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ASSESSMENT OF THE SAUVAGEAU 2001-8 TRAP TO EFFECTIVELY KILL ARCTIC FOX

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The arctic fox (*Alopex lagopus*) is the major furbearer and terrestrial predator throughout most of arctic North America (Garrott and Eberhardt 1987), and despite current low fur prices, plays an important role in the economy of northern communities (Underwood and Mosher 1982).

The species is primarily captured in leghold traps. Because of the growing public opposition

to these traps, however, Canada has committed to a major research program to develop more humane trapping systems (Barrett et al. 1988, Proulx and Barrett 1991). Preliminary work indicated that the arctic fox readily approached and entered cubby sets with Conibear (Woodstream Co., Lititz, Pa.) traps (Mallory et al. 1988), but the Conibear 220 model would require mechanical improvement in or-

der to quickly and consistently kill arctic fox (F. Mallory et al., Inst. North. Ont. Res. Dev., Sudbury, unpubl. rep., 1990).

We selected the Sauvageau 2001-8 (Les Pièges du Québec, St-Hyacinthe, Que.) as an experimental trap because it generated higher energies (\bar{x} momentum: 2.0972 kg m/sec; range of clamping forces: 261–585 Newtons) than the Conibear 220 (\bar{x} momentum: 1.448 kg m/sec; range of clamping forces: 0–472 Newtons) (Proulx 1990). Our objective was to evaluate the potential of the Sauvageau 2001-8 trap to quickly kill arctic fox under simulated natural conditions.

STUDY AREA AND METHODS

We conducted the study in a 2.2-ha compound in Vegreville, Alberta. In August 1989, 25 arctic fox pups were received from Eskimo Point, Northwest Territories, and were reared to adult size in outdoor kennels for diverse behavior and humane trapping studies. Experiments with the Sauvageau 2001-8 trap were conducted with 18 foxes from December 1989–February 1990 in 2 350-m² test enclosures. Both enclosures had a 2.4-m-high perimeter fence with a 1.2-m overhang, and encompassed an open field with scattered willows (*Salix* spp.).

Trap and Set

The Sauvageau 2001-8 consists of 2 20.4 × 23.7-cm metal frames equipped with 2 22.0-cm torsion springs made of 0.72-cm-diameter wire. One of the frames has an extra striking bar (0.64-cm-diam wire) at each extremity (Fig. 1). The trap was originally set with a baited 2-prong trigger on the top of a post driven in frozen ground (Baker and Dwyer 1987; R. Hall, Dep. Nat. Resour., Northwest Territ., Yellowknife, pers. commun., 1989), but it failed to properly position 2 foxes and they either retreated too quickly at firing time or approached the trap sideways (Proulx 1990). After several tests with 2 other foxes, a portable 3-sided cubby made of wire mesh was developed (Fig. 1). The cubby was placed around a post that kept the bottom of the trap 22 cm above the ground surface. The traps were equipped with an offset trigger made of 2 short prongs shaped in a 5 × 11.8-cm rectangle. A red cloth dipped in fish oil and wrapped around the trigger prongs was used as bait. Traps and triggers were boiled, dyed, and waxed once. Approach tests with traps wired in a set position (Proulx et al. 1989b) indicated that 5 foxes would have been consistently struck in the head-neck region (G. Proulx et al., unpubl. data, 1989).

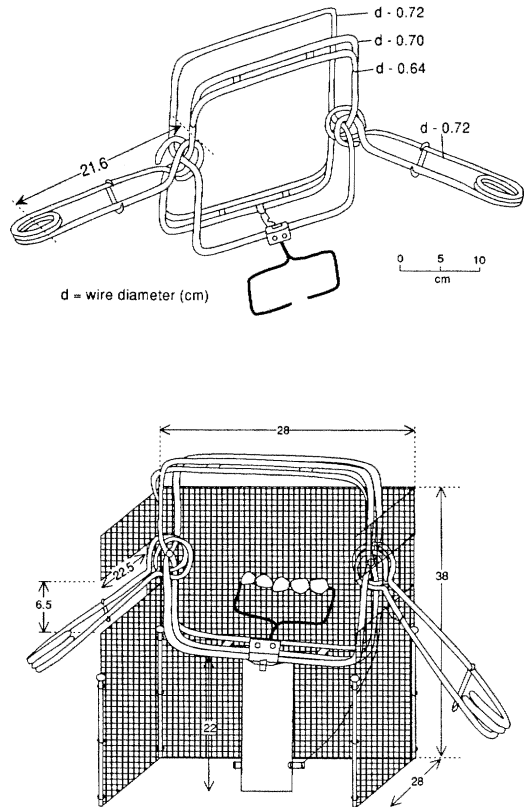


Fig. 1. Diagram of the Sauvageau 2001-8 trap and set. Dimensions are in cm.

Preselection Tests

We first evaluated the killing ability of the Sauvageau 2001-8 trap in preselection tests with arctic foxes (animals used in approach tests to develop the trigger and the trap set) immobilized with ketamine HCl (10–20 mg/kg; Austin Lab., Joliette, Que.). The trap passed the preselection tests if it rendered ≥ 5 of 6 (a control level without implied statistical significance to justify subsequent kill tests with unanesthetized animals) foxes unconscious in ≤ 3 minutes. Unconsciousness (determined by the loss of corneal and palpebral reflexes [Walker 1979, Horton 1980, Rowsell et al. 1981]) had to be irreversible (tests were successful only if foxes did not regain consciousness after the 3-min period) and followed by death (loss of cardiac activity determined with a stethoscope).

Kill Tests

Upon success at the preselection-test level, we evaluated the Sauvageau 2001-8 in kill tests with unanes-

Table 1. Location of strike, time intervals between trap firing and irreversible loss of corneal and palpebral reflexes and heartbeat, and major trauma of arctic foxes in preselection and kill tests with the Sauvageau 2001-8 trap, Vegreville, Alberta, 1989-1990.

Test	Location of strike (no. of foxes)			Time of loss after trap firing (sec)		Major trauma (no. of foxes)		
	Skull	C ₁ -C ₂	C ₆	Eye reflexes	Heartbeat	H ^a	F ^b	None
Preselection	1	3	1	5-98	139-280	4	0	1
Kill	2	7	0	<25 ^c -180	130-325	8	1	0

^a Hemorrhage in spinal canal or damage to central nervous system.

^b Fracture only at strike location.

^c Animal was unconscious on arrival of observer.

thetized animals. The trap was considered humane if it rendered 9 of 9 foxes irreversibly unconscious in ≤ 3 minutes (Proulx et al. 1989a, 1990). Our calculations based on a 1-tailed binomial test (appropriate because we were not interested in a trap that rated below the acceptance criterion [Zar 1984:388]) suggested that such a trap would be expected, at a 95% level of confidence, to humanely kill $\geq 70\%$ of all arctic foxes captured on traplines.

All the tests were videotaped. During the kill tests, when the trap fired, we ran to the test enclosures to monitor the state of consciousness of the animals. Animals were necropsied by a veterinary pathologist. All animal husbandry and research procedures were conducted in accordance with the guidelines of the Canadian Council on Animal Care (1984).

RESULTS

Preselection Tests

Five traps rendered 5 of 5 arctic foxes irreversibly unconscious in ≤ 3 minutes. The average times to loss of consciousness and heartbeat were 49.8 (SE = 16.6) and 214.6 (SE = 23.2) seconds, respectively (Table 1). Most animals sustained vertebrae fractures or damage to the central nervous system. In 1 lower neck hit (C₆), no trauma was apparent.

Kill Tests

Nine of 9 kill tests were successful (Table 1). The average times to loss of consciousness and heartbeat were <73.4 (SE = 16.9) and 213.6 (SE = 18.6) seconds, respectively (Table 1). These averages did not differ ($P > 0.05$)

from those of the preselection tests. In all the tests, skull fractures and damage to the central nervous system were present (Table 1).

This study showed that the Sauvageau 2001-8 trap can be expected to render $\geq 70\%$ of captured arctic foxes irreversibly unconscious in ≤ 3 minutes ($P = 0.05$).

DISCUSSION

Little humane trapping research has been done on furbearer species in the tundra biome of North America (Mallory et al. 1988). Trappers can set the Sauvageau 2001-8 safely with spring safety hooks equipped with an elastic band, quick-links that keep the springs cocked, or safety pliers (N. Gravel, Chutes-aux-Outardes, Que.) (Proulx 1991). Although the Sauvageau 2001-8 is a powerful trap that quickly kills arctic fox, it does not damage pelts.

We found that the fish-oil impregnated cloth was an advantageous bait because it did not attract birds. However, arctic foxes were cautious when investigating the traps. Contrary to Mallory et al. (1988), we did not find that the animals approached and entered cubby sets with rotating-jaw traps readily and without much hesitation.

We do not believe that the Sauvageau 2001-8 set on a post with a baited trigger will capture many nontarget species. Baker and Dwyer

(1987) suggested that snowy owls (*Nyctea scandiaca*), common ravens (*Corvus corax*), and hares (*Lepus* spp.) could be the only possible nontarget animals trapped. In future studies, we intend to verify the humaneness, the capture-efficiency, and the selectivity of the Sauvageau 2001-8 on traplines.

SUMMARY

The Sauvageau 2001-8 rotating-jaw trap set in a portable 3-sided wire mesh cubby quickly killed 9 of 9 arctic foxes in a simulated natural environment. The average times to loss of consciousness and heartbeat were estimated at <73.4 (SE = 16.9) and 213.6 (SE = 18.6) seconds, respectively, after firing the trap. This study confirmed that the Sauvageau 2001-8 trap can be expected to render $\geq 70\%$ of captured arctic foxes irreversibly unconscious in ≤ 3 minutes ($P = 0.05$).

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