How to Implement an Internal Parasite-Control Program Based on Fecal Egg Counts

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1. Introduction
Recent literature has documented increasing anthelmintic resistance to common equine internal parasites, most notably cyathastominis (small strongyles) and Parascaris equorum.1,2 This problem is likely to exacerbate with many clients still operating under the assumption “if some is good, more is better,” and thus, deworming their horses as often as every 4–6 wk. Also, the widespread availability of inexpensive over-the-counter anthelmintics has left many equine veterinarians with only a peripheral role in a farm’s parasite-control program.

The use of routine fecal egg counts (FEC) allows veterinarians to decide which horses to deworm and when to deworm. Additionally, egg counts can identify anthelmintic resistance on individual farms through fecal egg-count reduction tests (FECRT). A recent special lecture presented at the American Association of Equine Practitioners Convention last year3 and preceding equine parasite symposium4 emphasized the need for selective use of our remaining effective anthelmintics as necessary to reduce the formation of resistance.

The purpose of this paper is to describe how to implement such a program in an equine practice and show results of how such a program can work.

2. Materials and Methods
Beginning in February 2008, our practice implemented routine FEC in horses over 1 yr of age as part of our wellness program to encourage our clients to adopt responsible anthelmintic use. The program was introduced in our quarterly client newsletter with a one-page diagrammatic description of a high-shedder (HS) and a low-shedder (LS) testing and treatments scenarios tailored to our mid-Atlantic seasonal parasite load. The implementation required agreement among our eight veterinarians, three veterinary technicians, and six veterinary assistants on client education, sample collection, and prompt processing and result notification. The process is outlined below.

The determination of the HS patients was set at an egg count of 300 eggs per gram of feces based on known information regarding nematode egg shedding and selecting against sampling errors for false negatives. The samples were collected by the sta-
ble managers/owners or the veterinarians and staff of the practice. The samples were placed in sealed containers with emphasis on eliminating air space, refrigerated, and processed within 36 h to reduce potential larval development.

The FEC were performed by veterinary technicians and assistants using a modified McMaster egg-counting technique.\textsuperscript{a} Using the calibrated vial in the kit, 26 ml sodium nitrate\textsuperscript{b} had 4 g fecal sample added and mixed thoroughly. This mixture then had 0.5 ml fluid aspirated and used to charge two separate slide chambers provided in the kit. These chambers have 1-cm\textsuperscript{2} gridlines, similar to a hemacytometer, and contain 0.15 ml of sample per each one to be analyzed. The resultant volume examined under the two chambers is 1/100th of the initial volume sampled. Therefore, the number of nematode eggs identified in the two chambers is either multiplied by 100 and divided by the 4 g of feces used or simplified as multiplying the number of eggs identified times 25.

The results of each patient’s test were shared by the veterinary technicians with the attending veterinarian and owner. The LS population was instructed to administer an anthelmintic according to a pre-established rotation with special attention to premises with known resistance determined by our accumulating results (Tables 1–3). Special attention was paid to location with demonstrable pyrantel resistance.

3. Results

Initial acceptance by owners of the program was met with mixed opinions based on pre-existing beliefs of frequent rotation being most effective management. This improved as the program was explained and benefits were realized. Owner satisfaction is considered very positive.

The manpower required to process and report the samples took 15 min per sample. This accounted for approximately 24,510 min or 408 h of work in 2009. Time allocation for processing was made in the evening and overnight technical shifts if the daytime staff was busy.

The first fiscal year accounted for 1,420 total FEC on 624 patients and increased in the second year to 1,634 FEC for 1,056 patients. The percentage of HS (23\%) to LS (77\%) is consistent with previously reported incidence of nematode resistance (Table 4).

\begin{table}[h]
\centering
\caption{WEC’s Guide to Parasite Control—High Shedders}
\begin{tabular}{lcccc}
\hline
 & \textbf{February} & \textbf{May} & \textbf{June} & \textbf{October} & \textbf{January} \\
\hline
\textbf{Submit Fecal} & \textbf{Yes} & \textbf{Yes} & \textbf{Yes} & \textbf{Yes} & \textbf{Yes} \\
\textbf{Dewormer} & Moxidectin with Praziquantel & Oxibendazole\textsuperscript{a} & Ivermectin with Praziquantel & Moxidectin with Praziquantel & Pyrantel\textsuperscript{b} \\
\hline
\end{tabular}
\end{table}

\textsuperscript{a}We recommend a fecal egg reduction count (FERC) 10–14 days after administration of Pyrantel or Oxibendazole one time every 2 yr.

\begin{table}[h]
\centering
\caption{WEC’s Guide to Parasite Control—Low Shedders}
\begin{tabular}{lcccc}
\hline
 & \textbf{December} & \textbf{June} & \textbf{September} \\
\hline
\textbf{Submit Fecal} & \textbf{Yes} & \textbf{Yes} & \textbf{Yes} \\
\textbf{Dewormer} & Moxidectin with Praziquantel & Ivermectin with Praziquantel & No action unless > 300 \\
\hline
\end{tabular}
\end{table}

\begin{table}[h]
\centering
\caption{WEC’s Guide to Parasite Control—Foals}
\begin{tabular}{lccccc}
\hline
 & \textbf{6–8 Wk} & \textbf{14–16 Wk} & \textbf{22–24 Wk} & \textbf{30–32 Wk} & \textbf{After 38 Wk} \\
\hline
\textbf{Submit Fecal} & \textbf{No} & \textbf{Yes} & \textbf{No} & \textbf{Yes} & \textbf{Follow Adult Schedule} \\
\textbf{Dewormer} & Oxibendazole & Pyrantel & Oxibendazole & Pyrantel \\
\hline
\end{tabular}
\end{table}

Do not deworm foals under 1 yr with moxidectin.
4. Discussion

The reengagement of veterinarians in equine parasite management is paramount in avoiding development of further anthelmintic resistance and is consistent with standards of care where correct identification of medical issues is necessary before instituting treatment. The acceptance of owners to individual patient care was positively received when the larger issue of parasite control was explained. Our clientele has appreciated our commitment to their horse’s specific situation. This has allowed further patient inclusion in our program by 15% in the face of a difficult economic environment.

To promote acceptance of the fecal testing, the pricing of the individual test was set slightly below the price of benzimidazole anthelmintics. This allowed the program to show cost savings to the owners versus previously practiced rotational programs, plus it was emphasized that LS horses were not in need of treatment that otherwise may have been administered.

By establishing a record of individual HS on a premise, this allowed owners to alter their management practices to promote proper fecal removal of pastures from these individuals. Examples of older horses, especially immunocompromised individuals, acting as surrogates for young horses were reconsidered as effective measures to reduce further propagation of resistance on a premise. Finally, we confirmed increase in HS among stables relying on daily administration of pyrantel tartrate. These premises required special attention when advising anthelmintics and required either ivermectin or moxidectin to reduce FEC.

During implementation of the program, several challenges were encountered that are also essential to consider when considering a similar program. First, the labor training required to undertake the program is a significant challenge. Our practice used continuous staffing and processed a majority of samples after hours between other responsibilities. This is not feasible in practices without the available laboratory area or staffing. Outsourcing fecals to a reference laboratory will often result in a significant increase in cost. Second, we are often challenged in achieving the level of compliance that we desire from our clientele. Typically, fecals are collected one time annually during wellness visits in the spring. However, not all clients remember to collect and submit additional samples throughout the year to ensure efficacy of the parasite-control program. This becomes even more of a challenge with individuals in the HS group, where successful outcomes rely on closely monitoring FEC. This year, we have started using our practice software to identify specific individuals and remind clients when we recommend testing. We choose to share the program with our regional colleagues in an effort to have a more effective influence in our regional parasite management and share our FEC processing capacity. The need for further establishment of regional centers for affordable processing will be necessary to establish acceptance of FEC implementation.

References and Footnotes


**a**Paracount-EPG kit, Chalex Corp., Wallowa, OR 97885.
**b**Fecasol, Vetoquinol USA Inc., Buena, NJ 08310.