Authorized Reprint 1988 from Special Technical Publication 974 1988 REP 1988-068

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A Test Method That Evaluates Avian Perch Repellents

REFERENCE: Scott, E. J. and Schafer, E. W., Jr., **"A Test Method That Evaluates Avian Perch Repellents,"** *Vertebrate Pest Control and Management Materials: 5th Volume, ASTM STP 974,* S. A. Shumake and R. W. Bullard, Eds., American Society for Testing and Materials, Philadelphia, 1987, pp. 52-55.

ABSTRACT: A cage design and test method that evaluates the efficacy of tactile avian perch repellents in the laboratory is described. Pigeons, starlings, and house sparrows were tested. Efficacy was demonstrated by a chi-square analysis of the time spent on perches by pigeons and starlings. Activity of individual birds exposed to three to five perches over a 2 to 4-h period was monitored. Pressure-sensitive microswitches were used to monitor activity, while counter and event recorders registered the number of landings and total time spent on each perch. Closed-circuit TV provided a visual record of bird activity without human disturbance. Examples of tests run with four avian perch repellents and pigeons demonstrated the differences in bird response and efficacy of the four products.

KEY WORDS: laboratory test, perch repellency, birds, pigeons, starlings, house sparrows

The U.S. Environmental Protection Agency (EPA) currently maintains registrations for tactile avian perch repellents that control nuisance birds in rural and urban areas. These products discourage perching and roosting activities of pest birds on structures where their fecal material and feathers can create a nuisance and a potential fire and health hazard. As far as we know, no existing cage design or test method has been published that evaluates the efficacy of avian perch repellents. We present a simple cage design and test method that assesses the efficacy of avian perch repellents in the laboratory.

Methods

The prototype cage used for testing pigeons (rock doves, *Columba livia*) was constructed of 2.5 by 5.1-cm pine firring strips and 2.5 by 5.1-cm welded wire (Fig. 1). It was 1.8 m in length by 0.6 m wide by 0.7 m high. For testing house sparrows *(Passer domesticus)* and European starlings *(Sturnus vulgaris),* the same cage was used with a 0.64-cm-thick plywood sheet dividing the cage into two 0.9-m sections. The cage back was 0.64-cm-thick plywood—one side had a door with spring hinges so birds could be inserted, removed, fed, and watered. Perch slots were located throughout the cage sides at three heights (10, 30, and 50 cm). The cage sat on 0.64-cm-thick wooden slats which rested on a 0.64-cm-thick plywood sheet for easy removal of the paper used to catch droppings and food.

Three sizes of pine dowel (0.64, 1.3, and 1.9 cm diameter) and two lath strips (0.64 by 5.1 cm) were used in the test cage. One end of each perch mounted over an integral lever microswitch on

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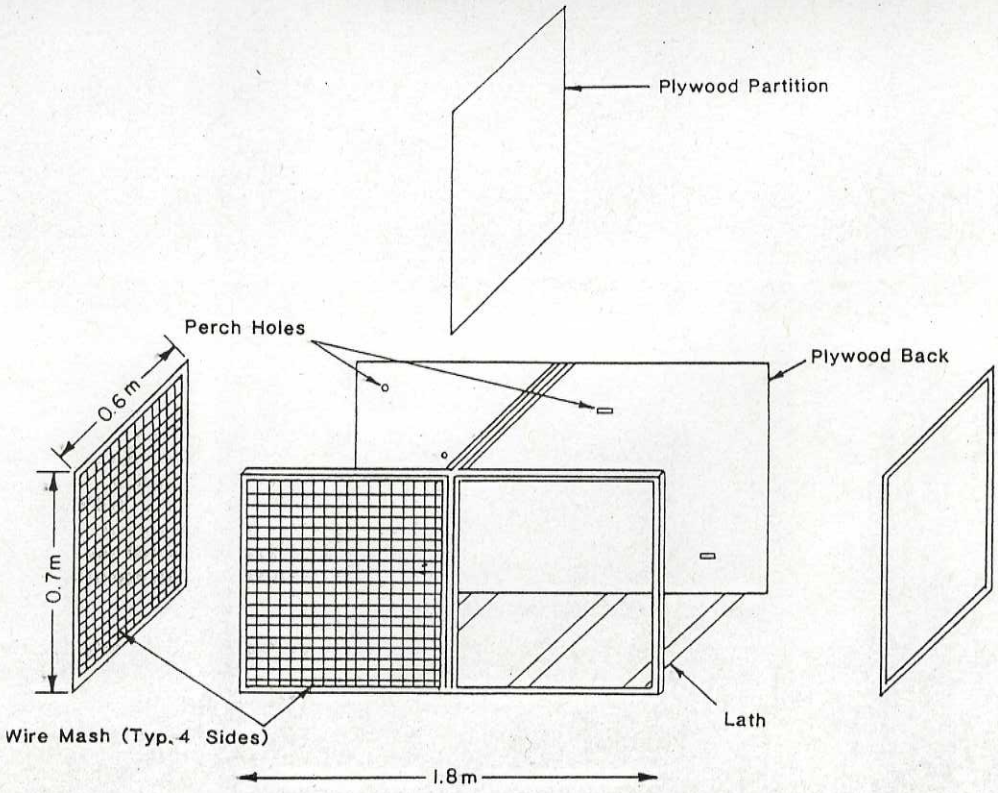

FIG. 1—*Test cage design to evaluate avian perch repellents.*

the plywood cage side. Each switch had a 7-g-minimum and a 40-g-maximum operating force and required a pretravel distance of 0.22 cm to accurately indicate bird excursions on and off the perch. Each switch connected to timers and event counters that recorded the number of landings and the total time on each perch.

With pigeons, each perch was partially supported by an elastic band so that the pigeon's weight triggered but did not damage the switch. With starlings and sparrows, the elastic band was also used; however, additional weight was added to the end of the perch so that activation of the switch occurred when the bird landed. In order to eliminate any observation bias, the cage front faced an access window 1.8 m away. A closed-circuit TV camera located at one end of the cage allowed all five perches to be observed remotely.

To determine the amount of time the birds spent on untreated perches, we conducted a pretest. Six pigeons were individually observed for a total of 26 h; three starlings were individually observed for a total of 12 h (see Table 1).

Each bird was placed in the test cage for an adjustment period of 18 h with three to five perches. Perches were covered with masking tape to prevent absorption of the perch repellent. During this period, the bird's behavior was observed for perch size, shape, and height preferences. The test period of 2 to 4 h followed and was conducted between 0600 and 1000 h. Each bird was offered a choice of one or two treated (preferred) perches and two to four untreated (nonpreferred) perches. Water and food were available throughout the adjustment and test periods.

TABLE 1—*Amount of time that pigeons and starlings spent on perches during the pretest period.*

Species	Number of Birds Observed	Total Time Observed, min	Total Time Spent on Untreated Perches, min
Pigeons	6	1560	580
Starlings	3	720	139

Tests of each product and each species were replicated two to five times with untested birds. Four avian perch repellents were chosen; the trademarks are not given because the study's purpose was to evaluate the cage design and test method, not the chemical. Brand A was "oily" and not very viscous, while Brand B was oily, but quite viscous. Brand C had a toothpaste-like viscosity, and Brand D had a caulk- or grease-like viscosity. A chi-square analysis tested significance between the pretest and the test periods.

Results/Discussion

The adjustment periods with pigeons indicated that they preferred 50-cm level, 1.9-cm dowel and 0.64 by 5.1-cm lath perches. Starlings, on the other hand, preferred 0.64 by 5.1-cm lath and 1.3-cm dowel at the 50-cm level, and sparrows preferred 10 and 30-cm level 0.64 and 1.3-cm dowel.

Table 2 presents the results of the commercial products tested with all three species of birds. Starlings preferred to rest on the floor, not on treated (preferred) or untreated (nonpreferred) perches, while pigeons used the treated (preferred) perches more than the other perching surfaces in the test cage. Brand A did not deter pigeons from perching, but the other brands initially repelled them from treated (preferred) perches.

One interesting and little-documented problem with avian perch repellents was noted during the testing. Severe feather fouling resulted from the use of Brand A. Although pigeons and

TABLE 2—*Comparison of the average perch time of pigeons, starlings, and sparrows exposed to perch repellents for 3 h.*

Perches	Average time on Perches, s			
	Brand A (5)[a]	Brand B (3)	Brand C (2)	Brand D (2)
Treated (preferred)				
Pigeons	6479	8	62	240
Starlings	4	...	...	...
Sparrows	2	...	...	...
Untreated (nonpreferred)				
Pigeons	540	7	0	0
Starlings	16	...	...	...
Sparrows	63	...	...	...
Floor/other				
Pigeons	3781	10785	10738	10560
Starlings	10780	...	...	...
Sparrows	10735	...	...	...
Total time for each species	10800	10800	10800	10800

[a] Number of birds tested.

starlings were able to preen themselves clean within 24 h of exposure to this less viscous repellent, sparrows were unable to thoroughly preen themselves and had to be cleaned with towels or they would have died. Death was not a desired event for this study because we were interested in the development of a test method, not the evaluation of chemicals. The more viscous brands, such as Brand B, caused less feather fouling, particularly with sparrows. Although we did not attempt to quantify this effect, it could easily be done by visually estimating the extent and amount of fouling that occurred on each bird.

We noted, after many trials, that the perch repellent with a toothpaste-like viscosity (Brand C) did not stop pigeons from landing on treated perches. Pigeons moved about the perches treated with this material and removed the originally applied repellent; the perch was no longer coated within 3 h.

The repellent with a caulk- or grease-like viscosity (Brand D) and with a high degree of "tackiness" was most effective. Pigeons rested on a water pan's edge that was placed in the cage bottom to deter them from resting on the floor rather than return to treated or untreated perches.

A chi-square analysis of the time spent on the perches before and during treatment gave a highly significant difference at the 1% level for pigeons ($X^2 = 1298.3$, $p_{0.01,1} = 6.64$) and starlings ($X^2 = 63700.4$, $p_{0.01,1} = 6.64$) (house sparrows were not pretested). From these highly significant values, we interpret that the cage design and test method provide a viable means to evaluate perch repellents.

Summary

This cage design and test method permit, with proper statistical considerations, comparative evaluations of the efficacy of avian perch repellents in the laboratory. The advantages of this cage design and test method are the following:

1. Products can be tested for their effectiveness on different species of pest birds.
2. The test method is simple.
3. Construction materials and cage facilities are relatively inexpensive.
4. Perch repellent products and formulations can be compared with each other.
5. Feather fouling can be documented and perhaps quantified.

Future Research

The authors suggest testing perch size and location separately to better understand which perches and the location of those perches each species prefers. Also, the number of birds needed for solid statistical analysis for each species needs to be determined for testing purposes; our tests were preliminary in nature so we only tested two to five birds per product. Further research could also be done on quantifying feather fouling and its effects on birds for various perch repellents. And finally, other perch repellents could be tested with this method to add to the knowledge base of perch repellents.