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OBSERVATIONS ON THE EFFICIENCY OF THIABENDAZOLE AS AN ANTHELMINTIC FOR HORSES IN IRAN(*)

by

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SUMMARY. — Thiabendazole, at a dose rate of approximately 40 mg. per kg., was highly efficient in removing adult large and small strongyle worms from 15 naturally infested horses, as judged by faecal worm egg counts done by the McMaster Method. A subsequent rise in egg counts at 9 weeks after treatment was attributed to development of immature large strongyle worms unaffected by treatment. Useful activity against *Parascaris equorum and Oxyuris equi* was noted. Some of the worms passed after treatment were collected and identified. Thiabendazole had no effect against the larvae of *Gastrophilus intestinalis*.

Introduction

The anthelmintic activity of thiabendazole (2-(4'-thiazolyl) benzimidazole) originally reported by Brown, Matzuk, Ilves, Peterson, Harris and Sarrett (1961) has been amply confirmed in sheep, but there are relatively few reports of its use in the horse. The first reports on the efficiency of thiabendazole against parasites of the horse appear to be those of Drudge, Szanto, Wyant and Elam (1962) Egerton, Cuckler, Ames, Bramel, Brightenback and Washko (1962) and Turk, Ueckert and Bell (1962) in America, Guilhon (1962) in France, Reinecke and Rossiter (1962) in South Africa, McDonald (1963) in New Zealand, and Enigk and Stoye (1963) in Germany. These authors found that thiabendazole was highly effective against the large and small strongyle worms, and also against mature *Oxyuris equi*,

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at dose rates of from 25 to 100 mg. per kg. Immature *Oxyuris* were removed at the higher dose rate. Results against *Parascaris equorum* were variable. Reinecke and Rossiter observed 95 and 100 per cent. reduction of *Parascaris* egg counts in 2 horses dosed with 50 mg. per kg., but Drudge *et al.* found that 100 mg. per kg. was required for high efficiency. Drudge *et al.* also noted that thiabendazole was not effective against 2 species of stomach bot larvae *(Gastrophilus intentinalis* and *G. nasalis)*.

This paper presents results of initial observations on the use of thiabendazole in horses in Iran.

Methods and Materials

Fifteen horses brought to the Razi Institute for studies on African horse-sickness were made available, provided that all of them should be treated. They were yearlings from the Mazandaran province bordering the Caspian Sea. Their average bodyweight was estimated at about 250 kg. Faecal worm egg counts were done by the McMaster method 3 times before treatment, and larval cultures were examined to determine the type of infestation present. The samples were examined once by flotation in mercuric iodide solution for presence of eggs of *Fasciola hepatica* which had previously been seen in horses from this area. These preliminary examinations showed that all of the horses were infested with large and small strongyle worms. Some were also infested with *Parascaris equorum*, and some with *Oxyuris equi*.

The thiabendazole was supplied as a wettable powder containing 68 per cent. active ingredient. It was given by mouth as a suspension in water. Fourteen of the horses were dosed on December 15th, 1963, each with 10 g. thiabendazole, representing a dose rate of about 40 mg. per kg. The 15th horse, initially left untreated as a control, was similarly dosed on December 19th. Taking December 15th as day zero, post-treatment egg counts were done at 3, 4, 14, 20, 24, and 69 days after treatment.

A number of worms were collected for identification from a random sample of faeces from treated horses in the first few days after treatment.

Horse No. 8 died at 48 days after treatment. A *post-mortem* examination was carried out by Dr. Sohrab of the Razi Institute.

Results

The results of the strongyle worm egg counts are shown in Table I. Differentia-

tion of larvae cultured before treatment showed that the egg counts were attributable in about equal proportions to large and small strongyle species. Treatment produced a marked reduction in egg counts, which were negative for all excepting 2 horses at 3 days after treatment. At 14 and 20 days, all of the counts were negative. At 24 days a count of 100 e.p.g. was recorded in one horse. At 69 days after treatment, moderate to high counts were obtained in 12 of the 14 surviving horses. Large numbers of worms were seen in the faeces of treated horses in the first few days after treatment.

Initially, eggs of *Parascaris equorum* were present in samples from 3 of the horses, the counts being 600, 200 and 100 e.p.g. faeces. Following treatment, several worms were passed and no eggs of this species were seen in subsequent samples.

During pre-treatment examination for *Trematode* eggs, eggs of *Oxyuris equi* were seen in the faeces of 2 horses. No attempt was made to detect these in subsequent samples, but numerous worms of this species were passed in the faeces after treatment.

The helminth species identified amongst the worms passed by treated horses were *Parascaris equorum, Oxyuris equi, Strongylus equinus, S. edentatus, Triodonto-*

TABLE 1

STRONGYLE WORM EGG COUNTS OF HORSES TREATED WITH THIABENDAZOLE (DOSE APPROXIMATELY 40 Mg. PER Kg.)

Horse No.	Mean of three counts before treatment	Eggs per gramme of faeces: Counts at ... days after treatment					
		3	4	14	20	24	69
1	733	—	—	—	—	—	1,300
2	966	—	—	—	—	—	900
3	700	—	—	—	—	—	—
4	2,743	—	—	—	—	—	700
5	766	200	100	—	—	—	1,300
6	1,233	—	—	—	—	100	600
7	2,050	100	—	—	—	—	400
8	2,400	—	—	—	—	—	Dead
9	1,433	—	—	—	—	—	500
10	3,550	—	—	—	—	—	900
11	1,566	—	—	—	—	—	300
12	1,166	—	—	—	—	—	500
13	2,566	—	—	—	—	—	800
14	2,033	—	—	—	—	—	1,100
15	2,833	4,200	4,700*	—	—	—	—

* Not treated until after sample taken on day 4.

phorus spp., *Trichonema* spp. and other unidentified small strongyles including many immature small strongyles. In one small composite sample of 200 g. faeces, including a portion from each horse, 75 worms were recovered.

The authors were absent when Horse No. 8 died. Death was attributed to perforation of the wall of the stomach by bot larvae, subsequently identified as *Gastrophilus intestinalis*. A detailed examination for helminths present at the time of death was not made.

Faecal cultures made from samples taken at 10 weeks after treatment yielded larvae of large strongyle worms only.

Discussion

A dose of about 40 mg. per kg. thiabendazole reduced the faecal worm egg counts to zero in all of 15 horses that harboured moderate to heavy burdens of large and small strongyle worms. Although previous workers (Enigk & Stoye, 1963; Egerton *et al.*, 1962) have shown that even small doses of thiabendazole markedly suppress production of eggs by strongyle worms of horses, the large numbers of worms seen in faeces passed after treatment in the present study indicated that the reduction in egg counts was due to removal of worms. The results thus confirm the conclusions of previous workers that thiabendazole is highly effective against mature large and small strongyle worms of horses.

The rise in egg counts in 12 of the 14 horses surviving at 10 weeks after treatment is considered due to development of immature worms not present in the alimentary canal at the time of treatment. Reinfestation was not probable under the conditions of stable management. Gibson (1953) showed the importance of continuing observations for at least 6 to 10 weeks after treatment when assessing the efficiency of anthelmintics in horses. In evaluating phenothiazine, he took particular precautions against reinfestation of his experimental horses in observations extending over 3 years. He found that, whereas treatment reduced egg counts to zero, due to the removal of large numbers of worms, a new adult population developed from stages "arrested" in the tissues. Moreover, he found that this phenomenon may recur after a second or subsequent treatments, so that several treatments may be required to completely remove an existing worm burden.

In the present study, larval culture of samples taken at 10 weeks after treatment yielded larvae of large strongyles only. It appears, therefore, that thiabendazole was highly effective against immature small strongyles, but was not effective against immature large strongyles that apparently were migrating in the tissues at the time of treatment.

The results indicated that thiabendazole is active against *Parascaris equorum* and *Oxyuris equi*, but few of the horses were infested with these species. Previous workers have reported that higher dose rates than those used in the present study are needed for high efficiency against *Parascaris equorum* and the immature stages of *Oxyuris equi*.

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