PRELIMINARY NOTE ON THE ADMINISTRATION OF NON-CONDITIONED PHENOTHIAZINE, IN SMALL DAILY DOSES, FOR THE CONTROL OF GASTROINTESTINAL PARASITES OF CATTLE IN PUERTO RICO [1]

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INTRODUCTION

Shorb and Habermann (1940) reported that the presence of one per cent by weight of phenothiazine in the feces of sheep would prevent the development of nematode larvae and that .5 gram of this compound per day administered in the feed would inhibit the development of all nematode larvae in the feces of these animals except those of *Strongyloides papillosus*. Habermann and Shorb (1942) confirmed these findings in an experiment involving the voluntary ingestion of mixtures of phenothiazine and salt by infected sheep.

Cattle in Puerto Rico are commonly infested with a number of different species of gastrointestinal parasites. Since the scarcity of available clean pasture prevents the use of pasture rotation as a means of controlling these infestations, it was considered desirable, in view of the favorable results obtained by Shorb and Habermann (loc. cit.), to determine the effect of the frequent administration of small doses of phenothiazine over a long period of time on the cattle and on the parasites harbored by them.

MATERIALS AND METHODS

Three herds of cattle on widely separated farms located on the north coastal plain of Puerto Rico were selected for these experiments. Herd 1

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was made up of 22 animals, 4½ to 24 months old, which normally grazed a relatively low-lying malojillo grass pasture, but were fed in addition chopped sugar cane trash or grass cut from a neighboring field, whichever was available at the time. Herd 2 was composed of 12 animals, 8 to 28 months old, which were kept in a feed lot containing some vegetation, but were fed chopped grass cut from a field used only for furnishing this type of feed. Herd 3 consisted of 15 animals, 7 to 11 months old, which were fed chopped grass, sugar cane trash, and concentrates. Some of the animals in the latter group were allowed to graze low-lying malojillo grass pasture.

The number of parasite eggs per gram of feces was first ascertained for each animal and the different species of parasites harbored by the animals was ascertained by noting the kinds of worm eggs present in the feces. Herds 1 and 2 were each divided into two equal groups in such a way that each group was passing approximately the same number of parasite eggs per gram of feces. Group 1 and Group 2 of Herd 1 were separated by a fence dividing the pasture originally occupied by the whole herd. Group 1 received ½ gram of nonconditioned phenothiazine per day per 100 pounds of live weight for 105 days. The compound was given in # 00 white gelatine capsules administered by means of a balling gun. Group 2 remained untreated as a control. At the end of the 105-day period, the treatment of Group 1 was discontinued and the treatment of Group 2 was begun at the same dose rate. The experiment was then continued for 69 days and was terminated because of the flooding of the pasture.

The two groups of Herd 2 were not separated from each other. Group 1 of this herd received phenothiazine in white gelatine capsules at the same dose rate as the animals belonging to Herd 1, but the compound was administered at weekly intervals. Group 2 of Herd 2 remained untreated as a control. Treatment was discontinued entirely at the end of 77 days, although the number of eggs per gram of feces was ascertained in both groups for an additional 89-day period.

Herd 3 was not separated into two groups. All of the animals in this herd received daily doses of phenothiazine mixed in the ground concentrate portion of their daily ration. These doses were equivalent to those received by the animals in Herd 1. Data on this herd were recorded for 175 days.

The animals belonging to Herd 1 were weighed at the beginning and at the end of the experiment. A weighing tape was used to estimate the weights of the animals at approximately weekly intervals during the experiment. The same tape was used in estimating the weights of the animals in Herd 2. The animals in Herd 3 were weighed on a scale at monthly intervals.

Determinations of the number of parasite eggs per gram of feces were made on all animals at the intervals indicated in Figure 1, and the data recorded. No autopsies were made.

DATA OBTAINED

Nine animals from Herd 1, six from Herd 2, and nine from Herd 3 were very lightly infested at the beginning of the experiment, and passed so few worm eggs that the data were not included in this paper. Observations on one other calf were also omitted because the findings were not comparable to those obtained on the remaining animals. Data from 24 animals are recorded in Figure 1.

The average number of parasite eggs per gram of feces for six animals of each group belonging to Herd 1 are given in Graph A of Figure. 1. These data show that the number of parasite eggs in the feces of the treated calves dropped markedly within one week from the beginning of treatment, while that of the control calves remained at a relatively high level for approximately two months. The drop in the egg count of the untreated calves which then occurred was probably due to the feeding of chopped sugar cane trash which may have decreased the rate of reinfection. When phenothiazine was administered to the previously untreated Group 2, the number of parasite eggs per gram of feces dropped to a very low level for the remainder of the experiment. The effect of discontinuing the treatment of Group 1 was not noticeable until about two months had passed when the number of worm eggs per gram of feces increased slightly. The number of parasite eggs passed by the animals in Group 2 which were treated in the last part of the experiment did not increase.

The average number of parasite eggs per gram of feces in three animals in each of the two groups belonging to Herd 2 is shown in Graph B of Figure 1. Although the number of eggs in the feces of the untreated cattle showed marked fluctuations, the same result as that obtained in the previous experiment following treatment is shown in this graph. The discontinuance of the treatment of Group 1 did not bring about an increase in the number of parasite eggs in the feces of these animals.

The average number of parasite eggs per gram of feces in six animals of Herd 3 is shown in Graph C of Figure 1. These data also corroborate the results of the experiment shown in the preceding graphs.

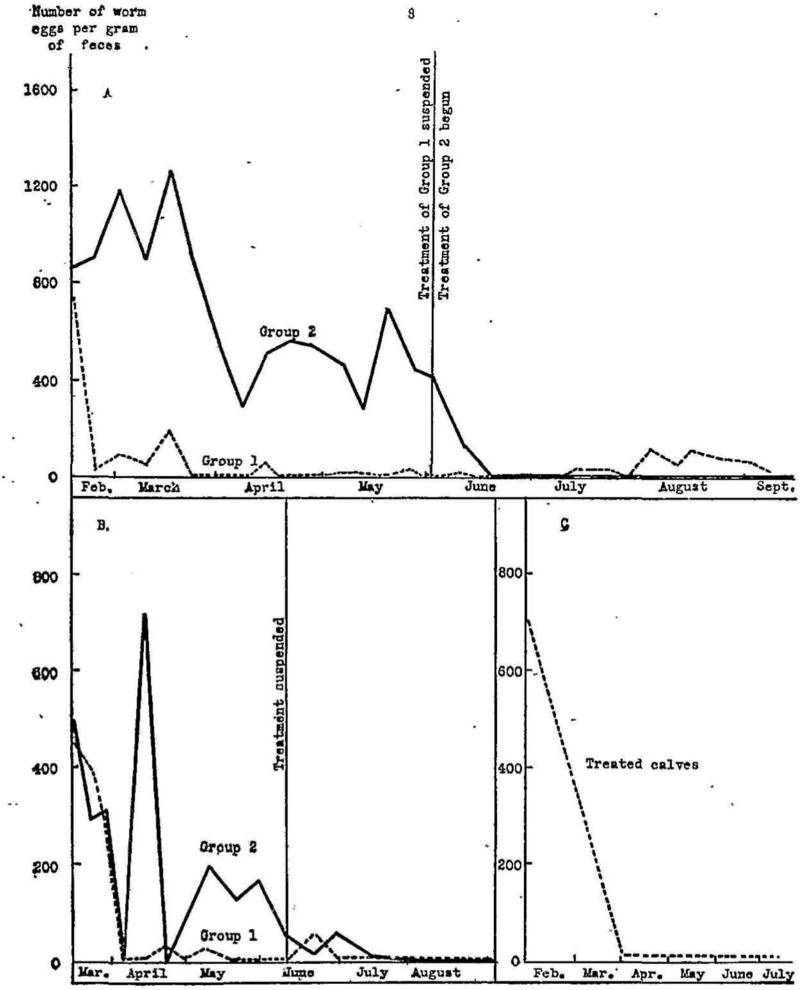

Figure 1. Average number of worm eggs per gram of feces passed by treated and untreated calves.

The data obtained from these three experiments show that the daily or weekly administration of nonconditioned phenothiazine to cattle infected with gastrointestinal parasites at the dose rate of ½ gram per 100 pounds of live weight per day decreased the number of parasite eggs passed unto the pasture by the infected animals to a negligible number.

While a general reduction in the number of parasite eggs in the feces occurred following treatment with phenothiazine, the reduction was not evenly distributed among the various species of parasites harbored by the infected animals. The eggs of the stomach worms, *Haemonchus contortus* and *H. similis,* the intestinal hair-worms, *Trichostrongylus* spp., the hookworm, *Bunostomum phlebotomum,* and the nodular worm, *Oesophagostomum radiatum,* disappeared relatively soon after the beginning of treatment. Those of the small intestinal worms belonging to the genus, *Cooperia,* the thread worm, *Strongyloides papillosus,* and the broad tapeworms, *Moniezia* spp. were not noticeably reduced in number by the treatment.

Effect of daily doses of phenothiazine on cattle and cost of treatment

The only visible sign that the animals were being treated with phenothiazine was the reddening of the urine upon exposure to air. So far as could be observed clinically and from the data obtained on the weight gained by the treated and untreated cattle, no ill effects could be detected during the entire experiment.

At the time these experiments were carried out, nonconditioned phenothiazine was selling at approximately $1.50 per pound. At this price, the daily expense of treating the animals in the three herds varied from .58 to .81 cents per head, the large figure representing the cost of treating the animals in Herd 3 where a slight excess of the compound was mixed with the feed in order to allow for losses due to the unavoidable scattering of the phenothiazine-feed mixture.

Discussion and summary

The results of the foregoing experiments show that daily doses of ½ gram of nonconditioned phenothiazine per 100 pounds of live weight administered to cattle infected with gastrointestinal parasites reduced the number of worm eggs passed unto the pasture by the infected animals. The eggs of the stomach worms, *Haemonchus contortus* and *H. similis*, the small intestinal hair-worms, *Trichostrongylus* spp., the hookworm, *Bunostomum phlebotomum*, and the nodular worm, *Oesophagostomum radiatum*, disappear relatively quickly from the feces of the treated animals. The eggs of *Cooperia* spp., *Strongyloides papillosus*, and the broad tapeworms, *Moniezia* spp., were not markedly reduced in number by this treatment. These results confirm those of Porter, Simms, and Cauthen (1941) showing that phenothiazine has little effect on the last three parasites mentioned. The dose rate used in these experiments compares favorably with that suggested by Shorb and Habermann (loc. cit.) for the prevention of the development of nematode larvae in the feces of sheep.

Acknowledgements

The writers are deeply grateful for the very helpful cooperation of Mr. Sergio Dávila, Mr. W. H. Wildman, and Dr. Morales Otero, who permitted the use of their cattle for these experiments.

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