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IMPROVED PERFORMANCE OF PADDED JAW TRAPS FOR CAPTURING COYOTES

SAMUEL B. LINHART,[1] *U.S. Department of Agriculture, Denver Wildlife Research Center, P.O. Box 25266, Denver, CO 80225–0266*

GARY J. DASCH, *U.S. Department of Agriculture, Denver Wildlife Research Center, P.O. Box 25266, Denver, CO 80225-0266*

Increased opposition to traps and trapping (Kellert 1981, Gentile 1987) has led to efforts to modify foothold traps so that the devices cause less injury to restrained animals but are as efficient as standard models. Much of this effort has been focused on evaluating the Victor Soft Catch®[2] trap (U.S. Patent 4,184,282) manufactured by the Woodstream Corporation, Lititz, Pennsylvania. The Soft Catch is a modified Victor double coil-spring trap. It has reduced foot injury sustained by most captured furbearers (Tullar 1984, Olsen et al. 1986, Linhart et al. 1988, Olsen et al. 1988, Onderka et al. 1990), but conflicting reports have been published regarding its efficiency in comparison with unpadded traps (Linhart et al. 1986, 1988; Linscombe and Wright 1988; Skinner and Todd 1990). Such inconsistencies likely resulted in part from varied trapper experience and trapping techniques, the environmental factors associated with different test sites, and possibly the species trapped. Moreover, modifications to the Soft Catch were made by the manufacturer to improve the trap's performance, concurrent with successive field trials.

Our earlier field tests (Linhart et al. 1986, 1988) of the capability of the No. 3 Soft Catch trap to capture coyotes (*Canis latrans*) showed it to be less effective than unpadded traps. However, a fourth-generation model of the Soft Catch that differed mechanically from the previous prototypes subsequently became available. Moreover, our coworkers and the trap manufacturer (W. E. Askins, Woodstream Corporation, Lititz, Pa., pers. commun., 1988) felt that setting procedures for the Soft Catch trap and familiarity with the trap by field personnel affected its performance. Accordingly, we undertook a third field trial in winter, 1989. This paper reports on the performance of unpadded and fourth-generation padded traps for capturing and holding coyotes, as well as details on trap-setting procedures.

STUDY AREAS AND METHODS

Personnel

To assure that Soft Catch traps were set according to procedures recommended by the manufacturer, a trapping specialist from Woodstream Corporation, W. E. Askins, assisted 2 trappers for the duration of the trapping period. Askins instructed both trappers assigned to the trial regarding Soft Catch trap-setting procedures and alternately accompanied both trappers on traplines. One trapper (G. Dasch), who had >25 years of trapping experience, also participated in the 2 earlier field assessments of the Soft Catch (Linhart et al. 1986, 1988). The second trapper (T. Schacherl) was a federally supervised trapper stationed in southern Texas with >15 years of trapping experience. He had also participated in the 2 earlier field tests (Linhart et al. 1986, 1988). Two biologists (S. Linhart and L. Windberg, Denver Wildlife Research Center), familiar with traps and trapping, monitored all aspects of the field trial.

Trap Types

Both trappers were provided with equal numbers of 3 types of traps: (1) a standard, unpadded Victor 3NM double long-spring trap with offset malleable jaws and a 1-m kinkless chain (routinely used by the U.S. Department of Agriculture's Animal Damage Control

[1] Present address: Southeastern Cooperative Wildlife Disease Study, College of Veterinary Medicine, University of Georgia, Athens, GA 30602.

[2] Mention of commercial products for identification does not imply endorsement by the authors or the federal government.

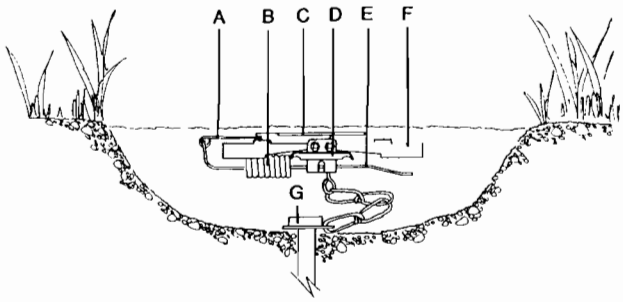

Fig. 1. Set position of unpadded No. 3 Victor double coil-spring and 3 NM Victor double long-spring traps. Axis of trap is horizontal to the ground (A = dog, B = coil-spring, C = pan, D = lever, E = cross, F = free jaw, G = stake).

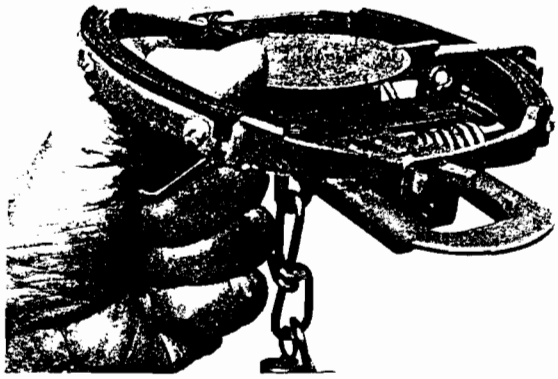

Fig. 2. Adjustment of the position and tension of trap pans on unpadded and Soft Catch coil-spring traps.

Program for coyotes); (2) a standard, unpadded No. 3 Victor double coil-spring trap with stamped offset jaws and a center-mounted 15-cm chain with no shock spring; and (3) the fourth-generation No. 3 Victor Soft Catch with replaceable synthetic rubberlike jaw pads and a 15-cm center-mounted chain with attached coil-spring to cushion the struggle of captured animals trying to escape. The Soft Catch model we tested had shorter jaw levers than those tested previously. According to the specialist from Woodstream Corporation, the shortened levers resulted in (1) faster trap movement through the soil upon activation, thereby increasing trap closure speed; (2) greater clamping force or pressure on the jaws holding the foot; and (3) decreased likelihood that traps containing coyotes will snag on roots or rocks around the trap set, thereby relaxing pressure on the levers and allowing escapes.

Both trappers established trap lines along unimproved ranch roads located in Brooks and Webb counties in southern Texas. Traps were set and checked from 22 January to 8 February 1989. Each of the 3 trap types was alternated along the route, and each trap was set at a site selected by the trapper based upon his trapping experience and judgment. All traps were staked (46–61 cm stakes) or double staked in soft earth. Each trapper used those lures and meat baits he preferred (coyote urine and/or commercial lures) with no regard to trap set or trap type because our objectives did not include a comparison of trap nights per capture among the 3 types of traps. Each trapper was assigned to catch 10 coyotes in each type of trap (a minimum of 60 total coyotes).

The unpadded traps were set horizontally to the ground surface (Fig. 1) in the customary manner. The pans on both padded and unpadded coil-spring traps were positioned in relation to the opened jaws by raising the pan until the end of the dog was inserted all the way into the pan notch. The front end of the trap cross was grasped between the middle and forefingers, and the pan was depressed with the thumb until the bottom of the pan rested on the top of the forefinger (Fig. 2). This procedure minimized excessive downward movement of the pan (or "pan drop") when stepped on by an animal. Failure to follow the above procedure would have resulted in insufficient pan tension and excessive pan drop because of the clearance necessary for installation of the pan tension screw. Excessive pan drop may allow some species (such as canids) to detect the trap and then remove their foot before closure of the trap jaws.

Soft Catch Setting Procedure

The Soft Catch traps, as demonstrated by the Woodstream Corporation representative, were set somewhat differently (Fig. 3). The modified procedure was recommended because the 2 coil-springs (1.75-size) that powered the jaws of the No. 3 Soft Catch were not as strong as those routinely installed on the No. 3 unpadded coil-spring trap (3-size). Furthermore, the installation of the jaw pads and steel retainers on the Soft Catch resulted in wider jaw faces (10.0 mm vs. 4.0 mm), causing more resistance as the jaws of a springing trap move through the soil. When Soft Catch traps were used, the trap bed was excavated in the usual manner. The pan tension screw was tightened beforehand so that the pan did not drop from its own weight (approx. 0.9 kg [2 lb] of pan tension). When the jaws were opened, care was taken that the dog was laid flat across the face of the pad so that the pad was not rolled or distorted. This procedure was used because a rolled or distorted pad may cause outward pressure on the dog and pan post, resulting in upward movement of the pan through the soil covering the trap. Such upward movement could expose the pan above the soil or cause the elevated pan to drop excessively when stepped on by a coyote.

Positioning of the trap stake varied depending upon soil firmness. Where firm soil was present, the trap stake was driven into the ground beneath the front or free jaw and off-center to the front end of the cross. The trap was bedded at about 5° below horizontal to the ground, and the stake was driven until the free jaw

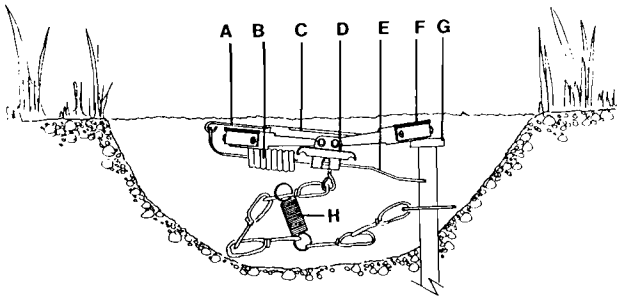

Fig. 3. Side view of the No. 3 Soft Catch trap in set position with axis of both trap and free jaw 5° from horizontal (A = dog, B = coil-spring, C = pan, D = lever, E = cross, F = free jaw, G = stake, H = shock spring).

could rest upon the top of the stake at about 5° above horizontal and about 1.3 cm (0.5 inches) above the trap pan (Fig. 3). Where soft soil was present, the stake was located beneath the trap and driven as far as possible; the free jaw was elevated by placing 2 pebbles under either end. The free jaw was elevated to: (1) leave space between the lever and the free jaw (Fig. 3), so that when the trap was sprung, the lever initially exerted force against the power jaw only, thus increasing jaw closure speed; (2) reduce the distance the free jaw traveled when the trap was sprung; and (3) cause the animal to place its foot deeper into the trap before it depressed the pan, thus reducing chances of toe catches and "pullouts."

Data Analysis

Trappers recorded the following data each day as traps were checked: trap type, presence of a coyote track over the trap pan, sprung trap, coyote caught but pulled out of the trap, and coyotes caught and held. They also recorded position of trap jaws on the limb (toe catch, catch on or above foot pads). Although traps were checked daily, captured coyotes were left in traps overnight and removed the following day to simulate a 48-hour trap-check law. This procedure was considered representative of trapping conditions and regulations in the western United States.

Capture rate was defined as the number of coyote captures per trap type divided by the number of capture opportunities or potential captures (Skinner and Todd 1990). Potential captures occurred when coyotes stepped on trap pans, sprung traps, were caught but pulled out, or were caught and held. For example, the capture rate for the No. 3 Soft Catch was calculated by dividing the actual captures (19) by all potential captures (3 + 0 + 2 + 19 = 24) or 79.2% (Table 1). A chi-square test for 3 vs. 2 contingency tables was used to test the null hypothesis of no difference in the number of coyotes that stepped on the trap and were caught among the 3 trap types.

RESULTS AND DISCUSSION

Sixty-three coyotes were caught (58 held, Table 1). Capture rates did not differ ($P > 0.50$) among long-spring (22), coil-spring (20), and Soft Catch (21) traps. The capture rate for the 3NM (83%) was similar to that found in our 2 earlier studies (75 and 78%, respectively; Linhart et al. 1986, 1988). However, the capture rate for the Soft Catch trap was much greater (79%) for this study than was previously reported by us (58 and 30%, respectively; Linhart et al. 1986, 1988). These results indicate that performance of the fourth-generation Soft Catch trap was improved by either the shortened levers or the use of the trap manufacturer's recommended setting procedure, or both.

Trappers recorded the location of the trap jaws on the limbs of 53 of the 63 coyotes captured during the study (19 for long-spring, 17 for coil-spring, and 17 for Soft Catch). In 49 of 53 instances, trap jaws were positioned above the foot pads. The remaining 4 coyotes were caught by ≥ 1 toe (1 for Soft Catch and 3 for long-spring).

Except for 2–3 nights when ice covered trap sets and made them inoperative, this field test was conducted under generally favorable trapping conditions (moderate temperatures, infrequent crusting of the soil covering traps, 11

Table 1. Numbers of coyotes caught in 3 types of foothold traps in southern Texas during January and February 1989.

Trap type	Tracks on pan	Sprung trap	Pull out	Caught and held	Capture rate (%)
No. 3 Soft Catch	3	0	2	19	79
Unpadded No. 3 coil-spring	2	0	0	20	91
Unpadded 3NM long-spring	1	0	3	19	83

of 34 days with rain, and high coyote density). Data comparing the performance of Soft Catch traps with unpadded models have not been published for the variety of unfavorable or marginal trapping conditions that commonly occur in the United States during the fur-trapping seasons. In Alberta, Skinner and Todd (1990) found equal efficiency ". . . under conditions of frozen ground, freezing and subfreezing temperatures, and falling or accumulated snow cover, sometimes crusted."

Our data indicate that the coyote capture rate for the fourth-generation Soft Catch trap was comparable to that for unpadded models, at least in southern Texas at a time of year when trapping conditions were generally favorable. To more fully assess the capabilities of the Soft Catch trap, similar data are needed from other areas and under marginal trapping conditions that commonly occur throughout the United States.

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