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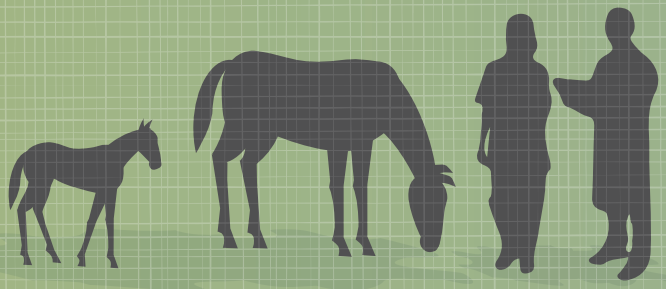

ANTIMICROBIAL AND ANTHELMINTIC STEWARDSHIP

Chair: Veronica Roberts

LIVE STREAM ▶

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Anthelmintic resistance – do we really need to worry?

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Anthelmintic resistance is widespread in equine gastrointestinal parasites that infect managed equine populations across the world. New equine anthelmintic products with new modes of action have not been introduced since the launch of ivermectin in the early 1980s and no new anthelmintic drug classes are in sight for the foreseeable future. This is concerning since several of the equine parasites possess substantial pathogenic potential and it is of utmost importance to maintain efficacious drugs to prevent and address clinical parasitism.

Cyathostomins

Over the past five decades anthelmintic resistance has been widely and increasingly documented in cyathostomin parasites. Virtually all grazing horses are infected with parasites belonging to the cyathostomin species complex, so the parasite population is exposed to anthelmintics virtually every time a horse is treated. Resistance to benzimidazole products is widespread on all continents, and levels have risen to a stage where resistance should be the expected finding until testing might prove otherwise. Similarly, in recent decades, resistance to pyrantel salts (pamoate, embonate, and tartrate) have been documented at increasing levels as well, and appears to be approaching benzimidazole resistance levels – especially in North America. Most recently, evidence is suggesting developing resistance to the macrocyclic lactone drug class (ivermectin and moxidectin) as well. The growing body of evidence illustrates shortened egg reappearance periods (ERP), which are defined as the number of weeks elapsed from the day of treatment until strongyle eggs are found in the faecal samples again. In the large majority of cases, both ivermectin and moxidectin still reduce strongyle egg counts to 0 at 14 days post treatment, but eggs are re-emerging as soon as 4–5 weeks post treatment. This is a dramatic reduction from the 9–13 and 16–24 weeks of ERP initially reported for ivermectin and moxidectin, respectively. Recent work has suggested that these findings are due to resistance occurring at the luminal L4 stage of the parasites. A proportion of these immature stages survives treatment and quickly develops into egg-shedding adults, which shortens the ERP substantially. Recent reports have documented full-fledged ivermectin and moxidectin resistance in cyathostomin populations in Ireland, USA and Australia, and careful monitoring of resistance to macrocyclic lactones is strongly encouraged in managed horse populations across the world.

To complete the picture, two studies have documented resistance in encysted cyathostomin larvae to the larvicidal regimen of fenbendazole, which consists of a 10 mg/kg dose administered daily for five consecutive days. The same two studies also evaluated the larvicidal efficacy of moxidectin and found it to remain at around 75%, which is consistent with findings in efficacy studies conducted at the time of product launch in the 1990s. Thus, moxidectin is now the recommended drug of choice for larvicidal efficacy against cyathostomin populations with resistance to benzimidazole products. As mentioned above, benzimidazole resistance is now the norm in equine cyathostomin populations across the world, so the larvicidal fenbendazole regimen is unlikely to be an appropriate choice in many cases.

Parascaris spp.

Since the early 2000s, *Parascaris* spp. parasites have been reported increasingly resistant to macrocyclic lactone anthelmintics around the world. Similar to the situation with the cyathostomins and benzimidazoles, ivermectin resistance should now be considered the expected finding in *Parascaris* spp. until efficacy testing might prove otherwise. Most recently, case reports from Sweden, Finland, Iceland, Australia and the USA have suggested sporadic resistance to both benzimidazoles and pyrantel salts as well, but it is currently unknown how common these occurrences are.

Resistance in other equine parasites

Mounting evidence suggests worldwide ivermectin resistance in the equine pinworm, *Oxyuris equi*, with reports from several different countries on four different continents. While none of the published reports evaluated the efficacy of moxidectin against this parasite, it must be assumed that it does not work either as it belongs to the same drug class as ivermectin. Veterinary practitioners often report apparent treatment failure of other anthelmintic drug classes as well, but these observations have not been scientifically confirmed at this point.

The equine stomach worm, *Habronema* spp., gives rise to equine summer sores, caused by larvae deposited in wounds by the fly vectors. Many veterinarians report treatment failure of various anthelmintic formulations using a variety of modes of administration, but none of these observations have been scientifically confirmed either. Interpretation of these observations is complicated by the fact that no anthelmintic formulation has a label claim for treating *Habronema* larvae present in wounds, so there are no baseline efficacies to compare to. Furthermore, anthelmintics may not penetrate the granulomas developing around the wound-dwelling larvae, so the observed treatment failures may not necessarily reflect resistance.