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Proceedings of the Vertebrate Pest Conference

Title

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Permalink

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Journal

Proceedings of the Vertebrate Pest Conference, 19(19)

ISSN

0507-6773

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Publication Date

2000

DOI

10.5070/V419110245

CAGE TRAP MODIFICATIONS THAT ENHANCE THE CAPTURE SUCCESS OF RACCOONS

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ABSTRACT: Raccoons (*Procyon lotor*) often are considered a nuisance species in suburban and urban areas, and thus, must be removed. However, raccoons are capable of removing bait from cage traps without being captured and appear to avoid baits that are infested with fire ants (*Solenopsis invicta*). We modified Tomahawk® cage traps with an extended metal floor that acted as a trip device, hardware cloth wrapped around the back half of traps to reduce the potential of raccoons obtaining bait without entering the traps, and developed a hook upon which to place baits to minimize the probability of fire ants locating the bait. We then compared the proportion of raccoon captures, baits missing, and baits with fire ants between cage traps with and without the modified floor and bait hook. Twenty-five raccoons were caught, 80 baits were stolen, and 108 baits were infested with fire ants during 432 trap-nights. A greater proportion of raccoons were caught in ($G=11.7$, 3 df, $P < 0.01$) and fewer baits were stolen from ($G=11.0$, 3 df, $P < 0.02$) cage traps modified with the extended metal floor than without the modification. Traps equipped with hooks were minimally affected by fire ants present on the baits (i.e., 8 of 216 baits; 3.7%), which was much less ($G=59.0$, 1 df, $P < 0.0001$) than traps without bait hooks (46.3%). Our modifications to cage traps enhanced the capture success of raccoons and should be considered if live-trapping of raccoons is required, especially in areas where fire ants are problematic.

KEY WORDS: fire ants, *Procyon lotor*, raccoon capture rate, trap modifications

Proc. 19th Vertebr. Pest Conf. (T.P. Salmon & A.C. Crabb, Eds.) Published at Univ. of Calif., Davis. 2000.

INTRODUCTION

Raccoons often are considered a nuisance species in suburban and urban areas. They can obtain high densities (Slate 1985), den in occupied residences, and rely on human refuse as food sources (Manski and Hadidian 1987). Exclusion fencing is not always practical or aesthetically pleasing to landowners, and frightening devices only offer a short-term solution to raccoon-human conflicts (Bogges 1994). Thus, animal damage experts often are asked to remove offending raccoons. However, due to the general public concern for animal welfare and safety of children and pets in suburban and urban situations, live-capture of raccoons often is necessary. Raccoons have been captured in cage traps (Hadidian et al. 1989; Rosatte et al. 1992) and in leg-hold traps (Proulx et al. 1993). Unfortunately capture success is often low when using live-capture techniques for raccoons. Factors reported to affect trapping success of raccoons include raccoon population density, age and sex composition, habitat type, season, time of day, and weather parameters (Lotze and Anderson 1979). Trap success is reported to be greatest when temperatures are $<24^{\circ}\text{C}$ (Ivey 1948). Hudson (1978) noted that the probability of capturing raccoons decreased after fruits became abundant. Both situations can pose complications for researchers and trappers in the southern latitudes, especially in areas with abundant precipitation and long growing seasons. To complicate matters further, raccoons are capable of removing baits from cage traps without being captured and appear to avoid baits that are infested with fire ants (C. L. Kerr, pers. observ.). After experiencing low capture rates of raccoons in the coastal plains of Texas, we modified cage traps with extended "trip" floors and bait hooks, and tested the trap success of our modified cage trap to that of the standard trap.

METHODS

The study was conducted on the El Charco ranch located in Nueces County, Texas during July through October 1997. The study area was predominantly an oak (*Quercus* spp.) and mesquite (*Prosopis glandulosa*) community within the riparian zone of the Agua Dulce Creek. Raccoons were captured in $102 \times 30 \times 30$ cm Tomahawk® (Tomahawk Live Trap Co., Tomahawk, Wisconsin 54487, USA) cage traps. Modifications to Tomahawk® traps included an extended metal floor that acted as a trip device, hardware cloth secured onto the back half of traps to reduce the potential of raccoons obtaining bait without entering the traps, and a hook upon which baits were placed. Floor modifications were constructed of 1.5 mm thick galvanized aluminum that were cut into 81×35 cm sheets. Approximately 2.5 cm of each long side of the aluminum sheets were folded upward at 90° angles. Folding the sides of the aluminum sheets increased the rigidity of the structure. The final dimensions of the floor modification were 81×30 cm. Floor modifications were slid into the Tomahawk® traps with the folded side of the structure facing upward. The weight of the floor modification did not affect the trigger mechanism of the Tomahawk® traps. In addition to floors, the back half of modified traps were wrapped in 1×1 cm mesh hardware cloth, which was secured onto traps with No. 12 wire. Bait hooks were constructed of 1 cm diameter aluminum wire that were cut into 18 cm pieces, of which both ends were bent into a hook shape. Hooks were sprayed with Diazinon to reduce the potential of fire ant infestation of baits. Bait hooks were suspended from the top of traps approximately 90 cm from the trap entrance. Ham, cut into 2 cm cubes, was used as bait in each trap. Traps equipped with bait hooks had the ham cubes impaled onto the hook; whereas the

ham cubes were placed onto the floor approximately 90 cm from the trap entrance within the remaining traps. Twelve Tomahawk® traps per trap-night were used; three traps received the extended floor and hardware cloth only, three traps received the bait hook only, three traps received all modifications, and three traps remained unchanged as a control. Twelve permanent trapping locations were selected within the riparian zone of the Agua Dulce Creek. Trap styles were randomly assigned to trap locations for the first trap-night, and then rotated in a cross over design so that each trap style was located at each trap site nine times. Traps were baited at sunset and checked for presence of raccoons, baits, and fire ants the following morning. Captured raccoons were ear-tagged for future recognition and released at site of capture. Traps were cleaned of fire ants before each use and fresh bait was used each evening. Goodness of fit *G*-tests with the Yates' correction for continuity were used to compare the proportion of raccoon captures, baits missing, and baits infested with fire ants between trap styles (Sokal and Rohlf 1995:729-732). Statistical significance was inferred at $P < 0.05$.

RESULTS

A total of 25 raccoon captures, 80 stolen baits, and 108 baits infested with fire ants were recorded during 432 trap-nights (Table 1). Twenty-one individual raccoons were captured during the study of which four were recaptured once. A greater proportion of raccoons were caught ($G=6.67$, 1 df, $P < 0.01$) in cage traps modified with the extended metal floor than without the modification. However, proportion of raccoons captured in traps equipped with hooks did not differ ($G=1.33$, 1 df, $P > 0.25$) from traps where baits were placed on the floor. Eighteen percent of the baits were stolen from all trap styles (Table 1), of which a greater proportion of baits were stolen ($G=11.0$, 1 df, $P < 0.001$) from control traps than those modified with the extended metal floor and exterior hardware cloth. Fire ants infested 25% of the baits; however, <4% of baits placed on hooks contained fire ants. The proportion of fire ant-infested baits was substantially less ($G=59.0$, 1 df, $P < 0.0001$) in traps equipped with hooks than traps without hooks.

Table 1. Proportion of raccoons captured, baits stolen, and baits infested with fire ants for Tomahawk® cage traps modified with an extended metal floor that acted as a trip device, hardware cloth secured onto the back half of traps to reduce the potential of raccoons obtaining bait without entering the traps, and a hook upon which baits were placed to minimize fire ant infestation.

Trap Style	<u>Raccoon</u>		<u>Stolen Baits</u>		<u>Fire Ants</u>	
	No.	%	No.	%	No.	%
Control traps ¹	2	1.8	40	37.0	57	52.8
Hook only ¹	2	1.8	23	21.3	2	1.8
Floor only ¹	9	8.3	14	13.0	43	39.8
All modifications ¹	12	11.1	3	2.8	6	5.6
Modified floor ²	21	9.7 ³	17	7.9 ³	NA	NA
Unmodified floor ²	4	1.8 ³	63	29.2 ³	NA	NA
Hook ²	14	6.5	NA	NA	8	3.7 ³
No hook ²	11	5.1	NA	NA	100	46.3 ³

¹Based on 108 trap-nights.

²Based on 216 trap-nights.

³Significant at $P \leq 0.05$.

DISCUSSION

Our trap modifications did result in greater capture success of raccoons. Standard Tomahawk traps contain a 10 cm wide trip plate that is located about 75 cm from the cage opening. Raccoons during our study were observed entering unmodified live-traps, reached over the trip plates, obtained the baits and exited the traps without capture. Raccoons that entered cage traps equipped with the extended floor immediately would step on the modification, which triggered the trap door to close. In addition to the extended floor, wrapping the back half of traps with small mesh hardware cloth created a barrier to raccoons; thus, enticing raccoons to enter into the trap in order to gain access to the bait. Even though bait hooks did not enhance our capture success of raccoons, elevating the bait off the trap floor had several advantages. First, fire ants had to climb the side and top of traps to gain access to the hook, then onto the Diazinon barrier to gain access to the bait. Such an indirect route to the bait seldom was accomplished by fire ants. Second, an elevated bait may provide a visual stimulus that can be seen from a greater distance from the trap. Lastly, elevating baits potentially allowed wind currents to carry the bait aroma a further distance; which in turn, could entice more raccoons to the trap area. We believe our trap modifications will benefit researchers and trappers who need to capture raccoons alive, especially in areas where fire ants are problematic.

ACKNOWLEDGMENTS

We thank L. A. McNeil and P. R. Haas for monetary support and access to the study area, and B. Goode for use of tools and his cooperation with the project. This is Manuscript Number 00-102 of the Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville.

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