

Evaluation of chemically treated wire coating to deter chewing by rodents

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Research team: Courtney L. Daigle* (PI), Peter Tutini**, and Logan Luskey*

*Animal Behavior and Welfare Laboratory, Department of Animal Science, Texas A&M University, College Station, TX

**Aversion Technologies, Inc, Annapolis, MD

Highlights

- Treated wires deterred chewing by rats
- Treated wires were more effective in deterring chewing in male rats compared to females
- Rats may learn to avoid chewing wires over time

Animals & Housing

Adult male (n = 12) and female (n = 12) Sprague-Dawley rats were individually housed in twenty-four (24) standard laboratory-rat cages (41 x 25 x 19 cm each). All rats will had access to *ad libidum* food and water through food hoppers and water bottles attached to the outside of the cages. All rats were provided with nesting paper during the times in which samples were not being tested. After sample testing had concluded, clean nesting paper was added to each cage. The rats were housed in a 12:12 light:dark cycle and ambient room temperature was maintained throughout the study at 22°C.

Sample testing protocol

A repeated Latin square design was used to evaluate the efficacy of the product to deter rat chewing. Rats were exposed to a single sample (approx. 2 inches long) for 24-hours without access to nesting material. Wires were classified as either “treated” or “untreated”.

At the end of the 24-hour testing period, the samples were removed, scored (Table 1), and photographed. Rats were then provided with nesting material for a subsequent 24-hour period without access to any samples. At the end of the 24-hour period without sample access, all nesting material was removed, and the next treatment was placed in the cage for an additional 24-hour period. This process was repeated so that each animal experienced each treatment twice in alternating order.

Statistical analysis

The impact of treatment, gender, and repetition and their interactions on wire chewing scores were evaluated with a General Linear Model (PROC GLM) in SAS v9.4. Differences among main effects were evaluated using Least Squared Means. Significant differences were identified at $P < 0.05$ and tendencies were identified at $P < 0.10$.

Results

The interaction between gender and treatment ($P = 0.02$) and the main effect of treatment ($P = 0.0003$) influenced wire scores. Treated wires had lower wire chewing scores (e.g., were chewed less) compared to untreated wires (Figure 1a). The treated wires had the lowest chewing scores for males exposed to treated wires (Figure 1b).

Wire scores in repetition 2 tended ($P = 0.07$) to be lower than wire scores in repetition 1 suggesting that the product may have long term efficacy beyond initial exposure. The remaining interactions, and the main effect of gender ($P = 0.13$) did not influence wire scores ($P > 0.05$).

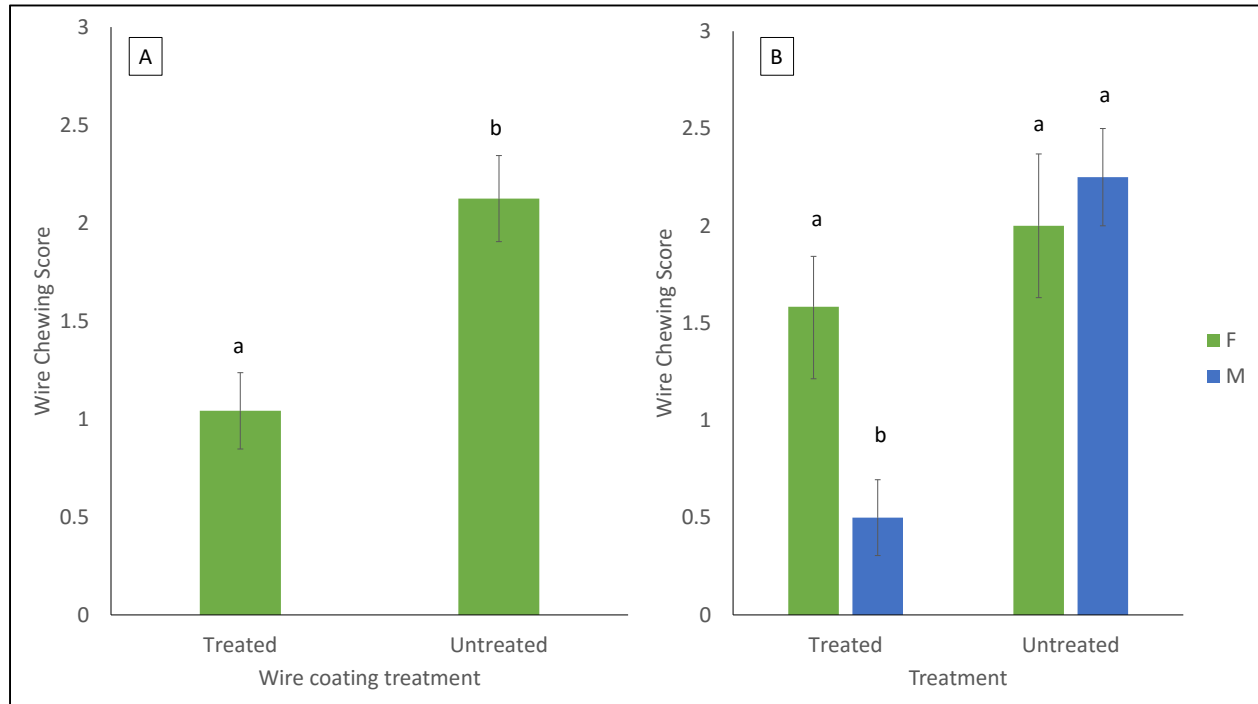






Figure 1: Wire chewing scores for rats exposed to treated or untreated wires (A), and the differences observed between genders for both treatments (B).

Conclusion

Treated wires appeared to deter wire chewing in rats. The efficacy of this product is most pronounced in males, as they were less likely to chew the treated wires compared to the females. There is potential that exposure to treated wires may influence future wire chewing behavior.

Table 1: Wire Scoring Guide

Wire Score	Description	Example	Visual representation
0 – No damage	Wire has no visible damage. Wire appears to be completely intact and functional.	Undamaged intact wire, looks like new.	
1 – Minor	Wire bundle is only very slightly damaged. Damage is not obvious and can only be seen upon close inspection. No wiring is exposed.	One or two single bites into the wire, without any pieces of coating chewed away and no wire exposed.	
2 – Some damage	Wire bundle is somewhat damaged, enough to be seen clearly without close inspection, but not significantly. Wires would most likely still function. Some chewing damage on the outer coating and wires is acceptable but any damage to the internal metal wire would constitute significant damage.	Small sections of the coating may be chewed away exposing small areas of the underlying wires, however there is damaged or frayed pieces of internal metal wiring present.	
3 – Significant damage	Wire bundle is significantly damaged. Wire would most likely not function. Any damage to the internal wire constitutes significant damage as well as chewing damage to the outer coating taking up more than ¼ of the total area of the bundle coating.	Large sections of coating have been chewed away exposing large areas of underlying wires as well as damaged and frayed internal metal wiring.	
N/S – No score	Wire cannot be found in cage/is missing	No wire can be found	