Author: Jacqueline B Matthews
(Reviewed by J Matthews)

Chapter 6. Reducing dependence on anthelmintics

Contents

Author: Jacqueline B Matthews
(Reviewed by J Matthews)

Overview

With increasing anthelmintic (including multi-drug) resistance, chemical options for controlling parasites in equines have become restricted. Therefore, to preserve remaining anthelmintic effectiveness, it is essential to reduce treatment frequency by applying control programmes that take account of the over-dispersed nature of intestinal helminths in their hosts, particularly in adult animals, where the majority of the burden is harboured by a small proportion of the population. This approach needs to be balanced with a requirement to minimise the risk of parasite-associated disease in susceptible individuals. Targeted approaches that use monitoring tools and other appropriate tests to direct treatments at epidemiologically relevant times of year, supported by non-chemical measures that reduce the force of infection in the environment, should be applied. Regular (interval) blanket treatments are no longer recommended as these exert a strong selection pressure for anthelmintic resistance (Pfister and van Doorn, 2018). Figure 1 highlights the basic principles of sustainable helminth control programmes, integrating the use of monitoring tools, non-chemical management strategies and knowledge of the lifecycle of key parasite species of concern for horses to reduce use of anthelmintic treatments.

Apply non-chemical management strategies (e.g. faeces removal, lower stocking densities) to reduce parasite infection pressure in the environment and break worm transmission cycles.

Use Faecal Egg Count (FEC) tests to inform the need to treat individuals shedding higher levels of eggs. Perform FEC reduction tests after treating to assess anthelmintic effectiveness.

Consider the presence of all lifecycle stages and male parasites where FEC tests cannot detect infection. Where appropriate, use other tests to assess infection levels in individuals, or if high risk apply strategic treatments.

Figure 1. Basic principles of sustainable helminth control programmes

Author: Jacqueline B Matthews
(Reviewed by J Matthews)

Chapter 6.1. Reducing infection pressure on pasture

The most effective way to mitigate parasite-associated disease is to limit the intake of infective larvae from pasture, or in the case of tapeworm, via the intermediate oribatid mite host found on pasture. Helminth control programmes should emphasise management measures that will reduce the number of parasites on pasture (Figure 2). This will lower the parasite burden in grazing horses, and, if combined with appropriate diagnostic tests, will lead to substantial reductions in anthelmintic use, which will reduce selection pressure for resistance whilst avoiding potentially pathogenic parasite burdens. Conditions will vary between premises and obtaining basic information on these parameters should always be performed as part of a general risk assessment before providing any advice on parasite control (see Chapter 1.3. A risk assessment-based approach to equine parasite control in adult horses).

Non-chemical management strategies to reduce parasite infection pressure on pasture (Figure 2):

- Regular full removal of faeces from pasture (ideally, at least twice a week)
- Lowering stocking density (ideally, at least 1-1.5 acres per horse)
- Resting pastures (for at least 6 months)
- Grazing pastures with other host species (consider liver fluke risk).

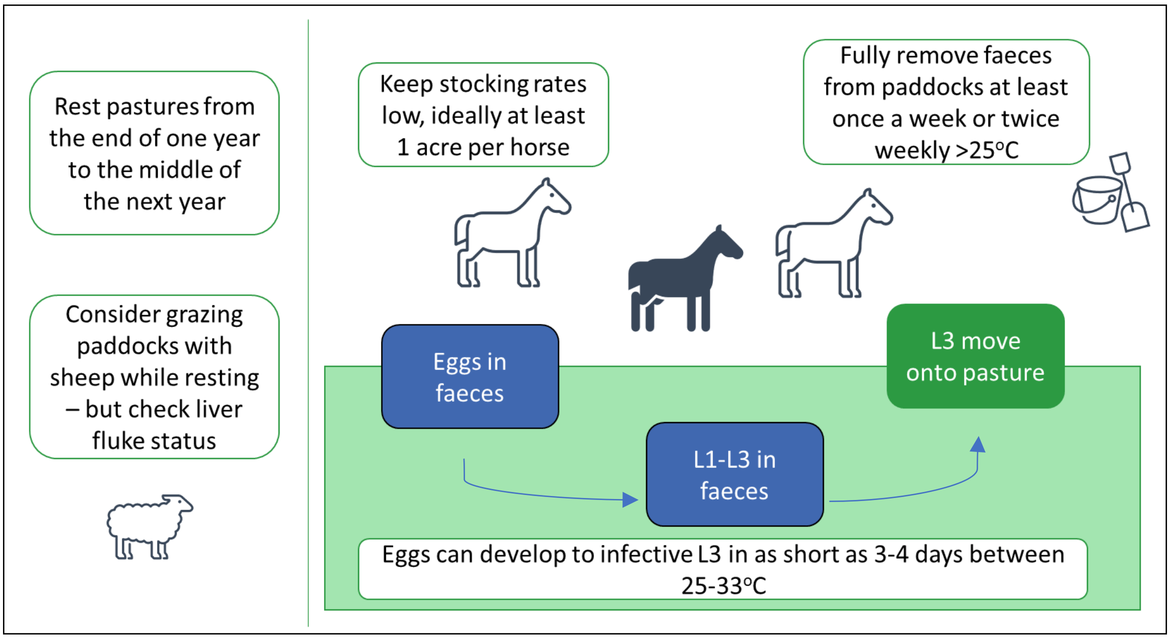

Figure 2. Management practices that can be applied to reduce parasite pressure on pasture

Regular removal of faeces from pasture

The most effective way to reduce helminth infection pressure on pasture is to remove faeces regularly (Figure 3). Herd, (1986) initially demonstrated that removing faeces from pasture twice a week afforded significant reductions in pasture infectivity, reducing reinfection potential for grazing horses. It was subsequently demonstrated that manual or automated faecal removal twice-weekly significantly reduced the number of strongyle eggs shed by donkeys compared to shedding in donkeys grazing paddocks where faeces was not removed (Corbett *et al.*, 2014). Likewise, the impact of pasture hygiene was demonstrated by Tzelos *et al.* (2017) who showed that, where faeces were removed from pasture, there were fewer FEC-positive horses and that these had significantly lower mean strongyle egg shedding after moxidectin administration compared to horses on premises where faeces were not lifted. Strongyle eggs develop to infective third stage larvae (L3) within 3-4 days at optimal temperatures (25-33°C), (Mfitilodze and Hutchinson, 1987); it is therefore recommended to fully remove faeces from pasture at least twice a week in the UK, especially in summer.

In terms of control of equine tapeworm, recent research has highlighted the seasonal dynamics of *Anoplocephala perfoliata* transmission and the critical role of the intermediate host, oribatid mites, in this process. On three equine premises in the south east of the UK, oribatid mite populations on pasture were shown to increase substantially during the spring and summer months (Wickenden *et al.*, 2015), coinciding with the main grazing period. To minimise the likelihood of mites ingesting tapeworm eggs, prompt and regular removal of faeces is essential to disrupt the parasite's life cycle and reduce environmental contamination with infective stages. In the same study, PCR analysis of mite samples revealed that, in the absence of effective dung management, 77.1% of samples collected in spring and 59% in summer tested positive for *Anoplocephala* DNA. These findings indicate that oribatid mites readily acquire tapeworm infection from contaminated pastures and that the risk of infection to grazing horses increases during these seasons. Without appropriate pasture hygiene, this heightened exposure to tapeworm infected mites can result in the accumulation of potentially pathogenic burdens by late summer, emphasising the importance of integrating environmental management with diagnostic-led treatment strategies, especially during these seasons.

Key points:

- Pasture contamination with infective larvae increases during the warmer summer months when strongyle eggs can develop to infective third stage larvae (L3) within 3-4 days under optimal temperatures (25-33°C)
- Pasture contamination with oribatid mites, including tapeworm infected mites, increases in spring and summer
- Twice-weekly poo-picking is recommended to reduce pasture contamination and prevent re-infection with parasitic larvae or with infected intermediate hosts, particularly in the summer
- Regular removal of faeces helps prevent the development of rough areas of pasture that may serve as a reservoir for parasites and also significantly increases the available grazing area.

Lowering stocking density

Maintaining a lower stocking density will impact the level of helminth contamination on pasture, with one horse/0.4-0.6 hectare (ha) of permanent grazing (i.e. 1-1.5 acres/horse) considered an appropriate stocking rate. This recommendation serves as a guide as several factors can affect the impact of stocking rate; these include, whether or not dung is removed and how frequently and effectively this is undertaken, the age, size and number of horses that graze the pasture, the amount of time that horses spend on the pasture, the season and how well the pasture is managed (Singer *et al.*, 2002). Grazing large numbers of horses on limited paddock space, particularly where faecal removal is not practised, is likely to increase the risk of helminth-associated disease. For example, a recent study (Joó *et al.*, 2022) found that strongyle egg shedding levels of horses kept at high stocking densities (i.e. >30 horses/ha) were significantly higher than in horses kept at low (i.e. 1-2 horses/ha) or at moderate (i.e. 3-10 horses/ha) densities. Recent studies have also demonstrated a relationship between stocking density and *A. perfoliata* infection as assessed by serum antibody testing (Kukurić *et al.,* 2025). In these studies, horses grazing on pastures with limited space - classified as borderline (0.17–0.3 ha/horse) or inadequate (≤0.1 ha/horse), exhibited a significantly greater risk of tapeworm infection compared with those grazing at lower stocking densities (>0.8 ha/horse). Multivariate analysis indicated that horses kept under borderline conditions were almost six times more likely to be infected (OR ≈ 6), while those grazing in inadequate conditions had an approximately eleven-fold increased risk (OR ≈ 11). These findings highlight the importance of maintaining a lower stocking density to help reduce tapeworm transmission on paddocks.

Despite the importance of stocking density of helminth control, there is lack of published data on associations between stocking density and pasture infectivity and how these relate to faecal removal; studies need to be undertaken to examine these interactions.

Key points:

- Lowering stocking density and regular poo-picking will help to reduce the level of helminth contamination on pasture
- The impact of lowering stocking density on reducing pasture contamination will also be affected by other management factors.

Resting pastures

Advice on resting pastures can be based on experimental and field observations of the epidemiology of strongyle eggs and larvae. Nielsen *et al*. (2007) reviewed experiments that examined environmental factors associated with strongyle egg and free-living larval development and survival. Laboratory-based studies (Table 1) demonstrate the more robust nature of non-embryonated strongyle eggs and L3, which are relatively resistant to the effects of frost, with the former less affected by freeze/thaw cycles. Snow cover is thought to favour L3 survival because temperatures are less likely to fluctuate below and above 0°C under snow.

Strongyle L3 deposited in one grazing season can persist until the start of the following season (Figure 3): during cool winter periods, although it is unlikely that eggs develop to L3, in very cold environments, unhatched eggs and larvae within dung have been observed to survive for months (Slocombe *et al*., 1987). UK-based field studies indicate that strongyle larvae derived from eggs laid in winter survive long enough to reach L3 (Ogbourne, 1972); in plot studies, larvae placed onto paddocks in January/February survived at a high rate until the subsequent May, although it is not known how viable the larvae were and what their capacity was to infect horses. There are no data on strongyle egg/larval development and survival in milder autumns and winters now observed regularly in the UK, and the impact of these conditions on horses that have significant grazing time during this period. One study that examined faecal egg excretion on UK Thoroughbred stud farms found that horses grazed from December to February shed relatively high levels of strongyle eggs (Relf *et al*., 2013). Further work needs to be undertaken to understand the impact of a changing climate on these stages before specific advice can be provided.

Table 1. Summary of the relative survival profile of free-living stages of strongyle worms exposed to different experimental conditions (adapted from Nielsen *et al.* 2007)

Stage of parasite	Heat[1]	Desiccation	Frost	Freeze/thaw cycles
Egg (non-embryonated)	++	ND	++	++
Egg (embryonated)	++	ND	+	-
L1	++	-	-	-
L2	++	-	-	-
L3	-	+++	+++	+

[1] temperatures in the range 30-38°C

-	Very susceptible	++	Moderately resistant	ND	No data available
+	Weakly resistant	+++	Very resistant		

Strongyle L3 are the stage most resistant to the effects of desiccation and can act as a significant reservoir of infection; however, L3 do not feed and have limited food reserves. At higher temperatures, these stages use up their energy reserves quickly and survive only a couple of days (Ogbourne, 1972), thus, when considering resting pastures in the UK, the recommendation is to rest strongyle-contaminated fields from *at least* the end of one season to mid-way through the following grazing season before re-introducing horses (Figure 3). It should be noted that even after this amount of time, contaminated pastures are not likely to be totally free of strongyle larvae; for example, one Swedish study showed that although resting pastures for one year greatly reduced the strongyle contamination level, two years of rest were required before pastures were considered parasite-free (Osterman-Lind *et al.*, 2022).

Harrowing has been proposed as a method of equine helminth control, as it is thought that this practice exposes parasite eggs and larvae to sufficient amounts of sunlight and desiccation to kill these stages. However, this practice is not recommended in the UK, where the appropriate climatic conditions are unlikely to occur. Indeed, UK field studies have shown that, in dry periods where there was faecal desiccation, L3 pasture levels were not reduced and translation of L3 from faeces was only impaired until the dung was moistened again (Ogbourne, 1972).

The most favourable environmental circumstances for helminth transmission on pasture in the UK occur from mid spring to the end of summer, so it is important to

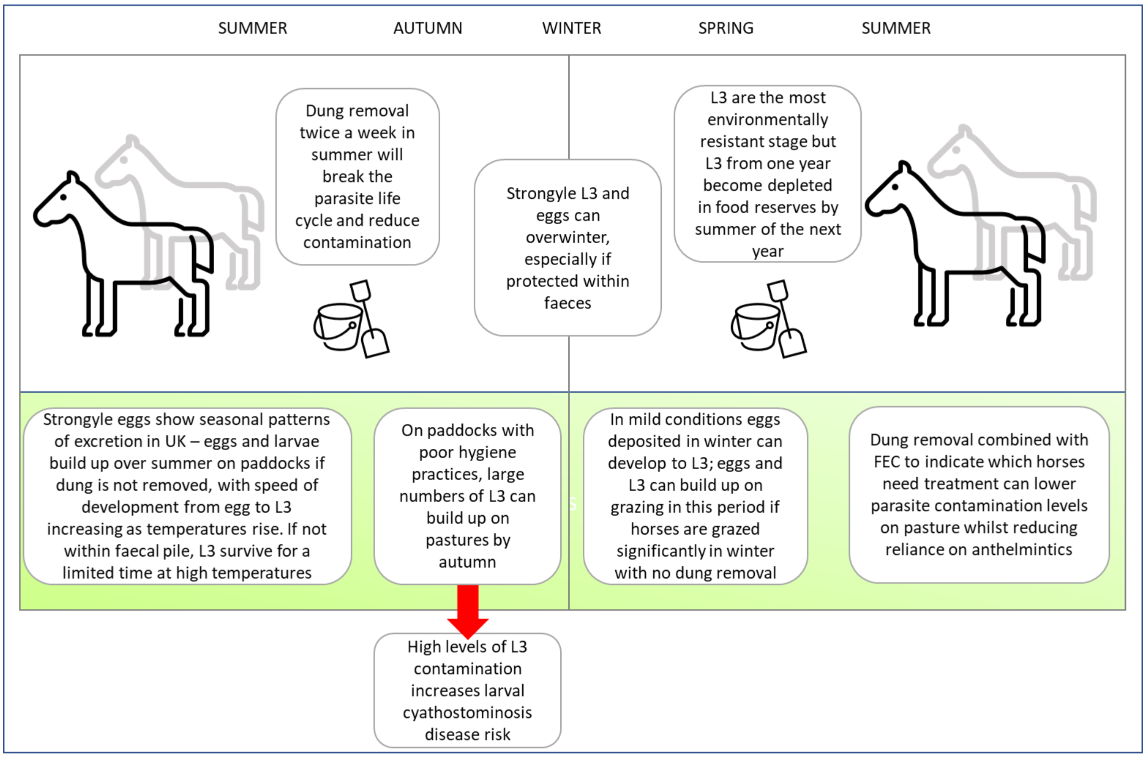

Figure 3. Basic principles of strongyle parasite transmission under UK climatic conditions

apply management practices optimally during these seasons (Figure 3). Anthelmintic treatments for nematode infections, guided by FEC testing, designed to reduce pasture contamination from higher egg shedding individuals, should focus on this higher transmission period (mid-spring to the end of summer).

As mentioned above, recent studies have shown that oribatid mite numbers and tapeworm-infected mites greatly increase on paddocks in spring and summer in the UK (Wickenden et al., 2025). As well as optimising pasture hygiene during these seasons, antibody testing for *A. perfoliata* should be implemented in spring to identify and subsequently anthelmintic treat infected horses that will increase paddock contamination with tapeworm eggs during the peak time of activity of the intermediate host.

Grazing with other host species

Alternating horses and ruminants on paddocks can be an effective method of reducing helminth contamination, as *most* parasites do not infect both host species (Figure 3). Grazing horses and sheep alternately has been shown to considerably reduce strongyle transmission when ponies on pasture pre-grazed by sheep from April-July were compared to ponies that grazed the same pasture all season (Eysker *et al*., 1986); FEC, pasture L3 counts, total worm counts and clinical parameters were lower in the pony groups that grazed pasture pre-grazed by sheep. In this study, higher burdens of the stomach worm, *Trichostrongylus axei*, which is less host-specific, were observed in ponies on paddocks previously grazed by sheep. This parasite is not considered a major pathogen in horses, but has been associated with gastritis (Leland *et al*., 1961). The liver fluke, *Fasciola hepatica,* can also complete its lifecycle in ruminants and horses. Liver fluke (*Fasciola hepatica*) is potentially pathogenic in horses (Howell *et al*., 2020), and its presence in co-grazing ruminants can pose a risk to equine health. Consequently, a risk assessment should be conducted to evaluate the likelihood of fluke infection in other grazing animals on shared or adjacent pastures. Coprological testing of ruminants is essential to identify individuals actively shedding fluke eggs, as these eggs can contaminate pastures and contribute to environmental transmission. When infected animals are detected, effective anthelmintic treatment should be administered prior to allowing horses to graze the same paddocks. Beyond treatment of individual animals, integrated pasture management plays a critical role in mitigating the risk of fluke transmission. Measures such as draining, or fencing off, wet areas where fluke intermediate snail hosts live can help reduce transmission. Monitoring seasonal trends in fluke infection, particularly during periods of high rainfall or in low-lying pastures, further informs the timing of interventions.

Key points:

- Grazing with ruminants will help to reduce the number of parasites (strongyles, ascarids and tapeworms) on pasture, as *most* parasites do not infect both host species
- Instigating specific environmental control measures and testing for liver fluke infection should be applied to horses co-grazing with ruminants, as this parasite can infect ruminants and horses.

Management considerations for *Parascaris* spp.

Parascaris spp. (ascarids) is very common on stud farms and is the most important parasite of foals and yearlings. Ascarid eggs shed in faeces are very resistant to environmental effects, with a proportion of eggs believed to survive between seasons (Nielsen, 2016b). Therefore, foals and yearlings should not be grazed on the same pastures year on year, and excellent pasture management is essential on paddocks grazed by youngstock.

Author: Jacqueline B Matthews
(Reviewed by J Matthews)

Chapter 6.2. How understanding parasite lifecycles and integrating monitoring tools and management practices can reduce anthelmintic use

Targeted treatment approaches can be applied straightforwardly in adult horses (5 years and older); however, the basic principles should apply to animals of all ages, taking into account that immunity levels and the various parasite species that are threats differ between age categories. Particularly in adult horse groups, integrating management practices with a risk assessment-based approach guided by monitoring test results and understanding of parasite lifecycles can considerably reduce the amount of anthelmintics administered.

Cyathostomins (small strongyles)

Monitoring faecal strongyle egg shedding and using effective anthelmintics to treat horses excreting moderate to high levels of eggs can greatly reduce contamination of paddocks. As a consequence, the entire grazing group will be exposed to a lower infection pressure from pasture, and if test results are used to assess which horses require treatment, this can lead to substantial reductions in anthelmintic usage compared with just treating the entire herd.

Integrating monitoring tools – cyathostomin overdispersion

Numerous studies across regions have shown that, in populations where strongyles have been managed by pasture management and/or anthelmintics, only 20-30% of horses excrete ~80% of the population's total egg contamination load at any point (Figure 4) (Flanagan *et al*., 2013; Relf *et al*., 2013; Lester *et al*., 2018; Nielsen *et al*., 2018; Joó *et al*., 2022). Notably, this pattern is not observed in groups grazing unmanaged paddocks or not receiving anthelmintic treatment, where the characteristic over-dispersed (negative binomial) distribution becomes less distinct (Wood *et al*., 2013). In such populations, a greater proportion of horses excrete moderate to high numbers of parasite eggs. This shift indicates lower control of parasite transmission dynamics, with infection becoming more uniformly distributed across the group rather than concentrated in a few high shedders. Consequently, reduced management intervention leads to greater environmental contamination, elevated pasture burdens and increased infection risk for all grazing horses.

In most managed populations, targeting treatments on the basis of strongyle egg shedding levels will lead to considerable reductions in anthelmintic use, with available evidence supporting the premise that strongyle egg shedding can be controlled long-term in groups despite leaving up to 84% of a population untreated (Lester *et al*., 2018). This approach has also been demonstrated, in some cases, to reduce the financial cost of parasite control compared to traditional interval treatment programmes that do not involve FEC testing (Lester *et al*., 2013).

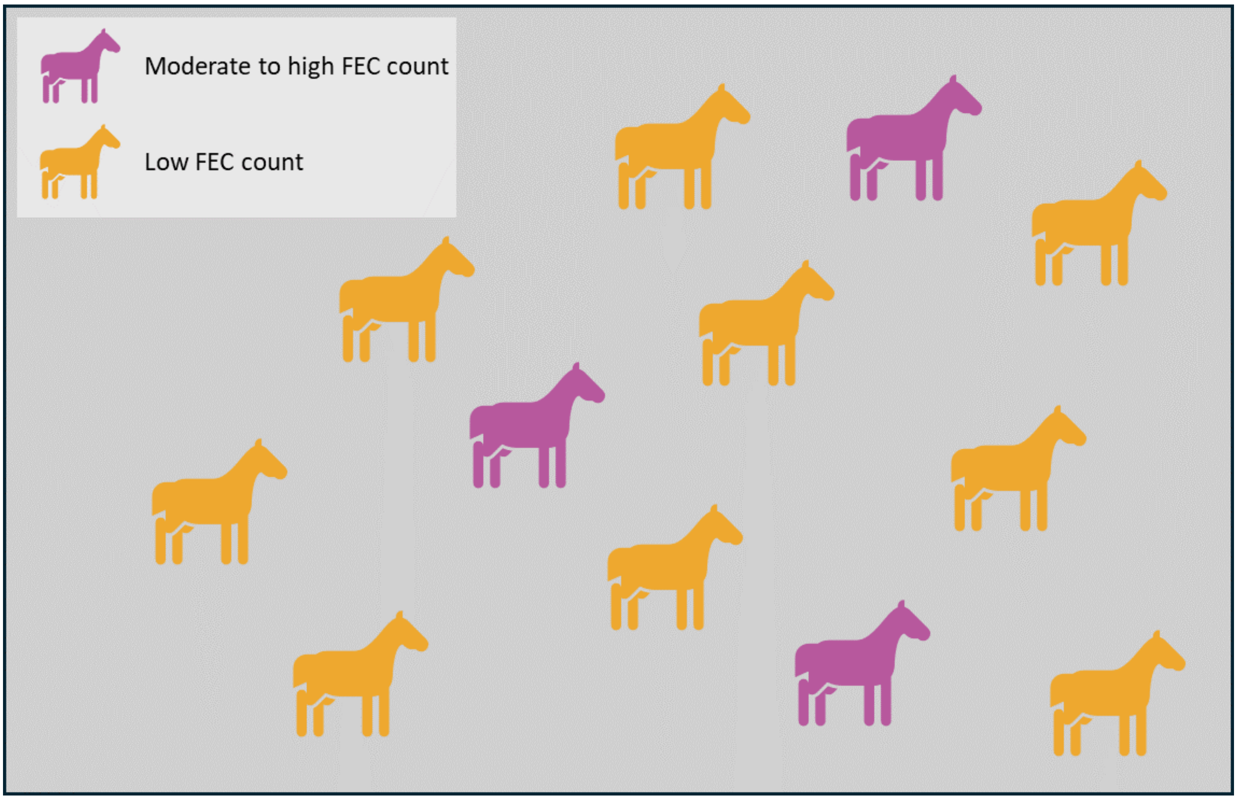

Figure 3. Cyathostomin overdispersion

Integrating monitoring tools and management practices

It is important to follow strongyle egg shedding dynamics in populations over time, rather than just applying a limited testing window to categorise horses as low, moderate or high egg shedders. This is because the probability that an individual will remain within a specific egg shedding category can be influenced by a change of field or stocking density, animal age, climatic variations (Table 2), time since last treatment and an individual's ability to control infection (for example, due to concurrent disease). FEC tests can be conducted year-round and there are no large fluctuations in the reliability of the test across seasons. The usefulness of determining FECs in the winter is dependent on the management of the horses (for example, access to grazing). Parasite control practices should be reassessed if there is high egg shedding in the winter. Consideration must also be given in winter to parasite stages that are not detected by FEC testing, most notably the encysted larvae of cyathostomins. These stages can constitute the majority of the total worm burden in individuals, particularly during the autumn and winter months (Matthews and Mair, 2025). Encysted larvae reside within the mucosa of the large intestine, and their mass emergence in late winter or early spring can trigger severe inflammatory responses, leading to larval cyathostominosis - a potentially life-threatening condition (see Chapter 1.1. Internal equine parasites & disease). Therefore, even in horses with low or negative FEC results, targeted larvicidal treatments (for high-risk individuals) or use of diagnostic testing, if required, to encourage withholding of treatment (for low-risk individuals) should be considered. In all cases, the potential benefits of intervention should be carefully weighed against the increased selection pressure for anthelmintic resistance.

Table 2. Summary of published reports of factors that influence strongyle egg shedding

Factors influencing strongyle egg shedding	
Season – FECs are most informative from spring to late summer	
July – September (Poynter, 1954)	FECs were highest
Winter (Poynter, 1954)	FECs were lowest
Spring – Summer (Duncan, 1974)	FECs increased in spring prior to plateauing in summer
Age – when undertaking a risk assessment-based approach to parasite control, the age profile of the group should always be considered	
Younger horses (1-4 years old) (Relf *et al*. 2013; Wood *et al*. 2013; Lester *et al*. 2018)	Higher FECs than horses of other ages
Adult horses (5-15 years old) (Relf *et al*. 2013)	Lowest strongyle levels within populations
Geriatric horses (20-33 years old) (Adams *et al*. 2015)	Higher FECs than adult horses

A strongyle egg shedding threshold for anthelmintic treatment of 200 eggs per gram (EPG) is commonly proposed and used in practice (Pfister and van Doorn, 2018). However, further research should be performed to assess the impact of various EPG thresholds used to inform treatment decisions in horses in various categories grazed under different conditions with different risk profiles. It is recommended for prescribers to choose a FEC threshold for treatment within the range of 200-500 EPG (see Chapter 1.2. Using monitoring tools effectively to determine the need for anthelmintic treatment, section on faecal egg counts).

Understanding the cyathostomin lifecycle to reduce anthelmintic use

The appropriate timing of anthelmintic treatments is important to target parasite lifecycle stages, such as cyathostomin mucosal larvae, that have the potential to cause disease (see Chapter 2. Selecting and using anthelmintics appropriately). Cyathostomin mucosal larvae have been identified as most abundant in horses in the UK in autumn and winter (Ogbourne, 1975). There is no published evidence to indicate whether or not strategic applications of larvicidal anthelmintics in autumn/winter reduce the risk of larval cyathostominosis, especially in light of increasing levels of anthelmintic resistance. If mucosal cyathostomins are killed in considerable numbers, this will interrupt the parasite lifecycle. However, blanket application of autumn/winter 'larvicidal' treatment to all horses is not considered necessary and may exert selection pressure for anthelmintics. For horses at grass, consideration of the biology of free-living stages is important to ensure larvicidal treatment is targeted when free-living strongyle eggs and larvae are more likely to be abundant on pasture (i.e. at the end of the grazing season (Figure 5) (Nielsen *et al.*, 2007). An approach to reduce the application frequency of larvicidal treatments is that therapy should be focused on foals, yearlings, adolescent horses and other animals for which an appropriate risk assessment indicates an increased risk of infection/disease (see Chapter 1.3. A risk assessment-based approach to equine parasite control in adult horses), and which repeatedly display high FEC (see above, Figure 4 Cyathostomin overdispersion) since these are most likely to harbour larger larval burdens (Nielsen *et al.*, 2007).

Tapeworm

The commonest cestode affecting horses, *Anoplocephala perfoliata* (tapeworm), has an indirect life cycle involving oribatid mites. These mites are ubiquitous in forage and associated soils and proliferate in environmental conditions favourable to strongylid free-living parasites, so co-infections are common. Pasture management approaches used for nematodes should thus also impact the transmission of tapeworms (Figure 5). Horses are infected with tapeworm by ingesting mites containing metacestodes (also known as cysticercoids). After a prepatent period of at least 6 weeks, adult tapeworms produce thick-shelled, irregularly-shaped eggs containing an oncosphere. Tapeworm eggs are not evenly distributed in faeces, likely due to the fact that eggs are shed within gravid proglottids that are released intermittently from adult tapeworms (Nilsson *et al.*, 1995). For this reason and the fact that tapeworm infections often comprise high proportions of immature or sterile worms which do not release eggs (Nilsson *et al.*, 1995), FEC tests have low sensitivity for detecting infection with *A. perfoliata* (Matthews *et al.*, 2023).

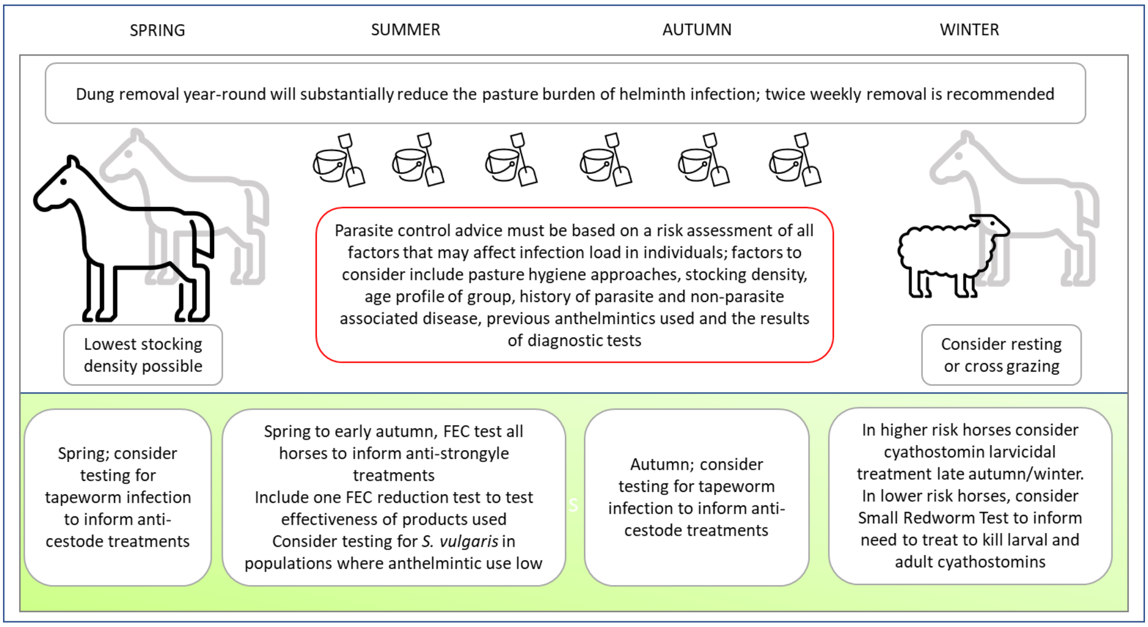

Figure 4. Summary of considerations for a management-based monitoring-led parasite control programme

Integrating monitoring tools and management practices

A large-scale study in Denmark (>11,000 coprological test observations) demonstrated no clear seasonality of *Anoplocephala* spp. egg detection, despite a higher prevalence reported in autumn, and that egg-producing *Anoplocephala* spp. were found in Danish horses year-round (Engell-Sørensen *et al.*, 2018). This study found no significant difference in *Anoplocephala* spp. detected across regions, indicating a lack of association between the prevalence of this parasite and soil type. The study did, however, identify that, in a sub-set of horses (n= approximately 1,200), prevalence of infection was highest in 1–5-year-olds, which has also been observed in other studies in Europe (Burcákova *et al.*, 2024). The fact that horses are infected with *A. perfoliata* year-round is also reflected in UK tapeworm testing data, which indicates no seasonality in the proportions of horses that test positive in the EquiSal tapeworm saliva test (Matthews *et al.*, 2024). Frequency of testing for tapeworm infection should therefore be based on assessment of infection risk in individuals or groups (see Chapter 1.3. A risk assessment-based approach to equine parasite control in adult horses). Horses grazing pasture where previous test results have demonstrated higher burdens, or where there has been tapeworm-related disease, or in groups where there are high proportions of individuals <5 years-old, should be tested spring and autumn. Horses considered at lower risk (for example, groups where previous tests indicate no/low levels of infection, no previous history of tapeworm-related disease or most animals are >5 years) can be tested in spring or autumn.

Anthelmintics licensed for the treatment of tapeworm have a short half-life, reaching negligible levels in approximately 24 hours, after which, horses can rapidly become reinfected. Thus, it is important to ensure that reinfection risk is reduced by good pasture management (Figure 5).

Oxyuris equi (equine pinworm)

The pinworm, *Oxyuris equi*, can become a persistent problem in groups of horses on some premises. This nematode has a distinct life biology, and its pre-parasitic egg stages are very persistent in the environment (see Chapter 9.1. Pinworms).

Strongylus vulgaris (large strongyle)

A possible consequence of reducing broad spectrum anthelmintic treatment frequency could be an increase in prevalence of the large strongyle, *Strongylus vulgaris* (Nielsen *et* *al*., 2012b; Hedberg-Alm, 2020). This parasite has a long pre-patent period and a high level of susceptibility to anthelmintics, especially macrocyclic lactones. The most recent UK study that examined equine faecal samples for the presence of *S. vulgaris* eggs did not detect this species (Tzelos *et al*., 2017); however, this was a limited study on a small number of yards and, going forward, annual monitoring *S. vulgaris* infection should be undertaken at premises where no or low macrocyclic lactone treatments have been applied over an extended period, especially in open herds where the risk of introducing new infections is increased (Figure 5). Monitoring can be undertaken by culturing larvae from faecal samples and discriminating large from small strongyle larvae on the basis of their intestinal cell morphology.

Considerations for foals and yearlings

Whilst cyathostomins are one of the most clinically important parasites in horses of all ages, non-strongyle nematodes should also be taken into consideration when considering anthelmintic use and parasite management approaches. Foals and yearlings are particularly susceptible to ascarids (*Parascaris* spp.) and the threadworm, *Strongyloides westeri*. These species exhibit epidemiological features distinct from those of strongyle nematodes. Information on the approaches for control and treatment of these parasites in foals and yearlings can be found in the relevant sections (see Chapter 1. Assessing the need for anthelmintic use and Chapter 2. Selecting and using anthelmintics appropriately).

Conclusions

In the last 30 years, anthelmintic resistance has been identified in cyathostomins and *Parascaris* spp. on many occasions, with anthelmintic treatment failures now being reported in *A. perfoliata* (Nielsen, 2023). The abundant nature of these parasites and the potential consequences of parasite-associated disease make preserving anthelmintic efficacy a key objective of control programmes. Traditional approaches relied on repeated anthelmintic applications to all horses in a herd, a major factor that influenced the rate at which resistance has developed. Helminth control strategies, therefore, need to substantially reduce the number of anthelmintic treatments applied to horses in all settings. Improved pasture and management practices and the use of appropriate tests to inform treatment decisions can be applied to support large reductions in anthelmintic use, particularly in adult horses. The impact that these approaches have on the prevalence and incidence of a range of helminth species does, however, need to be monitored to ensure that all recommendations align with field observations in horses managed under these regimens.