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FIELD TESTING THE C120 MAGNUM TRAP FOR MINK

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The wild fur industry endures extensive criticism from animal welfare and animal rights groups, who perceive the continued use of leghold traps as cruel (Gentile 1987). The opposition has infiltrated the political structures, particularly in the traditional fur markets of Europe where legislation would ban the import of furs by 1996 from countries still allowing use of the conventional steel-jawed leghold trap (Gilbert 1991). To avoid the European import ban, countries would have to ban the use of leghold traps or develop and use traps that meet currently unestablished international humane trap standards.

Part of Canada's response to perceived cruelty associated with aspects of trapping has been to establish a major research program to develop more humane trapping systems (Barrett et al. 1988). We considered a killing device to be humane if, at the 95% confidence level, it rendered $\geq$70% of target furbearers irreversibly unconscious in $\leq$3 minutes (Proulx and Barrett 1991, Proulx et al. 1993). Once a trap meets this performance level in monitored enclosure tests, it qualifies for field testing on traplines (Barrett et al. 1989).

The C120 Magnum trap used in this study is structurally similar to the trap tested and recommended for American marten (*Martes americana*) (Barrett et al. 1989, Proulx et al. 1989). However, the original pitchfork trigger

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produced single head and neck strikes, and when tested on mink (*Mustela vison*) the neck strikes did not always render the animals unconscious in ≤3 minutes. A pan trigger that produced double strikes was developed and the C120 Magnum then met all performance standards of the screening tests for mink (Proulx et al. 1990). We tested the C120 Magnum with pan trigger on traplines to (1) evaluate its ability to properly strike and effectively kill mink, (2) compare its success of capture to that of existing traps for mink, and (3) compare strike locations and trauma for mink captured in the C120 Magnum versus those captured in standard Conibear 120® (C120) traps (Woodstream Co., Lititz, Pa.) and those captured in the C120 Magnum in enclosure tests.

STUDY AREAS

The C120 Magnum with a pan trigger was field tested by trappers from 1 November to 6 December 1988 in central British Columbia (BC) and from 1 November to 9 December 1988 in eastern Newfoundland (NF). Traplines and trappers were recommended to us by area fur managers based on previous success in trapping mink and the operators' willingness to participate in the research. The NF trapline (47°N, 53°W) was located on the Avalon Peninsula, a plateau rising from the deep bays of the sea to as high as 300 m. The peninsula is in the boreal forest region with balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), white spruce (*P. glauca*), and white birch (*Betula papyrifera*) the predominant tree species. Large parts of the plateau are covered with leatherleaf (*Chamaedaphne calyculata*), scrub balsam fir, and black spruce (Wilton 1956, Ryan 1978).

The second trapline was situated in the rolling interior plateau of BC near Williams Lake (52°N, 121°W). Vegetation in the lower valley is grassland mixed with Douglas-fir (*Pseudotsuga menziesii*), pines (*Pinus* spp.), and quaking aspen (*Populus tremuloides*). Higher and wetter sites accommodate spruces (*Picea* spp.), western redcedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*) (Young et al. 1985).

METHODS

Traps and Trap Sets

The experimental C120 Magnum traps used in our study were similar to the traps evaluated for capturing marten (Barrett et al. 1989, Proulx et al. 1989). However, the traps we used had 4 clamping bars instead of 2 and were equipped with a 66- × 69-mm metal pan trigger that operated on a cam-lever principle (Proulx et al. 1990). Experimental traps were boiled, dyed, waxed, and placed in a wooden ground cubby box (35 × 17 × 17 cm) with long slotted sides and the back end closed by 2.5-cm wire mesh (Fig. 1). Traps were placed with the set springs 10 cm away from the back of the side slots and secured by joining spring loops with flexible branches. We positioned pan triggers inward. The force required to fire C120 Magnum traps was estimated at 225 g (R. Drescher, Alta. Res. Counc., Edmonton, pers. commun., 1992). All traps were wired to an anchor.

The standard trap used on the BC trapline was the factory C120 trap with a custom-made wooden pan trigger. Traps were boiled, dyed, waxed, and placed in a ground cubby box measuring approximately 25 × 17 × 17 cm, with shortened trap spring slots (10 cm). When fired, the trap springs strike the slot ends, driving the trap forward as the jaws close. A 57- × 70-mm wooden pan trigger was attached to the standard trigger with prongs set at the bottom and bent inward so that the pan was at a 30° angle to the bottom of the box. This trigger forced mink entering the box to squeeze through the narrow upper opening, thus firing the trap. The force required to fire C120 traps was estimated at 260 g (R. Drescher, Alta. Res. Counc., Edmonton, pers. commun., 1992).

The NF trapline used legholds (No. 1 and 1½ longspring, No. 1 and 1½ coilspring, No. 1½ jump spring, and No. 1½ Softcatch; Woodstream Co., Lititz, Pa.) as the standard traps. Foothold traps were placed just below the water surface in a drowning set, in small streams or at the edge of ponds or rivers.

All traps were baited. In the C120 Magnum and C120 trap sets, the bait was wired 10–12 cm behind the center of the traps. Within a trapline, all experimental and standard traps received the same baits and scents. The BC trapper used beaver (*Castor canadensis*) meat and home-made liquid scent. The NF trapper used herring (*Clupea harengus*) and an unidentified scented paste.

Experimental Design and Animal Processing

All trap sites were selected by trappers. On the NF trapline, a C120 Magnum and a standard trap were placed at each site. The sites were initially selected because they were suitable for a submerged leghold drowning set; experimental traps were placed 10–50 m away from standard trap sets. On the BC trapline, the trapper set only 1 trap/site with each trap type determined at random. All traps and trap sets were individually numbered and photographed. There were equal numbers of experimental and standard traps in each trapline. Each trapper was assisted daily by an experienced technician who recorded data.

Traps were visited every 3–4 days and signs of animal activity at the trap site, trap performance, and

capture success were recorded. Measurements regarding strike location and pelt damage were recorded. For mink captured in C120 Magnum and C120 traps, the distances from the nose of the animal to the proximal and distal striking bars were recorded and compared. These distances also were compared to the same measurements made for mink caught in C120 Magnum enclosure tests (Proulx et al., unpubl. data). Animals were removed from the trap, labeled, placed unskinned in a plastic bag, and frozen. In the laboratory, carcasses were thawed, radiographed, and necropsied by a veterinary pathologist. The pathologist was unaware of trap type or trap set used to capture the animal. The sex and mass of mink were determined and traumatic lesions caused by the trap were recorded.

We used analyses of variance to test for differences in striking distances between field and enclosure mink, C120 Magnum and C120 traps, and study sites. We used 2 × 2 tables with the Yates correction to test for independence between trap type categories and animals captured (Siegel 1956:107–109, Dixon and Massey 1969:242–243). Chi-square goodness-of-fit test was used to compare capture success between experimental and standard traps.

RESULTS

Trap-nights and Monitoring

On both traplines the number of trap-nights for C120 Magnum traps was virtually identical to the total trap-nights for standard traps (Table 1). Differences in trapping effort were caused by delays in the setting or removal of traps during the study period. In BC, all traps were checked 7 times following their installation. In NF, C120 Magnum traps and combined standard traps were checked an average of 7.7 and 7.9 times, respectively.

Capture Success

On the BC trapline, the C120 Magnum and the C120 captured a similar ($\chi^2 = 0.48$, 1 df, $P = 0.50$) number of mink (Table 1). Both traps also captured a similar ($\chi^2 = 0.32$, 1 df, $P = 0.70$) number of nontarget animals. The C120 Magnum caught 42 nontargets: 1 bushy-tailed woodrat (*Neotoma cinerea*), 1 feral domestic cat (*Felis catus*), 7 American martens, 7 muskrats (*Ondatra zibethicus*), 4 red squirrels (*Tamiasciurus hudsonicus*), and 22 ermine (*Mustela erminea*). The C120 caught 35

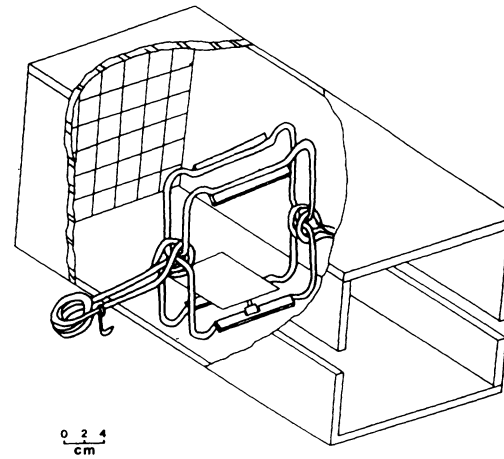

Fig. 1. The experimental C120 Magnum trap in cubby set.

nontargets: 6 gray jays (*Perisoreus canadensis*), 2 feral cats, 3 northern flying squirrels (*Glaucomys sabrinus*), 7 American martens, 4 muskrats, 1 red squirrel, and 12 ermine. There was independence between trap type (C120 Magnum and C120) and species captured (mink and nontarget animals) ($\chi^2 = 0.36$, 1 df, $P = 0.70$).

On the NF trapline, the C120 Magnum and the leghold traps captured a similar ($\chi^2 = 1.73$, 1 df, $P = 0.20$) number of mink (Table 1). However, the C120 Magnum caught fewer ($\chi^2 = 8.41$, 1 df, $P = 0.01$) nontarget animals than did the leghold traps. The C120 Magnum caught 39 nontargets: 20 feral cats, 1 muskrat, 17 Norway rats (*Rattus norvegicus*), and 1 red squirrel. The legholds captured 68 nontargets: 5 crows (*Corvus brachyrhynchos*), 6 feral cats, 5 muskrats, 48 Norway rats, 3 red squirrels, and 1 ermine. There was independence between trap type (C120 Magnum and all legholds combined) and species captured (mink and nontarget animals) ($\chi^2 = 0.06$, 1 df, $P = 0.90$).

Capture Locations and Injuries

The C120 Magnum equipped with the custom pan trigger double-struck 29 of 30 mink:

Table 1. Total captures and trap-nights using experimental C120 Magnum and standard C120 and leghold traps on traplines in British Columbia and Newfoundland, 1988.

	British Columbia trapline				Newfoundland trapline			
	C120 Magnum		C120		C120 Magnum		Legholds[b]	
Species or group	*n*	CE[a]	*n*	CE	*n*	CE	*n*	CE
Mink	15	0.95	18	1.12	15	0.73	22	1.07
Other furbearers[c]	40	2.53	25	1.55	2	0.10	9	0.44
Nonfurbearers[d]	2	0.13	11	0.68	37	1.80	59	2.87
Trap-nights	1,582		1,613		2,052		2,055	

[a] Capture efficiency: number of captures/100 trap-nights.
[b] No. 1 and 1½ longspring, No. 1 and 1½ coilspring, No. 1½ jump spring, and No. 1½ Softcatch.
[c] Includes ermine, red squirrels, muskrats, and American marten.
[d] Includes bushy-tailed woodrats, Norway rats, northern flying squirrels, feral domestic cats, and birds.

26 in the neck (vertebrae C_3–C_7) and posterior thorax to anterior lumbar regions, and 3 in the thoracic and abdominal regions. One mink was caught by a single strike on the neck. The C120 double-struck 16 of 18 mink: 12 in the neck and posterior thorax to anterior lumbar regions, and 4 in the thoracic and abdominal regions. It also hit 1 mink on the neck and another on the thorax in single strikes. Leghold traps captured all mink by a limb, 19 by a front leg and 3 by a hind leg.

For mink caught in double strikes in the C120 Magnum, we compared the distances from the nose tip to the proximal (D_1) and distal (D_2) striking bars for field and enclosure animals. For mink caught in BC, D_1 ($\bar{x}$ = 224 mm, SE = 12.0, n = 15) did not differ (F = 0.64; 1,27 df; P = 0.44) from that for mink caught in NF ($\bar{x}$ = 236 mm, SE = 8.1, n = 14). Similarly, D_1 for field-caught mink was nearly identical (F = 0.39; 2,36 df; P = 0.68) to D_1 measured in enclosure tests ($\bar{x}$ = 232 mm, SE = 7.9, n = 9). The statistics for D_2 showed an identical relationship. The custom-made pan trigger used on the C120 trap on the BC trapline positioned the animals similarly to the C120 Magnum (F = 1.01; 1,46 df; P = 0.32).

All mink on both traplines were dead when trappers arrived. No pelt damage was recorded in mink captured in the C120 Magnum and the C120 traps. Pelt damage was recorded for 1 mink captured in a No. 1½ longspring leghold; the captured right hind limb had been completely severed at the femur. Twelve (40%) of the 30 mink captured in the C120 Magnum on both traplines received serious traumatic lesions involving the central nervous system, the vertebrae, or the heart (Table 2). None of the mink captured in the C120 received serious trauma (Table 2).

DISCUSSION

The usefulness of postmortem reports in the assessment of the humaneness of traps is limited because trauma varies greatly and can be superficial (Proulx et al. 1989, 1990). Therefore, the ability to replicate proven strike locations that had consistently induced unconsciousness in enclosure tests in mink on the traplines constituted a critical aspect of this study with respect to the assessment of the humaneness of the C120 Magnum. Our field study indicated that most (87%) mink captured in the C120 Magnum were struck in the neck and posterior thorax to anterior lumbar regions. In enclosure studies, such double strikes led to an irreversible loss of consciousness in ≤3 minutes (Proulx et al. 1990).

However, autopsies indicated that whereas 40% of mink captured in the C120 Magnum trap had received major traumatic lesions, all mink captured in the C120 trap received little or no injury. Proulx et al. (1989) suggested that the C120 Magnum humanely killed animals by suffocation. Because the C120's clamping

Table 2. Prevalence of major traumatic lesions observed for mink captured in the C120 Magnum and the C120 traps on traplines in British Columbia and Newfoundland, 1988.

Lesion combinations	C120 Magnum		C120	
	n[a]	%	*n*[a]	%
Separation/fracture of vertebra	8	26.7	0	0
Hemorrhage/laceration of central nervous system	2	6.7	0	0
Tracheal compression	1	3.3	0	0
Hemothorax, heart rupture	2	6.7	0	0
Muscle bruising/laceration	12	40.0	9	50.0
None	5	16.7	9	50.0
Total	30	100.1	18	100.0

[a] No mink is represented in >1 row or column.

forces are much lower than those of the C120 Magnum (Proulx et al. 1989), it is unlikely that it can consistently kill mink by compressing the trachea and thorax. In previous research, an upgraded version of the C120 trap (although less powerful than the C120 Magnum) was found to be inadequate for mink in a double-strike evaluation (Gilbert 1981).

The C120 Magnum captured as many mink as the C120 and leghold traps and is therefore acceptable from an efficiency point of view. However, like the standard traps, it also captured nontarget animals (>70% of all captures). On the remote BC trapline, 95% of all nontargets were furbearers that are sought and marketed by trappers. We believe that the number of small animal captures could be reduced by calibrating the pan trigger to fire at >500 g pressure. In NF, the trapline was close to human dwellings and 95% of all nontarget animals were nonfurbearers, unwanted by trappers. Although many of these nontargets could be classified as pests, their capture is a source of concern to antitrapping groups (Defenders of Wildl. 1984). Again, increased pan tension could be used to avoid the capture of animals that weigh less than mink. Cubby boxes with smaller openings also could be developed to exclude feral cats. However, near human dwellings, box or cage traps may be more appropriate to capture mink without endangering household pets.

The C120 Magnum with pan trigger is the first mink-killing trap to meet the humaneness criteria described by Proulx and Barrett (1991). The C120 Magnum also is an efficient humane trap for marten and it has the potential to humanely kill smaller furbearers (Barrett et al. 1989). Therefore, we recommend that this trap be adopted by trappers and wildlife managers.

SUMMARY

The experimental C120 Magnum with pan trigger for mink was tested against equal numbers of standard traps (Conibear 120, leghold Nos. 1 and 1½) in British Columbia and Newfoundland. The C120 Magnum (3,634 trap-nights) and the standard traps (3,668 trap-nights) caught 30 and 40 mink, respectively. The C120 Magnum double-struck mink in acceptable locations, i.e., the neck and posterior thorax to anterior lumbar regions. The C120 Magnum is recommended as an efficient and humane killing trap for mink.

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