Endoparasite Control Strategies in Horses
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Introduction
Traditional methods of parasite control based upon regular de-worming were introduced by veterinarians in the 1960’s in order to prevent disease caused by Strongylus vulgaris (one of the large redworm group). Disease resulting from infection with this parasite is now exceedingly rare in the UK, however little has changed in the way in which we worm horses. This has resulted in the excessive use of wormers and as a result a number of types of worms have become resistant to the wormers we use most commonly. The most widespread resistance has occurred in the cyathostomin group (small redworms).

Methods of worming need to take into account the changing prevalence of equine parasites with small roundworms and tapeworms now being the major causes of disease. In addition, worming strategies have to take account of the fact that some groups of worms, especially cyathostomin and ascarids, may already be resistant to some wormers. Resistance is likely to increase with continued intensive use of wormers and as there are currently no plans for the introduction of new classes of wormers, strategies have to be designed around what is currently available.

Tapeworms (Anoplocephala) in faeces

Key Concepts
- Intestinal worms are the only worms likely to cause clinical disease in horses in the UK. Many different species of worms will live in the intestine of each horse. The majority of species will be members of the cyathostomin family (small redworms).
- Infection with the disease-inducing groups of worms occurs from ingestion of eggs passed in horse faeces.
- Horses are most susceptible to worm-related disease in the first few years of life. Thereafter they develop a degree of immunity to intestinal worms but never become completely resistant to them.
- Horses are designed to live with intestinal worms and the presence of a small number of parasites is not harmful and may even have beneficial effects on the immune system.
- Worming strategies should be regarded as a preventative disease measure designed to keep parasite loads at a safe level and not designed to eliminate worms altogether.
- Wormers should never be regarded as a means of responding to worm-related disease once it has occurred. Once horses develop signs of worm-related disease treatment may be too late to prevent severe intestinal damage and even death.
- Horse worms will not infect other grazing animals and vice versa
  - All horses are not infected equally. 20% of the horses in a group will carry 80% of the worms.
Testing for worms

The most widely used test for assessing levels of worm infestation is the faecal worm egg count. This is simply a count of the number of eggs in each gram of faeces. If faeces contains more than 200-500 eggs per gram then there is considered to be a large burden of adult worms worthy of treatment. Diagnosing worm-related disease in individual animals can be difficult as disease is often caused by the early stages in the life-cycle before eggs can be detected in the faeces. However, faecal worm egg counts are very helpful in assessing the degree of parasite infestation in a group of horses, in identifying problem horses that consistently have large parasite burdens and in determining the effectiveness of different wormers.

Management to reduce exposure to worms

Removal of faeces from pasture helps to reduce the need for chemical worming and is therefore of considerable benefit in any worming plan. Faeces needs to be removed from pasture at least weekly. Rotation of pasture helps to reduce the build-up of worm numbers especially if sheep and cattle are included in the rotation programme. Any worms eaten by sheep or cattle will be killed. If regular rotation is not possible then one single movement mid-summer may still be of great benefit. Stable hygiene is also important in reducing ascarid infection in foals. As it is normal for foals to eat small amounts of the mare's faeces it is important that mares are managed and wormed appropriately in the lead-up to foaling.

Pharmacological Prevention and Treatment of Worms

There are 4 classes of wormer available for use in horses:

Ascarid collected from foal faeces

Stable hygiene is frequently overlooked but is an important factor in preventing parasite infections in foals especially on premises where large numbers of foals are born in a season
Table 1. Anthelminthic products licensed for use in horses in the UK

*Macrocyclic lactones comprise two closely related classes of drug, the avermectins and milbemycin

<table>
<thead>
<tr>
<th>Class</th>
<th>Drug</th>
<th>Trade names of products with a UK licence (updated Aug 2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzimidazoles</td>
<td>Fenbendazole</td>
<td>Pancur Panacur equine guard</td>
</tr>
<tr>
<td></td>
<td>Mebendazole</td>
<td>Telmin</td>
</tr>
<tr>
<td>Tetrahydropyrimidines</td>
<td>Pyrantel salts</td>
<td>Exodus Pyratape P Strongid(-P)</td>
</tr>
<tr>
<td>Macrocyclic lactones*</td>
<td>Ivermectin</td>
<td>Animec Eqvalan Eraquell Maximec Vectin</td>
</tr>
<tr>
<td></td>
<td>Moxidectin</td>
<td>Equest</td>
</tr>
<tr>
<td>Pyrazinoisoquinolines</td>
<td>Praziquantel</td>
<td>Equitape (with ivermectin) Equest pramox (with moxidectin) Eqvalan Duo (with ivermectin)</td>
</tr>
</tbody>
</table>

2. The spectrum of activity of different anthelminthics available for use in UK.

Key

- ✔ = Known to be effective. Not all products in each class necessarily carry a licence claim for efficacy but are known to be efficacious based upon published studies.
- ✖ = Ineffective
- ★ = Resistance may render the drug ineffective

* Fenbendazole has to be used as a 5-day course to be effective against encysted small redworms

2 Pyrantel has to be administered at twice the recommended dose to treat tapeworms

Resistance

Resistance refers to the ability of a worm to survive in the face of treatment with a wormer. In practice, resistance refers to the situation where large numbers of worms survive despite the use of recommended doses of wormer. These worms then reproduce and all subsequent generations of worms will be resistant. Resistance is irreversible. The most reliable means of identifying resistance is to perform a faecal egg count reduction test. This involves checking the numbers of worm eggs in faeces before and after administration of a wormer. A reduction in egg numbers of less than 90-95% indicates resistance.

Treatment Strategies

Considerations when developing treatment strategies:

- Aim to minimise the frequency of worming. Every time wormers are administered a selection pressure is placed on the worms exposed to the drug such that only the resistant worms are left behind to reproduce. Therefore, the more frequently wormers are administered, the more rapidly resistance develops. This effect is
particularly pronounced if wormers are administered more frequently than the recommended treatment interval (see below).

- Do not aim to eliminate worms altogether. This will not only prove impossible but the presence of normal worms in a population is beneficial as it reduces the proportion of resistant worms. The more normal worms there are in a population the less likely it is that subsequent generations of worms will be resistant. It is therefore desirable that a proportion of worms in the population are not exposed to wormers - this concept is often termed refugia and reduces selection pressure. A careful balance has to be struck between leaving enough worms in the environment to prevent resistance and keeping worm numbers low enough to prevent disease.

- The use of multiple different wormers in the same year increases the risk of resistance developing. Whilst more than one type of wormer may have to be used each year to kill different types of worms this should be strategic and kept to a minimum.

- The class of wormer used through the grazing season should be rotated on an annual basis.

- Consideration should be given to monitoring for resistance to different classes of wormers by performing faecal egg count reduction tests ideally on an annual basis.

- New horses should be treated (preferably with moxidectin and praziquantel) and then quarantined to remove worms and prevent shedding of potentially resistant worms onto the new pasture.

- Avoid under-dosing. Visual estimation of horses' weight is frequently inaccurate and weigh-tapes should be used to estimate horses' weight. If in doubt, over-estimate as under-dosing allows partially resistant worms to survive increasing resistance in the worm population.

- Avoid the illegitimate use of preparations for other species. Although similar drugs are available for use in sheep and cattle (and may be cheaper) they do not work in the same manner in horses and have been shown to contribute to the development of resistance because they are only partially effective.

Furthermore, injection of wormers designed for use in sheep and cattle has been associated with severe, and sometimes fatal, reactions in horses.

Worming strategies have to be designed around management factors on the farm such as stocking density and whether faeces is regularly removed from pasture

There are 3 recognised treatment strategies:

- 1.Interval dosing

Interval dosing is the traditional means of worming with the wormer being administered at regular intervals according to the normal worm egg reappearance period for each drug. For pyrantel this is 4 weeks, the benzimidazoles 4-6 weeks, ivermectin 6-8 weeks and moxidectin 13 weeks. It is important that all animals are wormed at the same time. It is this system of worming that has resulted in widespread resistance due to the constant selection pressure on worm populations. However, in situations where horses are constantly moving on or off a property or where there are large numbers of young horses it may be the most practical strategy. Every effort should be made to reduce the intervals at which wormers are administered.

- 2.Strategic dosing

All horses are dosed at strategic points in the grazing season (usually once or twice) based upon consideration of likely worm burdens.Timing will be influenced by factors such as climate and careful consideration needs to be given to all factors that influence the likely level of infection. Additional dosing may be administered at strategic intervals to remove worms such as tapeworms that are not susceptible to the wormer used during the grazing
season. This system is more suitable for settled populations of horses where the level of pasture contamination, and risk of infection, can be better estimated. This is a very good means of reducing the use of wormers, and hence resistance, but requires more attention to detail than interval dosing. It is particularly appealing when the population is settled and comprises mainly adult horses known to carry low worm burdens. The financial savings with reduced use of wormers can be considerable.

3. Targetted dosing

Horses are only treated when it has been demonstrated that they carry a large worm burden. Through the grazing season this involves performing regular faecal worm egg counts on all animals and treating animals with an egg count above a pre-determined level. This level is normally between 200 and 500. Blood tests are performed once or twice yearly and any horses that have antibodies to tapeworms (which indicates that they have been exposed to tapeworms within the last 3-4 months) are treated with a wormer effective against tapeworms. This system is only suitable for adult horses where the population is settled. It also requires a commitment on behalf of the manager to be diligent in collecting faecal samples and paying for blood samples. However, in well managed systems the costs of testing are generally less than the costs of treating on an interval dosing strategy.

The ages of animals will influence any worming strategy

Frequently a system that lies between strategic and targeted dosing is performed under veterinary guidance whereby some doses of wormer are administered at strategic points in the year and this is supplemented through the grazing season by faecal worm egg counts to guide use of wormer through the highest risk periods.

Worming Foals

Moxidectin is not licensed for use in foals under 4 months of age. Other products are generally considered safe in foals of over 1-2 months of age and some carry safety claims down to 2 weeks of age. It is worth checking the label for each product to ensure safety in young foals. Accuracy of dosing in young foals is especially important as they are more sensitive to toxic side-effects of overdosing. In most foals on well managed premises worming should not be necessary until a few months of age, however this will depend on when in the year they are born and on the level of pasture contamination. On premises with endemic ascarid or strongyloides, worming may need to be performed within the first few weeks of life and be continued on a regular basis.
The consequences of inappropriate worming strategies may be severe. This horse had been wormed regularly, but inappropriately and developed a severe and potentially life-threatening infestation.