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Strongyle egg shedding consistency in horses on farms using selective therapy in Denmark

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Abstract

Knowledge of horses that shed the same number of strongyle eggs over time can lead to the optimization of parasite control strategies. This study evaluated shedding of strongyle eggs in 424 horses on 10 farms when a selective anthelmintic treatment regime was used over a 3-year period. Faecal egg counts were performed twice yearly, and horses exceeding 200 eggs per gram (EPG) of faeces were treated. The results are presented as probabilities of the egg count outcome, when two previous egg counts are known. A horse with no strongyle eggs detected in the two previous faecal examinations had an 82% probability of a zero, and a 91% of being below 200 eggs per gram in the third examination. A horse with the two previous egg counts below 200 EPG had an 84% probability of being below 200 EPG the third time as well. When faecal egg counts exceeded 200 EPG on the previous two counts, the probability for a horse exceeding 200 EPG the third time was 59%. In conclusion, these data demonstrate consistent shedding from one grazing season to another in a majority of horses despite treatment of horses exceeding 200 EPG.

Keywords: Strongyle egg; Horse; Shedding; Consistency

1. Introduction

All horses with access to pasture are exposed to strongyle infections. Today, it is generally accepted that cyathostomins (small strongyles) are the most common parasites in horses and the most prevalent cause of disease, ill-thrift and poor performance. Since the 1960s, numerous studies have reported on increasing levels of cyathostomin resistance to a variety of anthelmintic drugs. The avermectin/milbemycins (macrocyclic lactones) are currently the only fully effective anthelmintic group (reviewed by Kaplan, 2002, 2004). It is widely accepted that avermectin/milbemycin resistance in cyathostomins is inevitable (Lloyd and Soulsby, 1998; Sangster, 1999; Kaplan, 2004).

Thus, there is a strong need to revise current approaches to parasite control in order to delay the development of resistance as much as possible.

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Currently one of the strategies used is selective therapy (Duncan and Love, 1991; Gomez and Georgi, 1991; Krecek et al., 1994). This approach advocates the faecal sampling of all horses resident on the premises and treatment of those whose egg counts exceed a chosen cut-off value. Horses with egg counts below this value are left untreated. Selective therapy is based on the premise that parasites of any kind are always over-dispersed in animal populations (Crofton, 1971; Sréter et al., 1994; Galvani, 2003). This should reduce the selection pressure for resistance due to presence of a large group of parasites that are not exposed to the drug during treatment, i.e., parasite refugia (van Wyk, 2001).

Only little evidence supports the existence of individual horses that tend to be high egg shedders at every faecal analysis, or so-called wormy individuals. However, a recent Dutch study reported a strong shedding consistency of strongyle eggs over a six week period, during which the horses were not treated (Döpfer et al., 2004). It has been proposed that this knowledge could be used to reduce the amount of faecal samples in a system of selective therapy and thereby make it more applicable under practice conditions (Döpfer et al., 2004).

This paper reports a study of the consistency of strongyle egg shedding in a system of selective therapy over a period of 3 years. The aims were (a) to investigate shedding consistency from one grazing season to another and (b) to evaluate if persistently high shedders could be identified in a system of selective therapy where the aim is to target horses with high faecal egg counts. The authors intended to predict the faecal egg count in individual horses, when the results of the two previous egg counts were known. For example, for a horse that had an egg count of more than 200 at spring and autumn 1998, what was the probability of the egg count being over 200 eggs per gram (EPG) faeces at spring 1999?

2. Materials and methods

Faecal egg count data were obtained from a veterinary practice in Sealand, Denmark representing 424 horses on 10 farms with variety of breeds. All farms used selective therapy with two annual faecal examinations on all horses on the farms. The cut-off value for treatment was 200 EPG, which is used by a majority of Danish equine practices (Nielsen et al., 2005) and corresponds with the 0–500 EPG range of cut-off values reported by Uhlinger (1993). One faecal sample was collected and analysed from each horse at each occasion during the study. The samples were collected at variable times of the day. The faecal egg counts were performed using a modified McMaster technique with a 50 eggs per gram sensitivity (Roepstorff and Nansen, 1998). Own unpublished data suggests that egg counts obtained on horse faeces using this technique should be interpreted with a ±50% variability. The size of farms ranged from 13 to 84 horses, and the age of horses varied from 0.5 to 28 years.

Faecal samples were taken at spring turn-out (March–May) and early autumn (August–September) during 1998, 1999, and 2000. In 1998 the anthelmintic drugs were chosen by the horse owners, but in 1999 and 2000 all horses were treated with pyrantel pamoate and ivermectin, respectively.

Data were evaluated by calculation of probabilities by counting all outcomes in the data set and presenting the results in terms of percentages. Only data from horses identified by name on the same farm at three or more consecutive faecal analyses were included in the study.

3. Results

Results are presented in Table 1. For a horse with 0 EPG at two consecutive faecal examinations, there is an 82% probability for another zero and a 91% probability that the EPG at the next examination is below 200 EPG. Horses with EPGs below 200 EPG at two consecutive occasions had an 84% probability of being below 200 EPG on the third occasion. Horses exceeding 200 EPG at the two previous examinations had a 59% probability of staying above 200 EPG at the third test.

Table 1
Calculated probabilities for outcomes of the faecal egg counts, when the results of the two previous egg counts were known

Results of two previous egg counts	Result of the third egg count	Probability (%)
0, 0	0	82
0, 0	<200	91
<200, <200	<200	84
≥200, ≥200	≥200	59

Egg counts are given as eggs per gram (EPG) faeces.

4. Discussion

A study in a herd of 31 horses reported a significant correlation of egg counts from 1 year to the next (Gomez and Georgi, 1991). A more recent paper reports high shedding consistency in horses left untreated for six weeks (Döpfer et al., 2004), leading the authors to speculate that this knowledge could be used to reduce the amount of faecal samples needed in a strategy of selective therapy. Data from this study support this idea and add further information on the phenomenon of consistent shedding of strongyle eggs. The data show a strong tendency of horses staying at low egg counts at every occasion of faecal analysis even though no treatments were administered. This could reflect a degree of acquired or age related immunity towards strongyle infection. It also illustrates the well known over dispersed distribution of parasites in any population of hosts (Crofton, 1971; Sréter et al., 1994; Galvani, 2003), where the majority of the horses harbour a low level of parasites.

There is, however, a strong tendency for some horses to stay above the cut-off value at every interval during the study period despite repeated treatments. Thus, it appears that there will always be high egg shedders in a herd regardless of treatment. This supports the idea of selective therapy as a means of reducing selection pressure for anthelmintic resistance and maintaining a parasitic refugium to dilute out resistant alleles in the parasite population.

The present data evaluate shedding consistency over a 3-year period, and indicate consistent faecal egg counts from one grazing season to another. However, it still remains unclear whether the number of faecal samples could be reduced below two per year without risking serious infections. Thus, more research is needed in order to provide good advice for horse owners and veterinary practitioners in the field. Also, more information on consistent shedding in different age groups of horses would be useful, as it is likely to be different in foals and young horses.

In conclusion, the present data illustrate consistent strongyle egg counts in horses over a 3-year period. A strong tendency of horses repeatedly having low faecal egg count levels at each occasion of faecal analysis was shown. A majority of horses with high faecal egg counts continued to have these in spite of selective therapy.

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