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A STUDY OF RODENT REPELLERS FOR HOUSE MOUSE CONTROL

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Published and unpublished reports of electromagnetic rodent repellers controlling rats, mice, and pocket gophers have stimulated the interest of poultrymen. The December 1975 Poultry Digest contained a report of excellent mouse control on an egg ranch in northern San Diego County following the installation of an "Amigo" rodent repeller. Dr. Harry Muller, Extension Poultry Scientist at the University of Georgia, in a recent letter said he observed rather good rodent control in the field with rodent repellers, particularly of the Norway rat and, in many cases, of mice in open southern-type poultry structures. It is claimed that the electromagnetic fields created by the repellers cause wild rodents to become disoriented and lethargic, lose interest in eating and die.

There are local quantitative data showing a lack of pocket gopher control with rodent repellers. San Bernardino County Farm Advisor Jack Davidson conducted a test during 1976-1977 on pocket gophers in an 80-acre alfalfa field with four "Nature Shield" repellers and found no reduction in pocket gopher activity as measured by the number of active gopher mounds. In a second test between January and March 1977, he used an experimental repeller on a small pasture, also with no reduction in pocket gopher activity. Paul Moore, Superintendent of Agricultural Operations at the University of California research farm at Riverside, observed the performance of an Amigo repeller between February and April 1976 and concluded it was ineffective under their field conditions in controlling pocket gophers.

Experts on vertebrate pest control say they are unaware of any research data to support the claims made for rodent repellers and are reluctant to accept testimonials and news articles. Since reports from both San Diego County and Georgia lack data collected under controlled test conditions, we decided to undertake a study to collect such data on mice.

Procedures

An older egg ranch in San Bernardino County with single-aisle open housing was found in November 1976. The ranch was heavily infested with the common house mouse (Mus musculus). In order to minimize the fly problem on this 80,000-hen ranch, the operators use a program of integrated biological fly control; droppings accumulate under the cages and upon cleanout, a pad of dry droppings remains, with a supply of beneficial predatory insects. While such management in this area leads to improved fly control, it also provides conditions that favor the development of mouse populations.

In December 1976, high mortality was observed among domestic cats living on this ranch or nearby. Late in January 1977, 10 cats were imported from another egg ranch, bringing the total cat population to approximately 20. From April through June, 1977, cats were observed hunting mice and appeared to be vigorous.

Two rodent repellers were installed at opposite ends of the test ranch on 120-volt power lines. At point X-1 (Figure 1) an Amigo Rodent Repeller Phase 2[1/] was installed, while at point Y-1 a similar

1/ Supplied through the courtesy of Robert Brown, Mira Manufacturing Corporation, Pine Valley, CA 92062.

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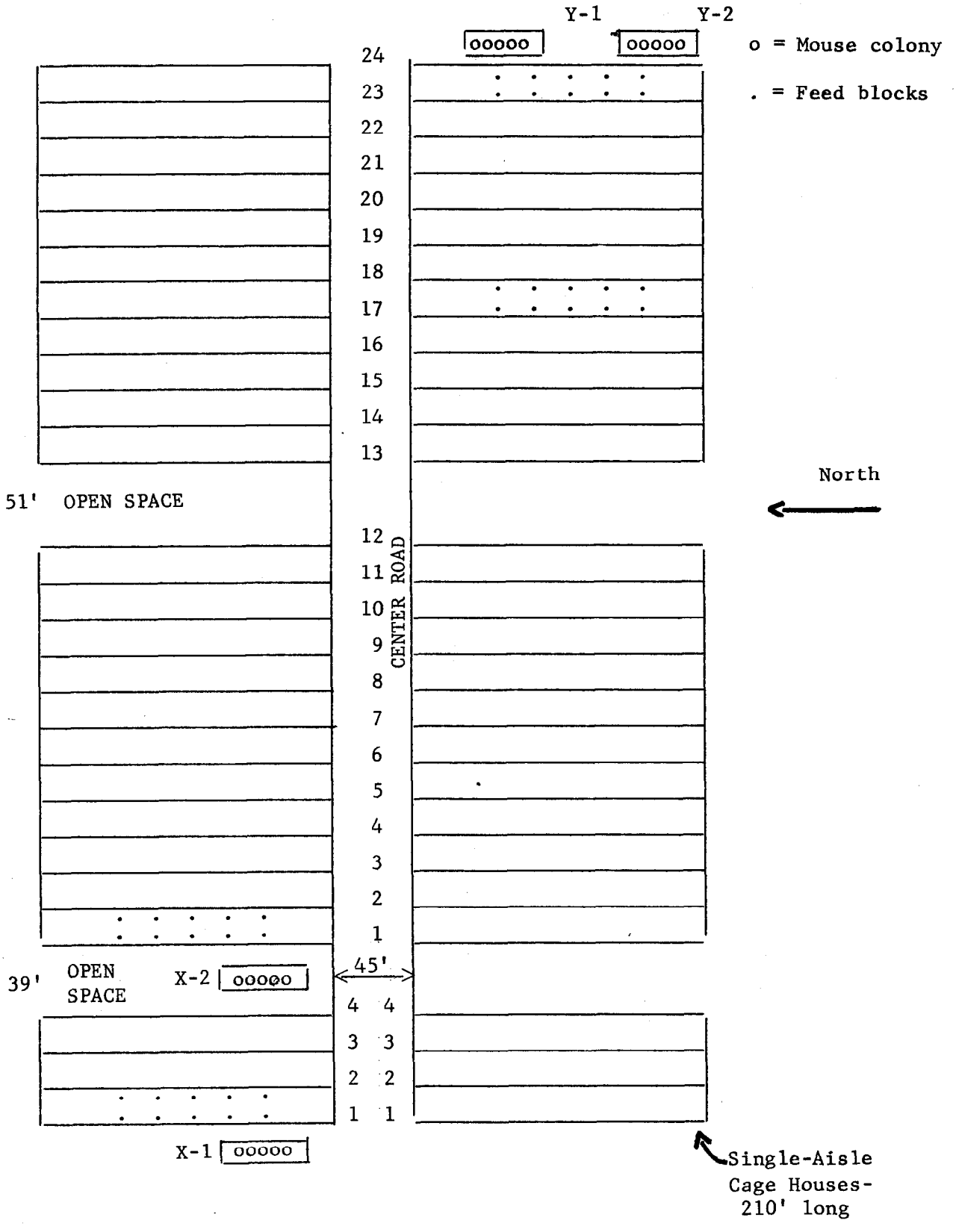
Fig. 1 - Ranch layout and location of repellers, feed blocks, and mouse colonies



device distributed by Resource Conservation[2/] was intalled; both devices were mounted in accordance with directions on 10-foot-long sections of 3/4-inch pipe driven 9 feet into the ground. The distance between X-1 and Y-1 was approximately 470 feet.

In part A of the test, observations were made on the consumption of feed blocks before and after using the devices. Feed blocks were made by mixing one part of hot paraffin with four parts of lay mash and forming 50-gram blocks in muffin-tin paper cups. While the mixture was still warm, a loop of light-weight wire was inserted so each block could be tagged. Two blocks were fastened by means of these loops and paper clips to a staple in the center of a 5" x 10" board. To keep the boards on top of the poultry droppings, dowels about 6 inches long, pointing downward, were placed at each end of the boards. The feed blocks were covered by the top of a styrofoam egg carton, with the ends cut out for mice to enter and leave.

Feed blocks were exposed to the mice at weekly intervals for 44 to 46 hours from January 18 to April 4, 1977 (6 weeks before and 6 weeks after starting the repellers on March 2). Observations for week 7 began immediately after starting the repellers.

Partial removal of manure below the cages began on March 3 and extended to March 14 after which the manure was rototilled. At each exposure before and after feeding, weights were obtained on 80 feed blocks; blocks were re-used if they weighed more than 30 grams. The dots in Fig. 1 show the location of each set of feed blocks; 10 in the row next to the Amigo repeller, and 10 more in row 2. Beyond the open 39-foot space 10 blocks were set in row 1 and 10 more in row 2. Blocks were placed in the same manner for the Resource Conservation (R-C) repeller at location Y-1.

Part B of the test involved the confinement of wild mice in modified metal wastepaper baskets. Wild mice were captured with live traps manufactured by H. B. Sherman Company, Rte. 4, 529-X-2, Tallahasee, Florida 32304. Captured mice were released in a 30-gallon plastic barrel where they were dusted with 5% Sevin® to control external parasites. Mice were handled using leather gloves, holding them up by their tails for sexing and placing one male (left ear clipped) and two females to a basket to establish a colony. Each basket had an inch of lay mash on the bottom, a few small rags, and two aluminum soft-drink cans for nesting. The top of each basket was covered with ¼-inch hardware cloth fastened by rubber bands and paper clips. At first, in the belief that mice needed very little moisture, a fresh carrot was added once a week. Later a fresh carrot and fresh sliced orange were added three times a week in addition to providing a test tube waterer.

Forty colonies were observed between March 2 and March 30. Five colonies were placed near the Amigo repeller--point X-1 --starting at a distance of 5½ feet and extending away from the repeller. At X-2 were five more colonies, approximately 52 feet from the Amigo repeller. The same arrangements were made for the R-C repeller at locations Y-1 and Y-2. The remaining 20 colonies were placed on another egg ranch (owned by the same company) about 2 miles away. At each location the mice were protected from the weather by a low shelter constructed of wood and corrugated metal roofing.

On March 30 the surviving mice were randomly distributed and additional mice were captured to re-establish the colonies at X-1, X-2, Y-1, and Y-2. Only 10 colonies were re-established at the control location.

Results and Discussion

The percentage of feed blocks eaten each week over a 12-week period is shown graphically in Fig. 2. By chance, the mouse population was higher in the vicinity of the R-C repeller, resulting in a greater consumption of the feed blocks.

As indicated by the consumption of feed blocks, the ranch had a substantial population of mice 6 weeks after starting the repellers, evidently not much lower than that found at the start. During weeks 10

2/ Supplied through the courtesy of James Dizon, Resource Conservation, Inc., 1888 Century Park East, Century City, Suite 420, Los Angeles, CA 90067.

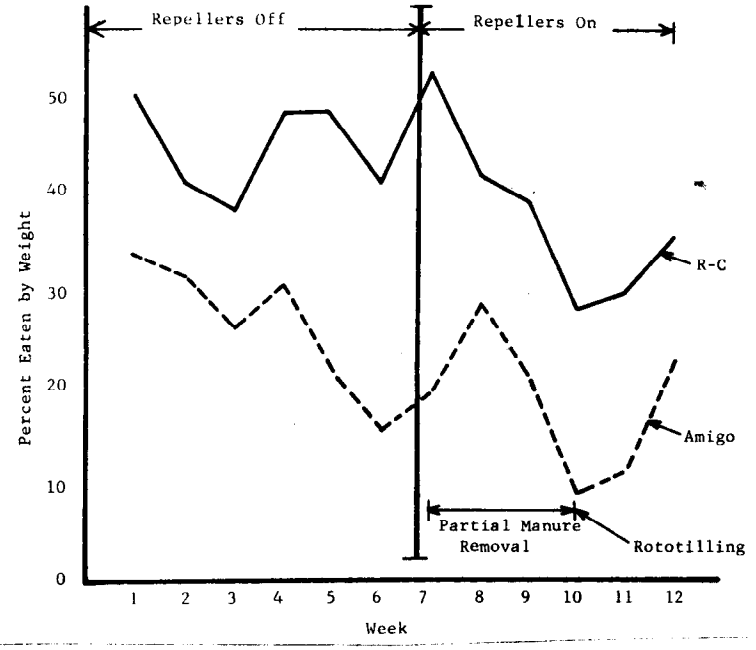


Fig. 2. Percentage of feed blocks eaten by mice during 44- to 46-hour periods at weekly intervals six weeks before and six weeks after starting the rodent repellers.

and 11, lower consumption of the feed blocks coincided with the rototilling that followed manure removal, but consumption increased during week 12. Because of the lower consumption of feed blocks during weeks 10 and 11, it was decided to compare statistically the three weeks before starting the repellers (4, 5, and 6) with the three weeks after (7, 8, and 9). The percentage of the feed blocks eaten after starting the repellers was not significantly different (Table 1). Actual amounts eaten are shown in Table 2.

Livability data on the mouse colonies in modified wastepaper baskets between March 2 and March 30 are shown in Table 3. March 1977 was a warm, dry month at the test site, which apparently increased mortality. On various treatments the number of baskets with all three mice dead and the number of baskets with one or more live mice were very similar, indicating no response to rodent repellers under these conditions. Numbers of mice surviving the various treatments appear in Table 4. No litters were produced.

After capturing additional mice and modifying procedures to supply more dietary water, we repeated this part of the test between April 1 and June 1--a 62-day period. Much better livability was obtained (Tables 5 and 6). There were eight baskets with survivors at the location where the Amigo device was installed and nine where the R-C repeller was installed. Problems occurred on the control ranch where tops were torn off five of the baskets in mid-April, perhaps by a large dog or a skunk. The remaining baskets were moved to a shop where the mice had more protection from both predators and weather. Livability was higher in the controls (Table 6), 93 percent compared to 63 and 74 percent, respectively, for the Amigo and R-C repellers. Some cool, wet weekends on the test ranch in late April and May, together with low levels of feed in the bottom of the baskets, probably accounted for the difference in livability. Reasonably good livability was observed on all three treatments, indicating no great variation in response under test conditions.

No litters were produced in the period ending June 1. Mouse colonies were maintained on the test ranch until July 1, 1977, and the R-C repeller continued in operation. The first litter was produced on June 13 in the set of baskets starting 5½ feet from the R-C repeller. It has been reported that wild mice require three

Table 1. Percentage of paraffin-feed blocks eaten by mice before and after use of rodent repellers

Period	Amigo	R-C	Both
3 weeks before	22.9%	46.3%	34.6%
3 weeks after	23.2	45.2	34.2
	NS*	NS	NS

*NS = nonsignificant difference.

Table 2. Average amount eaten per ten paraffin-feed blocks

Period	Amigo	R-C	Both
3 weeks before	107.2 g	231.6 g	169.4 g
3 weeks after	129.4	258.0	193.7
	NS*	NS	NS

*NS = nonsignificant difference.

Table 3. Mouse colonies in baskets, March 2-30

	Amigo	R-C	Control
Number March 2	10	10	20
Escaped/accidental loss	1	0	3
Alive March 30	5	4	9
Dead by March 30	4	6	8

Table 4. Number of mice, March 2-30

	Amigo	R-C	Control	Total
Number March 2	30	30	60	120
Alive March 30	12	7	17	36
Percent alive and captive March 30	40%	23%	28%	30%

Table 5. Mouse colonies in baskets, April 1-June 1

	Amigo	R-C	Control
Number April 1	10	10	10
Escaped	1	0	5
Alive June 1	8	9	5
Dead by June 1	1	1	0

Table 6. Number of mice, April 1-June 1

	Amigo	R-C	Control	Total
Number April 1	30 (27)*	30 (27)	30 (14)	90 (68)
Alive June 1	19	20	13	52
Percent survival**	63%	74%	93%	76%

* ( ) Number after adjusting for escapes.

** Number alive June 1 divided by adjusted number April 1 x 100.

weeks to adjust to the stress of confinement before starting to reproduce, but under our conditions, it took much longer.

One manufacturer of rodent repellers felt that the baskets provided the test mice with all their essential requirements and that it would be difficult to determine if they were disoriented under those conditions. Another consideration was the possible shielding of the mice from electromagnetism by the metal wastepaper baskets. Observations with a small transistor radio at points inside and out of the baskets 5¼ feet from each repeller indicated no reduction in the reception of electromagnetic impulses from the Amigo but a moderate reduction from the R-C repeller. Changing to plastic baskets 5¼ feet from the R-C repeller between June 19 and July 1 had no obvious effect on five colonies. On May 20, use of the Amigo rodent repeller was discontinued because it interfered with radio and TV reception nearby. The manufacturer said he could provide a shield for the repeller.

Various statements have been made by vendors of rodent repellers on the time required for mouse control: the first said, 7 to 21 days; a second said, 1 to 10 days; a third said that if it takes 30 days it is not going to work; and a fourth said from 2 to 3 months. In this test no changes in mouse behavior were observed. There were no indications of control as measured by the amount of feed block eaten by free-roaming mice or by livability of mouse colonies. However, because of numerous reports of repellers working, it may be well to repeat such studies, perhaps with repellers manufactured by other companies. Mouse population on the egg ranch gradually declined to a low level by late June, which is more likely related to partial removal of manure, rototilling, vigorous cats, and reduced breeding due to warmer weather.

After the R-C repeller had been operating for 6 weeks, fresh gopher mounds appeared 20 feet to the north and other mounds appeared 20 feet to the south.

Summary

1. Data were collected on the consumption of feed blocks by wild mice before and after the operation of rodent repellers on a large egg ranch. Under the conditions described, there was no indication that the repellers reduced the mouse population as indicated by the consumption of feed blocks.

2. In this test, captured wild mice placed in containers showed no reduction in livability when exposed to rodent repellers. Reproduction in captured wild mice was much delayed and apparently not influenced by rodent repellers.

3. Because both successful and unsuccessful control of rodents has been reported with electromagnetic devices, more scientific data should be collected. Test data should be developed and provided by manufacturers of such devices as a responsibility to prospective buyers.

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To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products not mentioned.

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