PennState Extension

Conducting Small Strongyle Fecal Egg Counts and Fecal Egg Count Reduction Tests

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Key Concepts Based on AAEP Parasite Control Guidelines

1. Important changes have occurred in equine parasite populations due to the introduction of new classes of dewormers. Large strongyles are now rare and small strongyles are the parasites of concern in adult horses, while ascarids remain the most important parasite in foals and weanlings.

2. Traditional parasite control programs feature rotational use of dewormers at regular intervals. This strategy is 40 years old and was designed to eliminate highly pathogenic large strongyles. This strategy was very successful and disease from large strongyles is now very rare.

3. Small strongyles are present in all horses but are relatively mild pathogens and only produce disease when the parasites are present at very high levels. Frequent deworming treatments are not needed to keep most adult horses healthy.

4. The strategy promoted today is to use products with proven efficacy that are administered at the appropriate time of the year based on the parasite burdens of individual horses.

5. In northern climates, egg shedding tends to be low in winter, whether or not the horses have been dewormed, and egg shedding increases in early spring through the summer months.

6. Adult horses vary greatly in immunity to parasites and shedding of small strongyle eggs. Most adult horses tend to have good immunity against small strongyles; 40-60% of adult horses tend to be low shedders; 20 to 30% are moderate shedders; and 10 to 30% are high; 80% of eggs come from 20% of the horses on a farm.

7. Adult horses tend to shed roughly the same number of eggs throughout their life time; low shedders will often remain low and high shedders have a tendency to remain high.

8. Horses less than 3 years of age require special attention and more frequent deworming since they are more susceptible to infection and developing disease.

9. Anthelmintic resistance is highly prevalent in small strongyles and ascarids. Resistance is the ability of parasites in a population to survive treatment with a dewormer. Resistance is an inherited trait. The rate of development of resistance is determined by the degree of selection pressure from

repeated exposure to a dewormer and the extent to which surviving parasites pass their genes to the next generation. Resistance occurs over time. With continued reproduction of resistant worms, eventually the resistant population is high enough that the dewormer fails.

10. To reduce the rate at which resistance occurs, it is critical to maintain parasites that are not exposed to the dewormer. This is known as the refugia. Parasites that are not exposed to the dewormer will not develop genes that are resistant to that dewormer.

11. Egg reappearance time is defined as the time interval between the last effective deworming treatment and the time it takes for significant egg shedding to be detected. Egg reappearance periods that are shorter than anticipated are an indication that resistance is developing to that product. The table below shows the egg reappearance period for the products when they were first developed and when the drug is fully effective. To evaluate egg shedding in adult horses, the sample should be collected 4 weeks after the egg reappearance period for the dewormer used.

Dewormer	Egg reappearance period when the product was first introduced	Egg reappearance time when the drug is effective	When FEC should be conducted after using this product
Fenbendazole/oxibendazole	6 weeks	4-5 weeks	≥9 weeks
Pyrantel	5-6 weeks	4-5 weeks	≥9 weeks
Ivermectin	9-13 weeks	6-8 weeks	≥12 weeks
Moxidectin	16-22 weeks	10-12 weeks	≥16 weeks

Deworming Considerations

1. Conduct fecal egg counts and focus deworming efforts on horses with high small strongyle egg contamination potential.

2. A basic foundation of anthelmintic treatments should be considered for all horses. This generally consists of one or two yearly treatments.

3. Choose a product that provides control of strongyles, bots and tapeworms for use in the fall, usually after the grazing season.

4. Evaluate the efficacy of dewormers on the farm using a fecal egg count reduction test.

5. Focus deworming treatments during times of peak transmission – usually spring through fall when the number of non-resistant parasites will be highest in the pasture.

6. Consider using a product labeled for encysted larvae in horses that have a history of parasite infection and disease.
7. Yearlings and two year old horses have a greater risk of parasite infection and disease due to reduced levels of immunity. More frequent deworming treatments (often 4 or more per year) may be necessary to control parasites in young horses. Conducting fecal egg counts on a regular basis will help with deworming decisions and conducting fecal egg count reduction tests will ensure that the products are working.

8. Foals and weanlings are very susceptible to parasite infection and great care should be taken to ensure that the foals are dewormed with the correct product at the appropriate time for the parasites that are present. Targeted deworming based on fecal egg counts is not recommended for this age group. Very specific deworming protocol has been established for foals and weanlings. The most current recommendations have been provided for you to use.

9. Although specific protocol has been developed for this project based on AAEP guidelines, you and your veterinarian are encouraged to provide input into the program that is developed for your farm. Always involve your veterinarian in all decisions about your parasite control program.

Conducting and Interpreting Small Strongyle Fecal Egg Counts in Horses

1. This project is designed to monitor small strongyle egg production in adult horses and young horses (yearlings and two year olds) by conducting fecal egg counts (FECs). You may also conduct fecal egg counts on foals and weanlings to share with your veterinarian.

2. Fecal egg counts provide a measure of the number of eggs being shed into the environment.

3. A fecal egg count of zero does not necessarily mean that the horse is parasite free. The horse may have small strongyle larvae that are encysted or adults that are not shedding eggs and may harbor parasites other than small strongyles.

4. FECs from an individual horse will vary from sample to sample by as much as 50%. A horse with a FEC of 1000 may actually be shedding 500 or 1500 eggs per gram.

5. Low shedders are those horses that are considered to be below the threshold for deworming (generally between 100 to 500 eggs per gram; high shedders are generally over 1000 EPG.

6. Just deworming the high shedders significantly reduces the eggs that are put into the environment.

7. In order to reduce the selection pressure that can lead to the development of resistant parasites, horses with low to moderate fecal egg counts should not be dewormed.

8. For this project, low shedders will be defined as horses with a FEC of 1-200 EPG, moderate shedders have a FEC of 200-500 EPG, and high shedders have a FEC of 500 EPG. Generally horses should be targeted for deworming if the egg count exceeds 300 EPG. Since there is quite a bit of variability in manure samples obtained from the same horse, this number is only a recommended guideline for this project.

9. For this project, you will be asked to perform fecal egg counts for small strongyles on all of the horses on the farm. Fecal egg counts should be conducted approximately every 8 to 12 weeks beginning in April or early May. The start time for the project will vary based on geographic location of the farm and climate conditions. Monitoring egg counts will allow you to identify the high shedders on your farm and low shedders that have good immunity.

10. The deworming protocol has been developed using AAEP guidelines for young and adult horses. If you have foals on your farm, they may be included in the monitoring project but you will be provided with protocol specifically developed for foals and weanlings.

Fecal Egg Count Reduction Tests

1. Since one of the project goals is to determine which dewormers are effective on your farm, horses that are moderate to high shedders should be dewormed with a product that is recommended for the project. A fecal egg count should again be conducted 14 days after deworming to determine how much the egg shedding was reduced by the product.

2. The detection limit for the system that you are using is 25 eggs per gram. Based on this detection limit, horses with small strongyle fecal egg counts of 500 to >1000 are excellent candidates for conducting fecal egg count reduction tests. Horses with egg counts of 200 to 500 are considered to be suitable for the test but the results need to be carefully evaluated. For this project, we will be supplying you with dewormers for horses that have FECs of >300 EPG and we will ask you to recheck egg counts in 14 days post deworming.

3. To calculate the % fecal egg count reduction use the following formula:

   % FEC = (FEC before deworming – FEC post deworming) / FEC before deworming X 100

4. Since resistance occurs at the farm level (not the horse level), fecal egg count reduction tests should be preferably be performed on 5 to 10 horses on each farm that have moderate to high egg counts (over 300 EPG for this project). Many farms will not have many horses with egg counts over 300 EPG. Use as many horses as possible on your farm for the fecal egg count reduction test. The % fecal egg count reduction for all the horses tested should be added together and an average

taken. Resistance will be determined based on the average of the fecal egg counts for each dewormer tested.

5. Egg shedding reduction can vary based on the dewormer used. Benzimidazole (Anthelcide, Safeguard, Panacure) and pyrantel (Strongid, Exodus) should reduce egg shedding by at least 90%. Ivermectin and Moxidectin (Quest) should reduce egg shedding by 95% or more. If egg shedding is not reduced to these levels, then resistance should be suspected.

6. Caution ……..If fewer than 5 horses are used for egg count reduction tests, the results need to be carefully evaluated unless there is very high efficacy of the product (over 98% reduction in egg shedding) or very low efficacy (less than 80% reduction in egg shedding is consistently seen for all horses). In addition, since egg shedding can vary by as much as 50% from sample to sample, if the % reduction falls in a grey zone - defined as 5% less than the 90% target for benzimidazoles and pyrantel and 95% for ivermectin and moxidectin, then resistance needs to be determined carefully. It may be necessary to repeat the test. If fewer than 5 horses are used for the test, than the grey zone is increased to 10%.

Using the Paracount Kit and McMasters Counting Slide to Conduct Fecal Egg Counts

1. Mix the sample in the bag and be sure to take manure from several fecal balls.

2. Using the Paracount kit, add flotation solution exactly to line A (26 ml).

3. Add manure until level of fluid reaches line B (4 g).

4. Stir/mix thoroughly for 20-30 seconds.

5. Strain through cheese cloth or gauze into another container.

6. Stir/mix thoroughly and draw up approximately 1 ml of solution in pipette or syringe. Hold nearly horizontal. This will keep the eggs from floating to the top of the solution away from where you are dispensing the sample. If the counting chamber of the Mc master's slide is filled quickly, this may not be a problem.

7. Fill the first counting chamber of the McMasters slide – if any visible air bubbles are present under the grid, redo slide.

8. Expel any leftover solution from the pipette before filling second chamber. (If you fill both chambers with same sample this could be a significant source of error.)

9. Again stir/mix the solution thoroughly and draw up approximately 1 ml of solution in the pipette or syringe. Hold nearly horizontal. This will again keep the eggs from floating to the top of the solution away from where you are dispensing the sample. If the chamber is filled quickly this may not be a problem.

10. Fill the second chamber - if any visible air bubbles are present under the grid, redo the slide.

11. It is extremely important that there is no time lapse between the mixing of the solution after it has been strained and filling the chamber. If there is a delay the eggs will start to float to the surface and you will not get a representative sample.

12. Let slide sit for 2-5 minutes before reading results. This allows time for the eggs to float to the surface.

13. While waiting the 2-5 minutes for the eggs to float to the surface of the slide you can prepare another slide.

14. Slide needs to be read before 60 minutes.

15. Use 100X magnification. The eye piece is 10X. Combined with the 10X objective the magnification is 100X.

16. Grid is on the underside of the cover slip and can be used as a reference for focusing. The eggs also lie in the same plane as the small air bubbles.

17. Start in one corner of grid and carefully count all of the eggs in the grid. Only count an egg if more than half of the egg is inside. For the interior grid lines, if the egg lies on the left line count it if it lies on the right line do not count it. This will help avoid double counting an egg.

18. Count each type of egg individually.
    a. Strongyle
    b. Ascarid
    c. Tapeworm

19. Add the number of one type of egg seen in each chamber and multiply by 25. This gives you the number of eggs per gram of manure or EPG.

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