Feline lungworm infection: under diagnosed at home and abroad?

When veterinary professionals think of feline lungworm in the UK, *Aelurostrongylus abstrusus* springs to mind. Although of relatively low pathogenicity and infrequently diagnosed, this lungworm should still be considered as a differential in the coughing cat, as should *Eucoleus aerophilus*, another endemic feline lungworm. The effects of other nematodes on the respiratory systems of cats however, should also be considered. *Toxocara cati* is a ubiquitous UK nematode causing feline lung pathology and cats travelling abroad may be exposed to *Dirofilaria immitis* and the emerging *Troglostrongylus brevior*. This article considers the diagnosis, pathology, treatment and prevention of lung disease caused by these parasites.

**Key words:** cat, lungworm, bronchitis, treatment, control.

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**Introduction**

The spread of *Angiostrongylus vasorum* across the UK in recent years, alongside pharmaceutical companies having products licensed for its treatment and prevention, has led to raised awareness of this parasite among veterinarians and the public alike. What is not as frequently considered is the impact of feline lungworm on the health of UK cats. While cats are not infected with *A. vasorum*, they can be affected by the lungworms *Aelurostrongylus abstrusus* and *Eucoleus aerophilus* as well as *Toxocara cati* migration though the lungs. Pet travel is also increasing the potential for UK cats to come into contact with heartworm (*Dirofilaria immitis*) and the emerging lungworm, *Troglostrongylus brevior*. This article considers the relative risks to feline health posed by these parasites as well as the challenges they pose in terms of diagnosis, treatment and prevention.

**Endemic nematodes in the UK that may cause lung pathology in cats**

1. *Aelurostrongylus abstrusus*

*Aelurostrongylus abstrusus* has a worldwide distribution and is thought to be endemic in most European countries including the UK. It has an indirect life cycle with first stage larvae (*L1*) passing out in the faeces of cats and molluscs acting as intermediate hosts. A number of reptiles, amphibians and birds can act as paratenic hosts, making hunting cats at greater risk of infection (Traversa and Di Cesare, 2013). Adult worms live in the lung parenchyma and small bronchioles with small foci in the lung tissue, although larger foci of up to 1 cm with wider areas of consolidation can occur. Muscular hypertrophy and hyperplasia of the bronchioles, alveolar ducts and pulmonary arteries are typical pathological changes.

Although *A. abstrusus* infections are commonly of low pathogenicity and reports of fatal cases are rare, subclinical infections are more common than those causing respiratory signs. The most common clinical presentation in cats is a mild to moderate chronic cough but many other respiratory signs may also be present including sneezing, wheezing, mucopurulent nasal discharge and dyspnoea, with or without tachypnoea. These in turn may lead to lethargy, anorexia and weight loss (Traversa & Di Cesare, 2013).

Diagnosis relies upon Baermann faecal analysis (Figure 1) for the detection of *L1* larvae. In experienced hands this can be highly specific but is relatively insensitive as larvae are only shed intermittently and requires examination of fresh faecal samples over 3 consecutive days to improve sensitivity. *L1* larvae of *A. abstrusus* are typically 360–400 µm in length with a kinked s-shaped tail, dorsal and ventral incisures and a knob like projection. In cats that have travelled to continental Europe then *Troglostrongylus brevior* should be considered as a differential. *Trevior* *L1* larvae are morphologically very similar to *A. abstrusus* and distinguishing between them is a specialised task (the s-shaped tail is less kinked in *Trevior*), indeed, the wide variation in lengths reported in the length of *Trevior* *L1* larvae (300–500 µm) may be due to *A. abstrusus* *L1* larvae being misdiagnosed as *Trevior*.

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Treatment and prevention

Treatment: Fenbendazole is licensed for the treatment of *A. abstrusus* infection and is effective at 50mg/kg daily for at least 3 days although longer periods of treatment (up to 7 days) may be required. Compliance can be difficult with fenbendazole liquid and powder preparations in some cats. Eprinomectin (Broadline®) is now also licensed for the treatment of *A. abstrusus* infection (Knaus et al. 2014). A range of other spot on preparations, although off license, have been demonstrated to have 100% efficacy against the parasite (Traversa et al. 2009) including moxidectin (Advocate®), selamectin (Stronghold®), and emodepside (Profender®). This apparent susceptibility to a wide range of anthelmintics in routine prophylactic use against a range of other parasites, may explain why prevalence in domestic populations of cats remains low when compared to higher prevalence in feral cat populations. Lifestyle however is also likely to play a role in this variation. Response to treatment is excellent with reversal of pathological changes (with the exception of the muscular hypertrophy) and resolution of clinical signs.

Prevention: No anthelmintic is licensed for *A. abstrusus* prevention but it is likely that the routine use of anthelmintics for control of other nematodes such as *Toxocara cati* will be sufficient to limit the incidence of clinical aelurostrongylosis. In the case of concurrent or severe infections then attempting to limit access to paratenic and mollusc hosts by keeping cats indoors and/or using an anthelmintic spot on preparation off license monthly are likely to be effective prophylactic measures.

2. *Eucoleus aerophilus*

Canine and feline respiratory infection caused by *E. aerophilus* is sporadic across Europe and most cases are subclinical. Clinical cases in cats however, have been reported (Barrs et al. 2000, Foster et al. 2004). In Europe, the nematode is commonly found in wildlife, but recently it has been identified in companion animals including cats. Knowledge of epidemiological data (e.g. range of hosts and geographic distribution) of *E. aerophilus* in Europe is fragmentary but it would appear that cats are occasionally infected due to reservoirs of infection maintained in wildlife hosts such as foxes where prevalence can be high.

Typical clinical signs associated with infection include a cough (productive or unproductive), sneezing and dyspnoea, with or without tachypnoea and *E. aerophilus* infection should be considered as a differential in cats presenting with these signs. Diagnosis is achieved by identification of the lemon shaped, slightly asymmetrical bipolar plugged eggs by faecal flotation (Figure 2). Shedding of these eggs may be intermittent and faeces should be tested over 3 consecutive days.

Treatment and prevention

There is no product licensed for the treatment or prevention of *E. aerophilus* infection and data on efficacy of anthelmintics against the parasite is lacking. One recent study however demonstrated a spot on preparation of moxidectin (Advocate®) to have close to 100% efficacy against infection (Traversa et al. 2012). Prevention of exposure to environmental infection is difficult without keeping cats indoors but this should be considered in repeatedly infected cats or the use of monthly Advocate® preparation off license where this is not practical.

3. *Toxocara cati*

The life cycle for *T. cati* is shown in Figure 3. Infection with *T. cati* roundworms is ubiquitous, with almost all kittens and hunting cats being infected prior to anthelmintic treatment.

Although cats may be infected by ingesting embryonated eggs, the most important routes of feline infection are through transmammary infection and the consumption of paratenic hosts such as rodents.

After infection, migration through the lungs occurs and while much attention is rightly focused on the zoonotic aspects of *T. cati* infection, the role of this parasite in