

## WHO'S WHO OF NON-INTESTINAL WORMS?

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Worms cause a multitude of diseases in the horse. Symptoms displayed depend on where the worms are, which depends on the life cycle. Worms are not limited to the alimentary tract, although it is often involved as entry portal. Some worm species cause disease away from the gut, although most are now rare in this county. Some of the species seen in the UK will be discussed in this article.

### Lungs, liver and elsewhere

*Echinococcus granulosus equinus* is the name of a tapeworm infecting horses relatively commonly.

Tapeworms have a complex life cycle involving stages in two animal species, namely horses, the 'intermediate host', and dogs/foxes. The dog is the 'final host' and mature worms are found in their intestine; from there, segments containing eggs are released. These can survive up to 2 years on the pasture, long after all traces of the dog's droppings have gone. If they are eaten by the horse, they penetrate the intestine and travel to the liver or lung, occasionally escaping into the general circulation to develop in any part of the body. Once settled, they slowly develop into hydatid cysts over 6 to 12 months. These cysts can be up to tennis ball sized with thick fibrous walls, as shown in Fig. 1. Within the cyst, the lining buds to develop countless more intermediate worm eggs, called 'hydatid sand'. Cysts can also bud externally to form more hydatid cysts, which can migrate and develop elsewhere in the body. So from one egg, millions of further eggs slowly develop. Dogs and foxes become infected by eating infected horse meat, principally liver. The eggs within the cyst develop into adult worms within the dog's intestine. In the UK, this usually occurs when hunting horses are fed to hounds, but in Europe, offal from horse abattoirs is also a likely source.

Signs of infection in horses are rarely seen; the cysts are well tolerated and unaffected by wormers. Occasionally, development in the brain, or other parts of the body, bring clinical signs which depend on the site affected. Control of infection is largely reliant on regular worming of dogs (praziquantel) and avoiding feeding infected offal. You should be aware that other UK species of tapeworm have very similar life cycles with dogs as final host and involving cattle, sheep, pigs and human beings as intermediate host. Our meat inspectors help with avoiding infected meat, so buy good quality meat and worm your dogs!

### Lungs

*Dictyocaulus arnfieldi* is an < 8 cm nematode worm found in the lungs of horses and donkeys, hence the alternative name 'lungworm'. It causes parasitic bronchitis and is closely related to other worms causing this disease in cattle, sheep and deer. Infection is widespread in donkeys of all ages, but generally only occurs in younger horses, chiefly foals and yearlings. Unlike cattle, chronic coughing is not common. The disease in foals can present clinically as increased respiratory rate with some coughing. It is thought that the disease in horses is usually caught from sharing pastures with donkeys.

The exact life cycle of *Dictyocaulus arnfieldi* is unknown, but thought to be similar to the cattle species which is known. In the lungs, female worms lay eggs which hatch rapidly into larvae. These migrate up the windpipe, causing coughing and bronchitis, to be swallowed and passed out in the droppings. On the pasture the larvae mature, escaping the area of the droppings either by their own motility or using a species of fungus. The mature larvae are eaten, penetrate the intestine and travel back to the lungs. Here they break back into the lung to become adults. Diagnosis is straightforward in donkeys as abundant microscopic larvae are found in the droppings. Adult worms can also be seen in the lungs using a flexible endoscope. In horses, history of donkey contact or grazing is suggestive, but is usually confirmed after clinical signs of coughing have stopped after treatment. The worms are sensitive to all the main types of equine wormer.

### Skin and neck

*Onchocerca cervicalis* is a slender worm 2 to 6 cm long, typically found embedded in fibrous tissue of the ligamentum nuchae (withers and crest). They produce larvae which migrate to the skin where they are eaten by feeding midges. Infection occurs when larvae are deposited back in the skin by midges, typically over the chest, belly, and face including the eye. Soft painless lumps develop which swell, eventually diminishing again to a tiny hard calcified lump. Midges can affect extensive areas; some horses have immune reactions against the larvae causing dermatitis and swelling, as shown in Fig. 2. The larvae are killed by oral ivermectin, occasionally given with steroids to reduce inflammation. None worming drugs can kill the adult worms in neck. No-one really knows how many horses have adult worms, but one study found that it in a quarter of UK horses.

## Eye

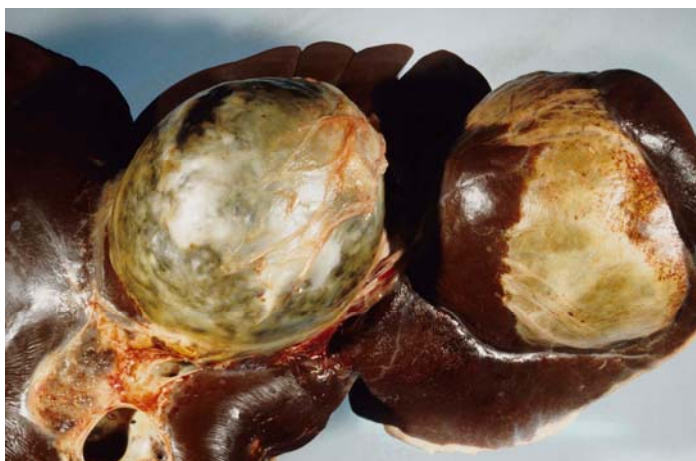
*Thelazia lacrymalis* are 1 – 2 cm long white worms living around the eye and in the tear duct. Their larvae are eaten by flies feeding at the eye, then return to the eye from the fly. Adult worms have a serrated tail which irritates the eye, resulting in tear production, conjunctivitis and corneal ulceration. Infection occurs with peak fly numbers. Worms can be seen in the conjunctiva, and treatment usually consists of worming eye drops in combination with medical treatment for any further damage to the eye itself.

*Setaria equina* resemble *Thelazia* and are found within the eye itself, causing intense irritation. They are killed by ivermectin, but surgical removal is preferable to avoid inflammation within the eye after the worm dies.

Worms have to gain entry to the body; most rely on being eaten, but a few use biting insects to gain entry. The numbers of these rarer worms are unknown in the UK, but thankfully they are unusual clinical findings. This is probably due to widespread use of worming drugs. I am very grateful to Professor Derek Knottenbelt for providing the photographs.

## FIGURE CAPTIONS

**Fig. 1.** Hydatid cysts of *Echinococcus granulosus equinus* found in the liver. Each cyst can reach the size of a tennis ball and contain millions of infectious tapeworm eggs.



**Fig. 2.** *Onchocerca cervicalis* larvae migrating in the skin of the face causing the characteristic dermatitis. Larvae are spread in the skin by feeding culicoides Midges.

