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METOCLOPRAMIDE HYDROCHLORIDE DID NOT PREVENT 1080-INDUCED VOMITING IN COYOTES

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ABSTRACT: Vomiting is a characteristic, although undesirable effect when using Compound 1080 (sodium monofluoroacetate) as a method of predator control for coyotes. Compound 1080 meat baits with (treatment) and without (control) an antiemetic, metoclopramide hydrochloride (MH), were fed to captive coyotes to determine whether MH would prevent vomiting. All treatment and control animals died as a result of consuming the 1080 bait with no difference between the groups in time from bait consumption to death. There was no significant difference between the number of treatment and control animals that vomited after consuming the baits. Likewise there was no difference between the treatment and control groups in the time from consuming 1080 to vomiting, the duration of the vomiting period, or the number of times each animal vomited. Despite indications in the literature to the contrary, MH did not prevent 1080-induced vomiting in coyotes.

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INTRODUCTION

Vomiting is a characteristic behavior of dogs (*Canis familiaris*) (Buck et al. 1976) and coyotes (*C. latrans*) (pers. obs.) poisoned with Compound 1080 (sodium monofluoroacetate, Tull Chemical Co., Inc., Oxford, Alabama 36203). Preventing vomiting is desirable because it might reduce the latency to death and might also allow a lower dosage of 1080 since a coyote would metabolize the entire dose rather than regurgitate part of it. In addition, vomitus contaminated with 1080 may be hazardous to nontarget species. Since 1080 is used in Livestock Protection Collars (EPA Registration No. 56228-22); experimentally in tallow, single dose baits (Burns et al. 1985); and in experimental bait delivery devices (Green, unpubl. data) to kill coyotes, an investigation of methodology to reduce 1080-induced vomiting is warranted.

Rathore (1985) used metoclopramide (Maxalon, also known as Reglan) to prevent 1080-induced vomiting in wild pigs (*Sus scrofa*). He also stated, without presenting data, that metaclopramide prevented vomiting in penned dogs given 1080 baits. I treated coyotes with 1080 baits with and without metoclopramide hydrochloride (MH) (Reglan, A. H. Robbins Manufacturing Co., Richmond, Virginia 23220) to determine whether the antiemetic would prevent vomiting.

METHODS

The study was conducted in 1986 at the U. S. Sheep Experiment Station, a research facility of the U. S. Department of Agriculture, Agricultural Research Service, Dubois, Idaho. All coyotes in the study were at least 1 year old, and with the exception of 2 animals, had been reared in captivity at the Sheep Station. The 2 wild-caught coyotes were in kennels for 2.5 months prior to the study. Coyotes were housed in kennels (3.7 x 0.9 x 2.1 m) constructed of chain-link fencing with concrete floors. Food (dry dog pellets) and water were provided *ad libitum.*

Coyotes used in the study were initially fed untreated baits for several days to establish that they would eat the baits within 10-15 min. Baits were made by rolling approximately 10 g of fresh ground beef into a ball. Coyotes were treated by allowing them to eat a single bait placed on the floor in their kennel. Two coyotes that ate the baits readily were given baits containing 10 mg MH (powder form) on 3 different days to determine whether or not MH caused any aversion.

Subsequently, each bait contained 5 mg of active ingredient 1080 (Am. Soc. for Test, and Mater. 1976). Solution for 1080 baits was prepared at 1 time by mixing 55.0 mg technical Compound 1080 (= 50.0 mg active ingredient), 5.0 mg Rhodamine B dye for a marker, and 10.0 ml water. In baits for control coyotes, 1 ml of the 1080 solution was injected into a meatball. Treatment-coyote baits were prepared by kneading powdered MH (20-388 mg) into the ground meat followed by injection of 1 ml of 1080 solution.

Generally, baits were chemically treated immediately before tests, and 2 coyotes were tested simultaneously in the morning. Each coyote was assigned randomly as a control (1080 only) or treatment (1080 with MH) animal. An observer recorded when the bait was consumed, when vomiting occurred, time between the first incidence of vomiting and onset of convulsions, duration and nature of convulsions, and time of death.

Chi-square was used to test for differences between the number of treatment and control animals that vomited. Linear regression was used to determine if there was a correlation between body weight and time to death, and t-tests were used to compare various treatment and control means. Statistical significance was accepted at $\underline{P} \leq 0.05$.

RESULTS AND DISCUSSION

Most coyotes consumed the untreated bait although not all consumed it quickly enough to be included in the study. Additionally, some coyotes would not eat bait with people present. Therefore, for some coyotes, the observer would leave the area after placing the bait and return later. Consequently, the exact time of bait consumption was not known for these animals, and their data are expressed as a mid-point value plus or minus a range of time. In calculating means, the midpoint value was used, i.e. the value used for time to death for coyote 624 was 261 min (Table 1). The 2 coyotes fed bait with MH only, showed no obvious reaction or aversion to the antiemetic.

All treatment and control animals died as a result of consuming the 1080 bait. Time to death did not differ between treatment and control animals (Table 1). Time to death was quite variable. One control coyote (599) died sometime

[1] At the time of this study, J.S. Green was a research wildlife biologist with the U.S. Department of Agriculture's Agricultural Research Service at the U.S. Sheep Experiment Station near Dubois, Idaho.

Table 1. Results of feeding captive coyotes 1080 baits with (treatment) and without (control) the antiemetic, metoclopramide hydrochloride (MH). (All times are minutes.)

Coyote No./ Sex/ Age	Body wt (kg)	mg MH/kg body wt	Total MH (mg)	Time from eating to		Duration of		Total times vomited	Time from eating to death
				Emesis	Seizure	Emesis	Seizure		
Treated Coyotes									
530/F/4	8.4	2.4	20	250	260	10	31	6	295
652/F/3	6.9	2.9	20	——	186	——[a]	219	0	407
639/F/1	7.9	5.1	40	182	208	24	119	7	328
531/F/4	7.8	5.1	40	361	374	13	6	5	382
624/M/1	9.8	6.1	60	170±10[b]	211±10	36	50	4	261±10
623/M/1	10.1	5.9	60	——	450±30	——	?[c]	0	510±30
619/F/1	8.3	9.6	80	181	216	30	14	4	230
641/F/1	8.4	9.5	80	238	240	11	30	4	274
644/M/1	10.5	9.5	100	310±62	311±62	1	28	1	339±62
638/M/1	9.9	10.1	100	?	279±27	?	50	1	331±27
524/M/4	12.8	20.0	278	358±45	393±45	32	80	5	473±45
561/M/3	8.9	40.0	388	413±45	440±45	21	31	3	471±45
Mean(SE)	9.1(0.5)			274(95)	297(90)	20(8)	60(25)	3(1)	358(26)
Control Coyotes									
513/F/4	8.6	0	0	267±15	286±15	19	15	5	301±15
599/F/2	9.7	0	0	——	530±10	——	?	0	660±1315[d]
620/F/1	8.4	0	0	170	207	36	26	12	241
629/F/1	7.3	0	0	158	178	19	8	6	191
631/M/1	9.1	0	0	310	313	1	20	1	334
642/F/1	8.4	0	0	364	410	30	15	5	425
643/M/1	8.3	0	0	285	306	11	13	2	320
647/F/1	7.9	0	0	——	235	——	24	0	260
653/M/6	9.4	0	0	——	490	——	37	0	528
Mean(SE)	8.5(0.3)			259(110)	328(116)	19(9)	20(8)	3(2)	325(38)

[a]Coyote did not vomit.
[b]Represents a range of time from 160-180 min (see text).
[c]Beginning time for the event was not observed.
[d]Excluded from mean value calculation (see text).

between 11 and almost 22 hours after consuming the bait, and the time-to-death value for this coyote was omitted in determining the mean time to death for control coyotes. Two coyotes (531 and 641) only ate a portion of their bait, but neither showed obvious differences in behavior when compared with the other animals. The oral LD_{100} for 1080 in coyotes as determined by oral gavage was estimated at about 0.16 mg/kg (Connolly 1980). Using this value, the lethal doses for coyote 531 and 641 were about 1.25 and 1.34 mg 1080, respectively. Since the baits they received contained 5.0 mg 1080, consumption of as little as 25 % of the bait could have been lethal. Burns et al. (1985) found 100% mortality only with baits containing 5 mg active ingredient 1080.

In animals that vomited, prevomiting behaviors (e.g. gaping, hunched back) were the first obvious symptoms of 1080 poisoning. There was no difference between the number of treatment (67%) and control animals (83%) that vomited after consuming 1080. Likewise, there was no difference in the time from consuming 1080 to vomiting, the duration of the vomiting period, or the number of times each animal vomited between treatment and control groups.

Immediately following the vomiting phase, a period marked by frenzied running, barking, convulsions, and seizures began. Again, there was no difference between treatment and control animals in the time from consuming the bait to onset or duration of the convulsive phase. The convulsive

phase was evident and similar in all animals. Further description of this phase in dogs is given by Buck et al. (1976).

There was a positive correlation ($r = 0.78$) between body weight and latency to death among the control (1080 only) animals, i.e. heavier animals lived longer after consuming the bait. Sample size among the different MH treatment levels was insufficient to allow a similar analysis in the treated coyotes.

Subsequent to this study, Rathore (pers. comm.) stated he used metaclopramide at the rate of 5-10 mg/kg body weight with 1080 for dogs, and 75% of the dogs vomited. He did not indicate the number of dogs that vomited when treated with 1080 only. Nevertheless, Rathore's figure of 75% is probably not different from the results of my study (67%). I conclude that MH did not prevent vomiting, did not significantly influence the onset or duration of the vomiting or convulsion phases, nor affect latency to death. Although MH was not effective in this study, it may have application in treatment of coyotes with other compounds that are highly emetic, e.g. chemosterilants (Stellflug et al. 1984).

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