Catherine Lane FdSc REVN

Catherine graduated from Hartpury College in 2012 after studying for the Equine Veterinary Nursing Science degree. She works at Western Counties Equine Hospital, Devon, where she has recently taken the position of Head Nurse. She is currently working towards the Higher Education Clinical Veterinary Nursing Diploma at Myerscough College.

The veterinary nurse's role in implementing targeted strategic worming for horses

Catherine Lane **FdSc REVN Western Counties Equine Hospital, Culmstock, Cullompton, Devon, EX15 3LA. UK**

ABSTRACT: Veterinary Nurses (RVNs) should emphasise four key elements to horse owners to promote strategic worming. These include: good pasture management, monitoring of parasite burden by faecal worm egg counts (FWECs) every three months, tapeworm ELISAs at the end of the grazing season and the use of anthelmintics if required.

Good pasture management

There are a number of ways in which RVNs can help clients to reduce worm burden in their horses:

- Removal of faeces from the pasture; this breaks the lifecycle of most internal parasites.
- The land can also be chain harrowed as this will spread any remaining faeces and expose eggs to the air leading to desiccation thus rendering them sterile. However, in damper seasons, the eggs may survive, and therefore faeces should be removed prior to harrowing.
- Horses can be rotated between paddocks, so the land has time to rest.
- Mixed-species grazing, such as grazing horses with cattle or sheep, has been shown to reduce the environmental egg burden of the pasture, as the animals will graze the areas of forage around the equine faeces, thus ingesting parasitic eggs and larvae. As the parasites are species specific, these eggs and larvae cannot complete their life cycle in abnormal hosts and therefore die (Beardsworth, 2008).

Faecal worm egg counts

Performing regular faecal worm egg counts (FWECs) is fundamental to evidence-based worm control in horses. Mixed practices with equine clientele as well as equine practices can offer this service to their clients to encourage strategic worming programmes, thereby reducing resistance to anthelmintic treatments in horses. Given the alarming advance of anthelmintic resistance in equine parasites, especially the cyathostomins, there is an urgent need for veterinary nurses to promote faecal worm egg counts to their clients (Snalune, 2008).

FWECs are inexpensive and straightforward to perform, the technique only takes around 5–10 minutes. The number of nematode eggs in a faecal sample is counted; this represents the roundworm burden of the horse. Cestode eggs do not show up on a standard test and require a blood ELISA test to detect antibody levels (Shepherd, 2011).

Clients may be reluctant to request FWECs, as the initial cost of multiple tests, which will give a more accurate result than a single test, could exceed the anthelmintic treatment itself. Although this isn't always the case: a recent cost-comparison analysis of target treatment protocols in horses identified that anthelmintic use based on the results of FWECs was reduced by 82%, which on average could lead to a saving of £294/yard/year when compared to a typical interval-treatment programme. This is of course dependant upon the number of horses in the yard. RVNs are well placed to advise on the benefits of using regular FWECs to

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support a strategic worming programme which is cost effective in addition to having ethical and environmental benefits (Rendell, 2013; Lester & Matthews, 2014). These benefits include the early indication of the presence of a worm burden prompting treatment and prevention of potential further problems such as colic. Additionally, an effective strategy can help to reduce unnecessary anthelmintic treatment where individuals have a low worm burden, which will help to reduce anthelmintic resistance.

The results of FWECs are most useful when all horses in the population are tested together so RVNs should try to encourage the client to adopt this approach. This is because only a relatively small number of horses are responsible for shedding the majority of nematode eggs into the environment. Approximately 80% of strongyle eggs are shed by around 20% of the total population in a group of horses sharing the same pasture (Lester & Matthews, 2014).

The results will provide an indication of which horses are contaminating the pasture and to what extent. However, they are of little value during the winter when horses have limited or no grazing and nematode egg production is negligible, as eggs will only hatch in temperatures of above 8° and development from egg to larva is impaired in cold weather. It is important to note that there can also be a wide variation in egg counts within a single horse from day-to-day. To counteract this, repeated samples should ideally be taken over three consecutive days and the results averaged, (Morgan, 2008).

Strongyle eggs are not evenly distributed in equine faeces. To get most accurate results, at least three faecal balls should be collected at random from the horse's dung sample to ensure a representative sample. These samples should be mixed thoroughly prior to analysis to prevent clumping of eggs (Lester & Matthews, 2014).

Carrying out an FWEC using the McMaster method

Equipment required (Figure 1)

- microscope
- McMasters slide **(Figure 2)**
- 42 ml saturated sodium chloride solution
- electronic scales
- 50 ml syringe
- 1 receptacle containing at least 8 plastic beads
- 1 empty receptacle
- tea strainer
- disposable Pasteur pipette
- latex gloves

McMaster method

The quantitative McMaster method works by the principle of flotation and is the most widely used test for estimating the numbers of strongyle eggs in an equine faecal sample.

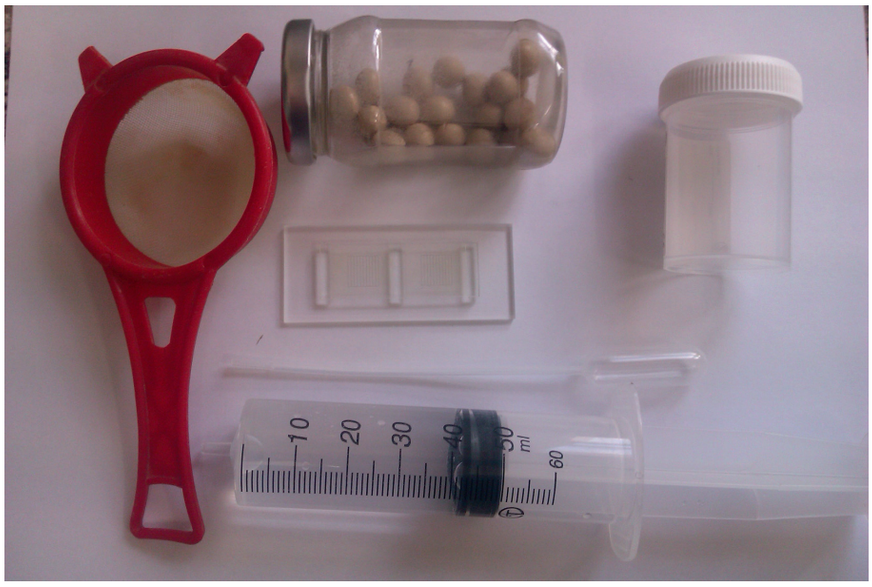

Figure 1. Equipment required for faecal worm egg counts using the McMaster method

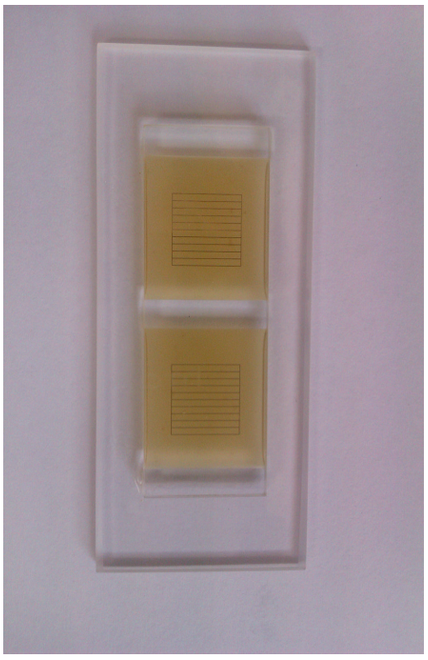

Figure 2. A McMaster slide with sample in place

1. The sample collected must be from freshly voided faeces (a maximum of 12 hours old) in order to minimise the development of any eggs.
2. Collect at least three faecal balls at random from the selected dung sample
3. The sample should be placed in a zip-lock bag, all the air should be expelled before sealing and the sample should be kept below 8°C (egg hatching is an aerobic process which doesn't occur below 8°C).
4. Mix faecal balls thoroughly.
5. Add 42 ml of sodium chloride (NaCl) solution, which is the flotation medium. The solution should be made by adding around 400 g of NaCl to 1000 ml of water, which will give the solution a specific gravity of around 1.2.
6. Add 3 g of the mixed faeces to 42 ml of NaCl solution and shake with the addition of a number of small beads to aid in the breakdown of the faeces.
7. Strain the sample through a fine-meshed tea strainer to filter the mixture and remove debris.
8. The filtrate should be retained and the faecal matter should be discarded into clinical waste.

9. This filtrate should be homogenised by stirring thoroughly to evenly mix the eggs throughout the sample, otherwise they will be concentrated on the surface layer, and if this is used for estimation relatively more eggs will be placed on the slide, giving an overestimation of the number of eggs per gram; this is a common error in practice.
10. Pipette the filtrate into a two-chamber McMasters slide using a Pasteur pipette
11. Place the slide on the microscope stage, observe under a x10 objective lens and allow 2–3 minutes for the eggs to float to the surface of the slide (**Figure 3**).
12. Examine the slide counting the strongyle eggs (**Figure 4**) Tapeworm eggs (**Figure 5**) and Ascarid eggs (**Figure 6**) present in both chambers. Ignore any outside the marked grids, (**Figure 7**).
13. Multiply the number counted by 50 to give the number of eggs per gram (EPG).

FWECs are useful for monitoring the efficacy of a worm-control programme and detecting resistance to anthelmintic treatments; however, FWECs have their limitations, which include:

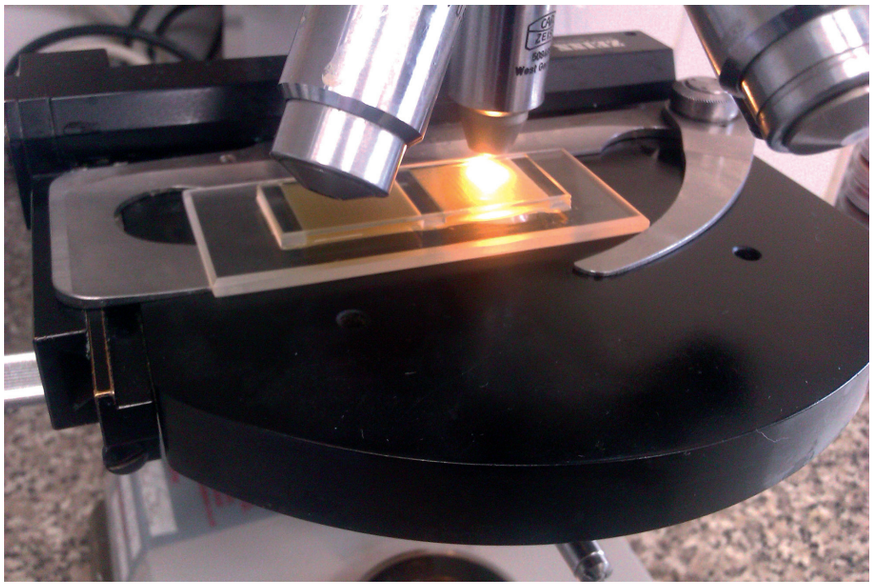

Figure 3. Microscope with McMaster slide in position

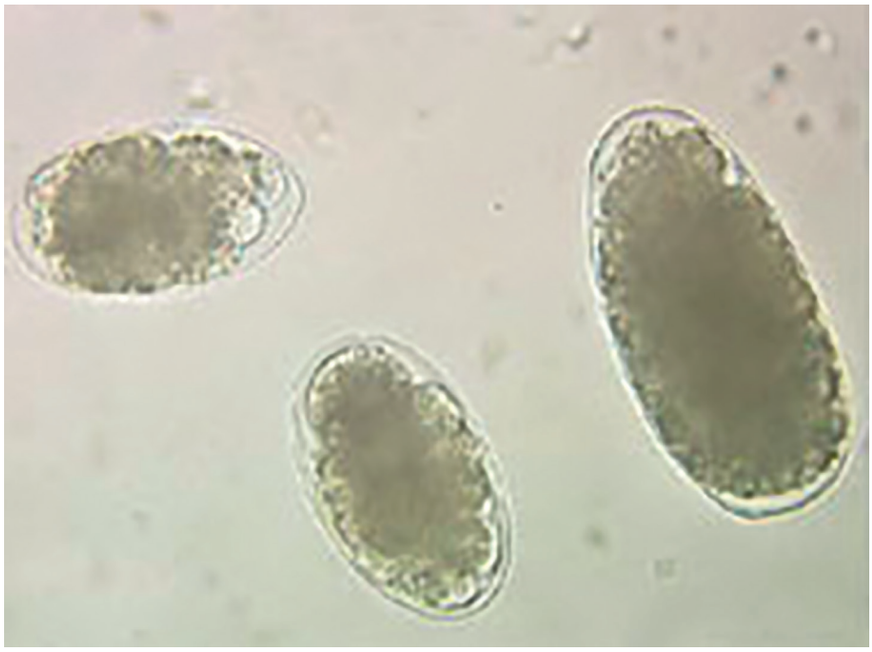

Figure 4. Strongyles egg

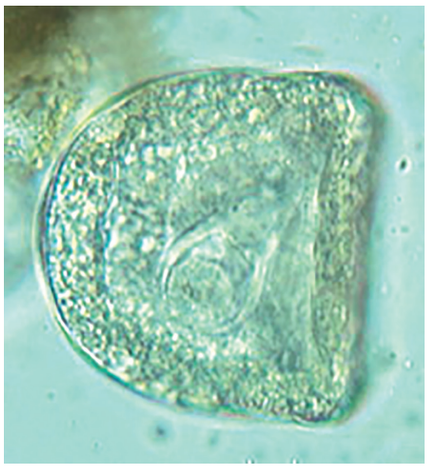

Figure 5. Tapeworm egg

- Eggs are only produced by mature adult females, so an FWEC does not allow identification of larval burdens or male worms and therefore does not measure the actual parasite burden, but only the number of mature females.
- Recent anthelmintic treatments will reduce EPG therefore repeat FWECs should not be repeated until at least 4 weeks after treatment with pyrantel, 8 weeks after ivermectin and 12 weeks following moxidectin treatment.
- Egg production may be suppressed by host immunity in older animals which may therefore have lower egg counts even if they have the same level of infection as a younger animal that has not yet developed a level of immunity.
- Encysted stages of strongyle parasites are not detected.
- Some nematode species only produce eggs periodically, so eggs might not always be present in faeces.

No eggs will be present if the initial infection is within the pre-patent period. That is the period between infection of the host and the earliest time at which the eggs or larvae can be recovered from faeces.

Promoting FWECs

To promote FWECs to clients, consider discussing the potential benefits of producing FWEC collection kits to facilitate sample collection and processing with the practice manager. These kits could be subsidised or even free to the

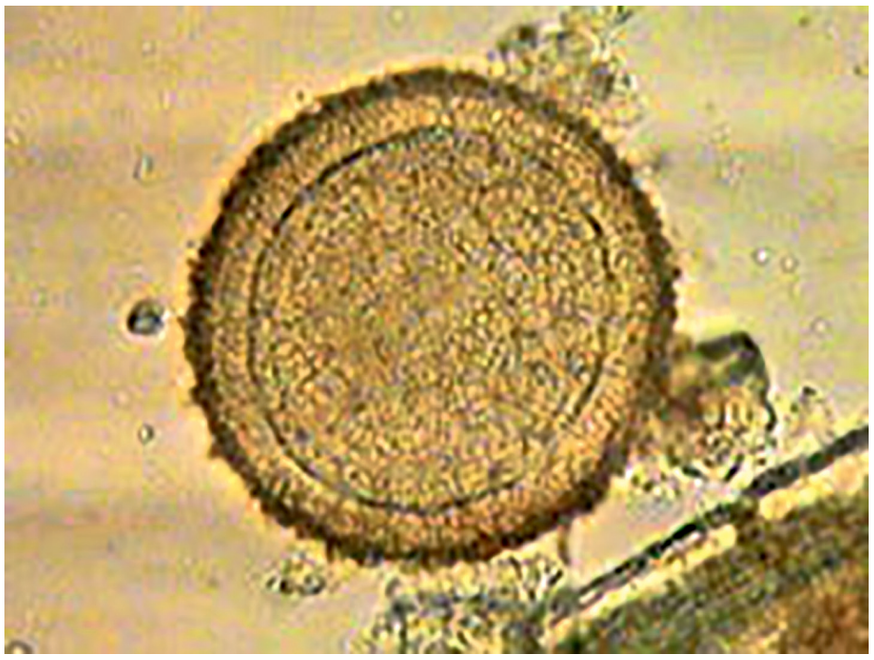

Figure 6. Ascarid egg

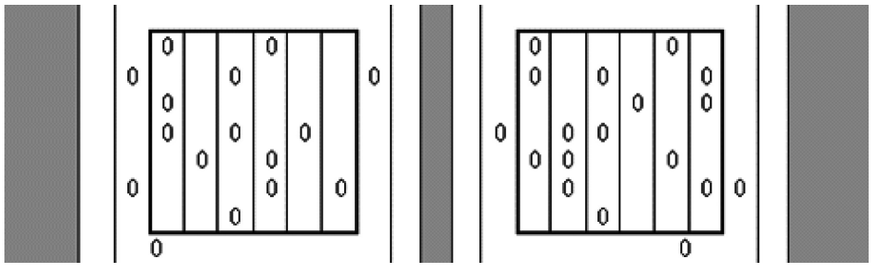

Figure 7. Counting eggs, ignore the eggs outside the grids

owner, depending upon the business plan of the practice, and would include a plastic zip-lock bag with a white label on which the owner can write the horse's name, their surname and date. Also included should be instructions explaining how to collect the sample, also consider including a return postage envelope which complies with UN No 3373, so the clients can post it back to the practice if they cannot deliver in person. These kits have multiple advantages in practice, the results of the FWECs can be reported to the client within 24 hours of the arrival of the sample and can also include interpretation and a suitable worming plan if required.

Worming plans

There is no one plan that will suit all patients and the RVN can play an important role in advising the owner in this respect. Looking at a patient holistically, factors such as the concentration of horses on the available pasture, the horses' movement between different pastures, the age of the horse(s), prevailing weather conditions and pasture hygiene should all be taken into account when formulating a worming plan.

Where adult horses are kept in relatively stable groups, this type of plan may be adapted:

- Consider FWECs at the start of each year to check individual status and the potential benefits of worming.
- FWECs to be performed in early spring or after the egg reappearance period of any previous anthelmintic treatment has expired (4 weeks for pyrantel, 8 weeks for ivermectin, 12 weeks for moxidectin); ideally all horses in the group should be tested at the same time.
- Treat horses with a FWEC of greater than 200-500 EPG using either ivermectin or pyrantel.
- Repeat FWECs 2–3 months after the previous test or administration of anthelmintic.
- Consider a tapeworm ELISA to measure the levels of antibodies to the tapeworm *Anoplocephala perfoliata* at the end of the grazing season.
- Consider whether or not treatment for encysted cyathostomins and/or tapeworm is necessary at the end of the grazing season.

Conclusion

The RVN can have an active role in advising and implementing strategic worming programmes for equine patients by using FWECs, good pasture management, and appropriate anthelmintic treatment. This will assist with the early indication of worm burdens, which could prompt early treatment and prevent further problems such as colic.

References

Beardsworth, A. (2008). Horse health plans: raising equine welfare standards. *V N Times, 9,* pp. 14–15.

Lester, H. and Matthews, J. (2014). Faecal worm egg count analysis for targeting anthelmintic treatment in horses: points to consider. *Equine Veterinary Journal, 46*(2), pp. 139–145.

Morgan, E. (2008). Strategic approach to worming. *Veterinary Times*, 48 pp. 6–8.

Rendell, D. (2013). Utilising faecal worm egg counts to control cyathostomins in horses. *Veterinary Times*, 33, pp. 8–10.

Shepherd, C. (2011). Worming horses and donkeys: An holistic approach. *V N Times, 2.* Retrieved from http://www.vetsonline.com/publications/vn-times/archives/n-11-02/worming-horses-and-donkeys-an-holistic-approach.html

Snalune, K. (2008). Equine internal parasites; their types and management. *V N Times, 7*, pp. 8–10.

Multiple Choice Questions

1. What type of worms do not routinely show up on a FWEC?

(a) Nematodes

(b) Cestodes

(c) Strongyles

(d) Ascarids

2. What temperature does the environment have to exceed for the worm eggs to hatch?

(a) 4 degrees c

(b) 6 degrees c

(c) 8 degrees c

(d) 10 degrees c

3. Approximately what is the specific gravity of the sodium chloride solution used in FWECs?

(a) 1.000

(b) 1.100

(c) 1.200

(d) 1.300

4. What is the approximate percentage of strongyles eggs shedded by around 20% of the total population of horses grazing the same pasture?

(a) 20%

(b) 40%

(c) 60%

(d) 80%

5. What amount of EPG in a fwec requires treating?

(a) 0

(b) 50–100

(c) 100–200

(d) 200+

6. What is the gold standard technique for detecting anophocephala perfoliata?

(a) FWEC

(b) ELISA

(c) Haematology

(d) Biochemistry

7. What objective lens should be used for examining the faecal sample?

(a) ×10

(b) ×40

(c) ×100

(d) ×1000

8. What are eggs produced by?

(a) immature male

(b) mature adult males

(c) immature females

(d) mature adult females

9. Which of the following answers does not prevent eggs from hatching?

(a) Storing sample in the fridge

(b) Storing sample at room temperature

(c) Storing faeces in a zip lock bag

(d) Expelling air from the bag which the faeces have been collected prior to sealing

10. How much sodium chloride solution should be added to 3g of faeces?

(a) 22ml

(b) 32ml

(c) 42ml

(d) 52ml

For the answers to the MCQs, please go to: http://www.bvna.org.uk/publications/veterinary-nursing-journal