

# Effectiveness of Ivermectin Paste for Removal of Nematodes in the Horse

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## SUMMARY

Thirteen Standardbred horses, two to five years of age, were treated with ivermectin paste per os at 200 µg/kg of body weight and 13 were untreated. Two weeks after treatment, previously untreated horses were given the paste. Fecal samples were collected from all horses at the time of treatment and periodically thereafter up to 14 weeks and were examined for nematode eggs using the Cornell-McMaster dilution and the Cornell-Wisconsin double centrifugation procedures.

All horses consumed the paste readily and had no signs of toxicosis. Strongyle eggs were found in the feces of all horses before treatment but not at two to three weeks after treatment. At five to six weeks after treatment only two horses had eggs in the feces. At eight, ten, 12 and 14 weeks after treatment 27, 69, 88 and 100% of the horses examined, respectively, had a few strongyle eggs but these were no greater than 18% of that of the pre-treatment samples. Ivermectin oral paste, therefore, appeared to be highly effective against both adult and immature strongyles.

**Key words:** Ivermectin oral paste, horses, strongyles, efficacy of treatment.

## RÉSUMÉ

### L'efficacité de la pâte d'ivermectin pour l'élimination des nématodes, chez le cheval

Cette expérience portait sur 13 chevaux Standardbred, âgés de deux à cinq ans, et elle consistait à leur administrer une dose buccale de 200 µg d'ivermectin/kg; elle impliquait aussi

13 témoins qui reçurent le même traitement, mais deux semaines plus tard. On préleva des échantillons de fumier chez tous les chevaux, au moment du traitement et à intervalles périodiques, pendant 14 semaines, et on y rechercha des oeufs de nématodes, à l'aide de la méthode de dilution de Cornell-McMaster et de celle de la double centrifugation de Cornell-Wisconsin.

Tous les chevaux avalèrent la pâte sans résistance et ne manifestèrent aucun signe d'intoxication. On détecta des oeufs de strongles dans le fumier de tous les chevaux, avant le traitement, mais non au bout de deux à trois semaines. Au bout de cinq à six semaines après le traitement, le fumier de seulement deux chevaux contenait encore des oeufs de nématodes. Au bout de huit, dix, 12 et 14 semaines, respectivement 27%, 69%, 88% et 100% des chevaux examinés à cette fin éliminaient quelques oeufs de strongles, mais leur nombre ne dépassait pas 18% de celui qu'on avait enregistré avant le traitement. La pâte buccale d'ivermectin s'avéra par conséquent très efficace contre les strongles adultes et immatures.

**Mots clés:** pâte buccale d'ivermectin, chevaux, strongles, efficacité d'un traitement.

## INTRODUCTION

Ivermectin is a new broad spectrum parasiticide (1) which in the horse is highly effective against bots, intestinal nematodes and the migrating stages of *Strongylus vulgaris* (2). Ivermectin was first introduced for horses as an intramuscular injection

and there have been a number of adverse reactions associated with it (2). The major concern is the reaction at the injection site complicated by *Clostridium* spp. infections. In the United States, the frequency of fatal clostridial myositis following the use of injectable ivermectin is one in 84,000 doses administered (2.5 million doses sold). Long winter hair coats, lack of adequate site preparation, use of multidose syringes, or a single needle on several horses and injection into nonpreferred sites (pectoral and gluteal muscles) have all been associated with the adverse reactions. When the injection formulation of ivermectin is administered per os it is as effective as parenteral administration (3) and this could be useful for show horses or horses in training. A paste formulation of ivermectin has also been found to be an effective parasiticide for the horse (4,5). The purpose of this study was to demonstrate the efficacy of the paste formulation of ivermectin against nematodes in horses in a field trial in Ontario.

## MATERIALS AND METHODS

The trial was conducted on two Standardbred farms with 26 horses ranging in age from two to five years. The horses were kept in box stalls except for a daily training outdoors and were maintained on a high plane of nutrition and with a high standard of management. On each farm body weights of horses were estimated and the horses were ordered by weight and paired beginning with the heaviest. One member of each pair was assigned randomly for treatment with ivermectin oral paste at 200 µg/kg of body

weight and the other was untreated. The mouths of horses were inspected before treatment to ensure the absence of food. For 4 h following treatment and daily for 2 wk, thereafter, horses were observed for signs of adverse drug reaction. The trial commenced on February 1, 1982 and continued into mid-May.

On the day of and just prior to treatment and again 2 wk after treatment, 10 g fecal samples were taken from all horses and the number of parasite eggs per gram (EPG) were estimated by the Cornell-McMaster dilution egg counting procedure (6). At 2 wk after treatment, horses previously assigned to the untreated group were administered the ivermectin oral paste at 200 µg/kg of body weight. Fecal samples from these horses were examined 3 wk after

treatment. Fecal samples from all horses were examined periodically for up to 14 wk after treatment. The Cornell-Wisconsin double centrifugation procedure (7) was used for the examination of fecal samples (5 g) collected after treatment.

#### RESULTS

All horses, except one, readily consumed the ivermectin paste and signs of toxicosis were not observed. One horse (No. 20) ejected a small quantity of the paste with a small bolus of food which was undetected prior to treatment. On the second day after treatment, ascarids were seen in the feces of one horse and bots in the feces of several, but parasites were not seen in the feces of untreated horses.

At the time of treatment, strongyle eggs were found in the feces of all

horses (Table I). Two horses had *Parascaris equorum* eggs in the feces. At 2 to 3 wk after treatment, the EPG, as determined by the Cornell-McMaster dilution technique and Cornell-Wisconsin centrifugation technique, in all treated horses and one untreated horse was zero. At 5 to 6 wk after treatment only two horses had strongyle eggs in the feces. At 8, 10, 12 and 14 wk after treatment, 27, 69, 88 and 100% of the horses sampled, respectively, had a few strongyle eggs in the feces. During the posttreatment period nine horses were found to have a few eggs of *Anoplocephala perfoliata*.

#### DISCUSSION

In this field trial, ivermectin paste was found to be readily consumed by all horses and was effective against stron-

TABLE I  
NUMBER OF STRONGYLE EGGS PER GRAM OF FECES FOUND IN HORSES FOLLOWING  
TREATMENT WITH AN ORAL PASTE OF IVERMECTIN AT 200 µg/kg

Horse ID	Time after Treatment (Weeks)								
	0 <sup>a</sup>	2 <sup>b</sup>	3	5	6	8	10	12	14
<b>Farm A</b>									
1	350	250	0		0	0	0	1.2	
2	350	0		0		0	1.8	31.4	51.8
3	150	650	0		0	0	0	0	
4	150	0		0		0	0.4	4.0	4.0
5	1000	1800	0		0	0.8	55.2	30.2	
6	450	0		0		1.2	65.0	73.0	80.0
7	950	950	0		0	0	10.8	32.4	
8	500	0		0		0	13.4	41.6	62.6
9	1200	700	0		0	0	1.6	8.6	
10	2100	0		0		0	8.0	36.4	80.0
11	1000	1750	0		0	0	0	15.4	
12	200	0		0		0	3.4	5.4	31.4
13	150	100	0		0	0	0	0	
14	900	0		0		0	0	5.2	9.6
15	100	0	0		0	0	1.4	1.8	
16	1100	0		0		0.2	16.2	24.0	41.6
17	950	1200	0		0.2	0	0	0	
18	550	0		0		0	0	4.0	5.0
19	1000	1100	0		0.4	0.2	0	50.6	
20	450	0		0		1.8	54.8	45.0	80.0
<b>Farm B</b>									
21	150	400	0		0	0	26.8		
22	700	0		0		0	8.6	39.8	
23	300	200	0		0	0	0.2		
24	1450	0		0		24.6	102.0	143.8	
25	2500	3000	0		0	1.6	15.0		
26	3300	0		0		0	37.3	4.6	

<sup>a</sup>Horses identified with even numbers treated at this time.

<sup>b</sup>Horses identified with odd numbers treated at this time.

gyles and ascarids. No adverse reactions were observed in these horses. These results confirm the findings from previous studies where an oral paste was used (4,5), but in those studies the sensitivity of the fecal analysis procedure was not identified. In our trial we used the highly sensitive Cornell-Wisconsin double centrifugation technique, and parasite eggs were not found in the feces of treated horses 14 to 21 days after treatment. This technique has a 100% sensitivity in detecting trichostrongyle eggs in bovine feces as low as 1.4 EPG (7). Although the sensitivity of this technique for the recovery of strongyle eggs has not been measured, there appeared to be no difference in the levitation and recovery of trichostrongyle and strongyle eggs in a flotation medium (8).

At 5 to 6 wk after treatment only two horses were found with a few strongyle eggs in the feces, and as the posttreatment period increased, an increasing number of horses were found with eggs. By 14 wk after treatment all horses examined had strongyle eggs in the feces. However, throughout the posttreatment period the number of eggs found were less than 18% of the number of eggs found prior to treatment. In two field trials using the injectable formulation of ivermectin, horses remained negative for strongyle eggs for up to 6 (3) and 10 wk after treatment (9), but the sensitivities of the fecal analysis procedures were not indicated.

In the present trial, the strongyle eggs were not identified to species, but on our previous examination of horses on both farms the strongyle eggs were predominantly from small strongyles. This study was conducted during a season when immature small strongyles would have been either dormant or resuming development in the wall of the intestine and in an environment where the horses had little opportunity for reinfection. Since there were few eggs as late as 14 wk after treatment, ivermectin oral paste may have had considerable activity against immature and dormant small strongyles.

Injectable and paste formulations of ivermectin are highly effective against immature strongyles in the lumen of the intestine (2) and fourth stage *S. vulgaris* in the arteries (10-14). Injectable ivermectin was not found to be very effective against immature small strongyles in the mucosa (15). However, the length of time from treatment to necropsy (six days) in that study may have been too short for a proper evaluation of ivermectin against those stages.

For the control of strongyles in horses, anthelmintics are given usually at set intervals throughout the year. In the present trial only a few strongyle eggs were found as late as 14 wk after treatment and it would appear that at least for stabled horses and horses exposed to little reinfection, ivermectin could be given every 16 wk or three times a year. With such infrequent use of ivermectin, strongyles are not likely to develop resistance quickly; strongyles which are resistant to benzimidazoles have been found when horses are treated at intervals more frequently than once every 16 wk (16). Interval treatment, which is the common method for the control of parasites of horses, is now being questioned since it would appear that horses may not acquire strongyles at equal rates throughout the year (17). Several researchers are gathering data on the epidemiology of the strongyles and it may well be that a seasonal approach to the control of strongyles is more efficient.

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