



## **Chapter 9. Use of anthelmintics in specific circumstances:**

### **Pinworms (*Oxyuris equi*)**

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## **Chapter 9.1. Pinworm (*Oxyuris equi*)**

### **Overview**

Equine pinworm (*Oxyuris equi*) is a nematode (roundworm). Pinworm does not cause any significant damage to the horse's digestive tract or other internal organs. However, pinworm can sometimes cause significant irritation where the eggs are laid, resulting in distress and pruritus with rubbing, leading to extensive skin damage around the tail and buttock area. This can range from hair loss, broken skin, to secondary infections and non-healing sores.

Pinworm (*Oxyuris equi*) lifecycle:

- Horse ingests pinworm eggs from the environment (paddock, stable, fencing, equipment, etc)
- Pinworm eggs hatch in the intestine
- Immature pinworms may be less susceptible to anthelmintic treatment
- Pinworms take up to 5 months to mature to adults
- Adult female pinworms move out of the rectum to deposit eggs on the surrounding skin
- The eggs are excreted with a sticky residue, which can sometimes be seen around the anus/perianal region of infected horses. It is often yellow-orange in colour.

## Detecting pinworm

There is no validated method for the detection of pinworm in horse faeces ([Figure 1](#)).

Testing for pinworm is not possible with faecal egg counts (because the eggs are laid outside the anus on the skin), so the current best option is a 'Tape Test'. Occasionally, female pinworms will be seen in the dung of infected horses.



Figure 1. Equine pinworm excreted in faeces

How to perform the Tape Test:

- Take a 4-inch strip of clear sticky tape and press it firmly on the skin of the anus and around it
- Fold the tape in half, sticking the sticky side to the sticky side
- Place in a clean, labelled sample bag and send to an appropriate laboratory where the sample will be examined under the microscope for pinworm eggs.

## Treatment of pinworm

Treatment for pinworm is challenging and is more likely to be successful if applied promptly after initial detection of clinical signs or pinworm eggs, along with an assessment for infection in other horses that share the same fields and buildings as the pinworm-positive horse.

Fenbendazole, pyrantel, ivermectin and moxidectin are all authorised for the treatment of pinworm in horses in the UK. However, due to the potential for rapid reinfection, oral administration with anthelmintics has variable effectiveness against these parasites



and treatment must be supplemented with environmental measures to reduce infection on the premises.

[Anthelmintic resistance in pinworms](#) has been most commonly reported to ivermectin and moxidectin (Nielsen, 2022), though few studies have been conducted to assess anthelmintic effectiveness against these parasites. Based on current knowledge of those few studies that have been conducted, oral administration with either fenbendazole or pyrantel is indicated.

Washing the perianal area with warm, soapy water daily will help remove the eggs and reduce environmental contamination, and therefore reduce the risk of re-infection.

### Monitoring response to treatment and preventing reinfection

A tape test should be performed every week for a month after treatment and initiation of cleaning regimens to assess the effectiveness of treatment and the cleaning regimen applied. If eggs are detected within a month of treatment, this may suggest that the treatment has not been effective, with the potential of low anthelmintic efficacy (Reinemeyer and Nielsen, 2013).

The best way to prevent reinfection is to avoid contamination of the environment by regularly washing the perianal area with mild detergent using disposable cloths and ensure that stables and grooming equipment are regularly cleaned and are not shared between horses. The more frequent the cleaning of the perianal area is performed, the fewer eggs will drop from infected individuals and contaminate the bedding and paddocks.

#### Environmental contamination

- Pinworm eggs in the horse's environment lead to reinfection.
- Removing the eggs from the environment is essential to reducing transmission by breaking the cycle of reinfection. This can be achieved by scrubbing/high-pressure washing the eggs off the surfaces that the horse is likely to have contaminated through rubbing activity.
- Moving horses out of stables and into paddocks with electric fencing could reduce the environmental contamination until the infection is under control.

- Removal and cleaning of rugs, avoiding sharing of rugs and daily cleaning of grooming equipment with an equine-safe disinfectant will also help reduce the risk of reinfection.

## **Anthelmintic resistance in pinworm**

Ivermectin and moxidectin were originally reported to have just under 100% efficacy against pinworm adults and fourth-stage larvae, but several published reports indicate reduced effectiveness of these anthelmintics against pinworm (reviewed by Nielsen, 2022). For example, a 2009 US study reported less than 50% efficacy of ivermectin against fourth-stage pinworm larvae (Lyons et al., 2009). In a later field study, horses were treated with ivermectin, then pyrantel was administered 14 days later. In this case, adult pinworms were recovered after ivermectin treatment but were subsequently killed and detected in faeces by the use of pyrantel, suggesting reduced effectiveness to the initial ivermectin treatment (Reinemeyer, 2012). Similar results suggesting pinworm resistance to macrocyclic lactones have been observed in naturally infected horses in New Zealand which received treatment with ivermectin or abamectin which did not lead to worm expulsion, followed by a subsequent oxibendazole treatment that did result in expulsion of adult pinworms (Rock *et al.*, 2013). Several subsequent European studies have also reported suspected macrocyclic lactones resistance in pinworm (reviewed by Nielsen, 2022). In all these European studies, adult pinworms were recovered in faeces after treatment with a second class of compound. Whilst there have been no published studies on anthelmintic resistance in pinworm in the last 6 years, given the evidence of reduced effectiveness across wide geographic regions, it is likely that macrocyclic lactones resistance is a common issue in this helminth species ([Table 1](#)).

In the field, owners and veterinary surgeons often report a lack of effectiveness of other classes of anthelmintics, but there are no peer-reviewed publications that report this phenomenon for benzimidazoles or pyrantel salts. More research studies are required to investigate this.

Measuring the effectiveness of anthelmintics against pinworm is challenging and no standardised test has been described thus far. The field studies mentioned above used

a follow-up treatment with an alternative class of anthelmintic, then collected the expelled parasites in faeces. This could be a useful method in practice; however, this will not be effective if multi-drug resistance is present. Studies that rely only on pinworm egg counts alone, as determined by a tape test, should be interpreted with caution but can indicate anthelmintic effectiveness if performed daily and the perianal area is thoroughly washed after each sampling.

Table 1. Summary of published reports of anthelmintic resistance in equine pinworms worldwide (adapted from Nielson, 2022).

Country	Benzimidazoles	Pyrimidines	Macrocyclic Lactones
<b>Brazil</b> (Felippelli <i>et al.</i> , 2015)	N/A	N/A	+
<b>Czech Republic</b> (Scháňková <i>et al.</i> , 2013)	N/A	N/A	+
<b>France</b> (Sallé <i>et al.</i> , 2016)	-	-	+
<b>Germany</b> (Wolf <i>et al.</i> , 2014)	-	N/A	+
<b>New Zealand</b> (Rock <i>et al.</i> , 2013)	-	N/A	+
<b>USA</b> (Reinemeyer, 2012)	N/A	-	+

N/A	<b>Blue</b> – anthelmintic class not evaluated in this study.
-	<b>Green</b> – anthelmintic class was evaluated but resistance was not reported.
+	<b>Purple</b> – anthelmintic class was evaluated and resistance was reported.

