pH, this delicate balance can be disturbed. Other potential sources of disease come from new fish stocks, plants or decorations.

Stressors, such as handling, overcrowding and inappropriate mix of fish types can also contribute to ill health. Fish should be inspected regularly for differences in appearance or behaviour that might signify disease. Other ways of reducing risk are listed in Panel 5. Unusual swimming movements (eg, flicking or rubbing against solid objects), inability to maintain balance, or hiding are often signs that all is not well.

Some fish medicines are available over the counter, including anti-white spot, anti-slime and velvet, anti-fungus and finrot, as is one of the oldest and best-known chemical treatments, methylthioninium chloride (methylene blue), which is used for ectoparasitic and fungal infections. (This chemical should not be used on scaleless fish, as it is toxic to them.)

VETERINARY WOUND MANAGEMENT

Pharmacists' knowledge of modern wound dressings can contribute not only to wound recovery but to strengthening markedly professional relationships with both the veterinary surgeon and the owner.

Over the past 35 years, there has been extensive research into the management of human wounds and consequently many changes have been made.¹³ The same cannot be said about the management of animal wounds. Many veterinary surgeons still consider that wounds heal despite attention, rather than because of it.^{14,15} In addition, unless an owner is convinced by the veterinary surgeon that a new, more expensive dressing will prove to be cost-effective in the

long-term, there is no incentive to agree to change from an existing one.

Although some veterinary surgeons might be interested in new types of wound management products developed for human application, and in their possible use, after modification, for the management of wounds in animals, manufacturers see no need to improve understanding of how to apply these dressings correctly. The commercial value of an animal plays a significant part in the perceived cost-effectiveness of any new wound dressing. Most farmers send injured cattle and sheep straight to the abattoir rather than spending money on veterinary fees and materials.¹⁵ It follows that the principal areas of interest are in small animals and equines.

Wounds to animals should be assessed and treated in the same way as those of humans. However, their management can be more complicated, because there are small but significant vital sign variations to be taken into consideration when deciding upon a suitable treatment regimen in various species.

In humans, products such as vapour-permeable films, alginates, hydrocolloids, hydrogels and foams, have been developed, which contribute in different ways to the enhancement of the healing cascade. However, their application to the management of animal injuries is only just beginning to be evaluated. Fortunately, veterinary surgeons and surgical material manufacturers are becoming more aware of the vacuum in knowledge of such products and of their potential for veterinary use.

The preparation of any wound before treatment is of fundamental importance but can require the use of restraint, sedatives or, in extreme cases, general anaesthesia. Injuries can vary from those caused by surgical procedures to open perineal wounds complicated by a rectal tear and exposure of the pelvic bones. Both of these examples are likely to be contaminated initially, although it is obvious that the latter injury has a significantly greater chance of becoming infected.

Regional perineural anaesthesia is recommended for wounds of the distal extremity of the horse. Hair should be clipped from a wide area around the wound edges. Care should be taken when clipping, because hair can enter the wound and increase wound healing time by acting in the same way as any other foreign body. Hairs are difficult to remove but protecting the wound by inserting sterile, moist swabs into it or by applying KY jelly around the edge while clipping can help.

Contaminated wounds should first be thoroughly lavaged with an isotonic solution such as sodium chloride 0.9 per cent weight by volume (normal saline) or Ringer's solution. If the wound is less than three hours old, antibiotics administered in the lavage solution decrease the chance of wound infection. If the wound is more than three hours old, adding antibiotics to the lavage offers no advantage.¹⁶ All debris and necrotic, or obviously devitalised, tissue should be removed, where possible. In most instances, this means trimming ragged skin

Panel 5: Reducing the risk of disease in fish

- 1 Monitor water quality carefully
- 1 Install a filtration and heating system, if necessary
- 1 Change the water regularly (owners should be advised to wash their hands thoroughly after cleaning a fish tank)
- 1 Feed the fish with a varied and balanced diet
- 1 Choose the mix of fish species in a tank carefully

edges and subcutaneous tissue or fragmented muscle, followed by surgical debridement.

Antibiotics should be given before wound closure and, in equines, tetanus status must be assessed. Primary wound healing can be assisted by the use of appropriate non-steroidal anti-inflammatory drugs, particularly where there is any delay in closure of the wound. Bandaging with a sterile, non-adhesive dressing can give support.

In wounds of the distal limb, large tissue deficits can lead to the production of excessive granulation tissue, particularly in horses. The precise cause of this is not known but movement, lack of soft tissue covering, excessive contamination and a reduction in blood supply might be involved. The management of excessive granulation varies but can include topical steroid or antibiotic ointments, excision of the tissue or application of caustic astringent materials, such as silver nitrate.

Many wounds of the trunk and upper limbs heal well by secondary intention (granulation and wound contraction) with good cosmetic results.

Semipermeable adhesive films (eg, Tegaderm and Opsite) are now used more often to accelerate re-epithelialisation in wounds where granulation tissue is established and wound exudate is declining. Adhesive hydrocolloid dressings (eg, Granuflex, Comfeel and Tegisorb) remain *in situ* and, when applied to the rumps of horses, have been shown to decrease healing time by up to 30 per cent.

Unfortunately, "wet to dry" bandaging of veterinary wounds is still being recommended for non-surgical debridement. This procedure involves packing the wound with gauze swabs moistened with normal saline, covering this with a white open-weave bandage or gauze, and allowing it dry. When dry, the packing is removed. Sadly, this can destroy some of the regenerating healthy tissue.

Modern debriding agents such as Intrasite (Smith & Nephew Medical Ltd), Debrisan (Pharmacia & Upjohn) or Aserbine

(Forley Ltd) are designed to remove debris by establishing an osmotic gradient within the wound. This type of debridement does not damage new granulation tissue and should have more of a place in the management of animal wounds.

The presentation, packaging and available sizes of wound dressings are often inappropriate for veterinary wounds. It is to be hoped that manufacturers will, in future, produce a wider range and that there will consequently be an improvement in the management of animal wounds.

CONCLUSION

The opportunities for community pharmacists to develop their involvement in sustaining the health of companion animals are considerable and can be satisfying professionally.

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