Evaluation of 3 types of snares for capturing coyotes

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Abstract During March 1992–January 1994, I evaluated the effectiveness of 3 types of lethal neck snares (Denver Wildlife Research Center [DWRC] prototype, Gregerson®, and Kelley) for capturing coyotes (*Canis latrans*) and releasing larger nontarget species. Field tests were conducted by Animal Damage Control personnel (trappers) in Montana, North Dakota, and South Dakota. Three hundred seventy-four coyotes, 91 deer (*Odocoileus* spp.), and 6 domestic cows or calves were captured during the study. The Kelley snare had the highest capture rate (97%) followed by the DWRC prototype (89%) and Gregerson (87%). All snare locks were effective in releasing substantial numbers of nontarget species. Trapper experience and expertise on the proper use and placement of snares is important in reducing accidental captures.

Key words *Canis latrans*, capture, coyote, evaluation, snare

Snares are widely used by trappers to capture furbearers such as coyotes (*Canis latrans*), red fox (*Vulpes vulpes*), gray wolves (*Canis lupus*), bobcats (*Lynx rufus*), lynx (*Lynx lynx*), and beaver (*Castor canadensis;* Baker and Dwyer 1987). Snares also are important selective control tools in coyote depredation management programs in the western United States. In 1988, 7,571 coyotes were captured in snares by personnel supervised by the U.S. Department of Agriculture's (USDA) Animal Damage Control (ADC) program (USDA 1994). Despite widespread use of snares, there has been little research to evaluate their effectiveness and selectivity. Guthery and Beasom (1978) reported neck snares were about 12 times more selective than foothold traps for capturing predatory mammals in south Texas. Boddicker (1982) discussed advantages and disadvantages of snares compared to other tools used in predator control and recognized the need for improving breakaway lock systems to avoid capture of nontarget species.

Because wildlife managers have been concerned about accidental capture of big game animals and domestic livestock in snares, researchers have improved snare selectivity and developed breakaway designs. Such snares are designed to capture and hold coyotes, but release nontarget animals that exert a threshold force on the snare cable or lock (Phillips et al. 1990). Information on snare selectivity and capture rates for target species is needed so wildlife managers can make informed decisions about snares. The ideal snare is selective and kills quickly or holds an animal without injury. I evaluated 3 types of lethal neck snares for capturing coyotes. Each snare type was designed to capture coyotes selectively and release larger nontarget ungulate species.

Methods

Field tests were conducted in Montana, North Dakota, and South Dakota from March 1992 to January 1994. Most animals were captured during winter by 9 Animal Damage Control Specialists, employed by the USDA's ADC program, and 3 Extension Trappers, employed by the South Dakota Game, Fish, and Parks Department. All 12 regularly used snares in their coyote depredation control work.

Three types of snares were selected based on their widespread use and on laboratory tests that indicated potential for selectivity (Phillips et al. 1990). Designs included a Denver Wildlife Research Center (DWRC)

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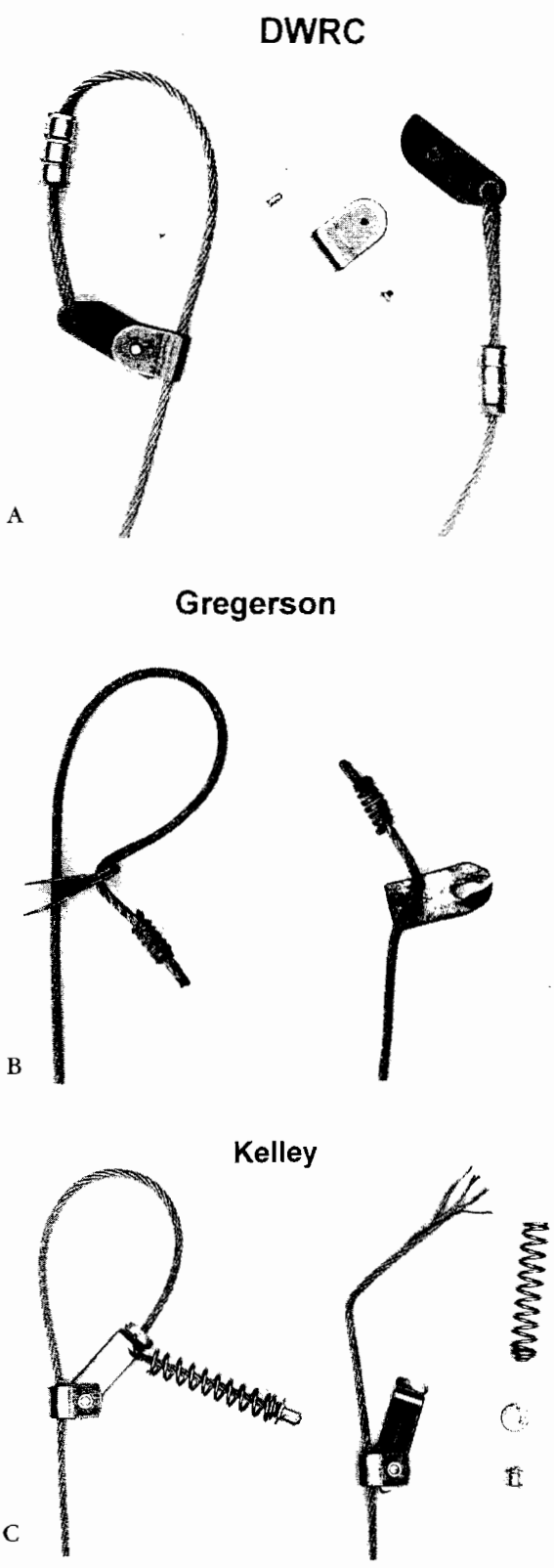

Three types of snares field tested in Montana, North Dakota, and South Dakota, 1992–1994. Photos show locks before (left) and after separation. (A) Denver Wildlife Research Center prototype, (B) Gregerson®, and (C) Kelley.

prototype, Gregerson[§] (K. Gregerson, Roundup, Mont.) and Kelley (D. Amberg, Morris, Minn.) snares (reference to snare type or commercial manufacturers does not constitute endorsement by the author or the USDA). The DWRC snare lock is a 3-part system modeled after the Cam-Loc™ (Slutker Fur, Edmonton, Alta., Can.) developed in Canada. The cam portion of the lock fits into a U-shaped piece of sheetmetal. The 2 parts are held together by a 1.60-mm-diameter aluminum shear pin. The pin is designed to shear when approximately 118 kg of force is applied to the lock. The Gregerson lock is constructed from a single piece of 11-gauge sheet metal folded to a double thickness. This lock is designed to tear apart by the cutting action of the cable when approximately 154 kg of force is applied. The Kelley lock is similar in design to a standard Cam-Loc except that the end of the cam section is L-shaped. A coil-spring is attached to the lock and held in place by a small ferrule. The ferrule is designed to separate from the cable when approximately 123 kg of force is applied to the lock. Following release of the ferrule, the snare loop opens and allows the captured animal to escape.

All snares were made from 2.4-mm (3/32 inch) braided 7 x 7 (strands x wraps) galvanized aircraft cable (409 kg breaking strength) and were approximately 2.5 m long. I provided snares, locks, and instructions to each participant as needed; however, I could not control factors such as loop size or placement of snares. I assumed that differences in these factors among the participants were negligible and that test results (capture, holding, or release of animals) reflected mechanical functions of the snares and snare locks. Each participant was instructed to standardize lines by setting snares along trails used by coyotes and anchoring all snares to solid objects; drags were not used. I could not control the length of time between snare checks or the length of time animals remained in snares. Participants were instructed to use snares as they would in normal control duties, when appropriate and in accordance with local or state regulations. I assumed that these variables also would have negligible effects on results. In my experience, animals escaping from breakaway snares do so shortly after capture, before acclimation to restraint occurs or when they are approached by a person checking snares.

Each participant recorded the following data when snares were checked: (1) species of animal captured, (2) status of the animal captured (alive, dead, or escaped), and (3) location of snare on the body. Capture rate was defined as number of coyotes captured and held in a snare type divided by number of coyotes caught and held plus those that escaped. Pearson's chi-square goodness-of-fit test (Snedecor and Cochran

Table 1. Number of coyotes captured in 3 types of snares in Montana, North Dakota, and South Dakota, 1992–1994.

Snare type	No. captured by:			No. of escapes		Total captures	Capture rate (%)
	Neck	Body	Leg	Severed cable	Broke lock		
DWRC	118 (68)[a]	12 (50)	3 (33)	5	11	149	89
Gregerson®	105 (71)	7 (14)	2 (50)	16	1	131	87
Kelley	78 (94)	6 (83)	7 (14)	2	1	94	97

[a] Numbers in parentheses indicate percentage of animals dead when snares were checked.

1980) for 2 x 3 contingency tables was used to test for differences in capture and kill rates among snare types.

Results

Three hundred seventy-four coyotes were captured; 149 using the DWRC snare, 131 in the Gregerson snare, and 94 in the Kelley snare (Table 1). Capture rates were 87% (Gregerson), 89% (DWRC), and 97% (Kelley; 2 df, $P = 0.041$). Three hundred and one coyotes (89%) were snared by the neck, 25 (7%) by the body, and 12 (4%) by the leg. Ninety-four percent of the coyotes (73 of 78) snared by the neck with Kelley locks were dead when snare lines were inspected versus 71% and 68% for the Gregerson and DWRC locks, respectively ($P < 0.001$, Table 1).

Ninety-one deer, including mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), and 6 domestic cows or calves, were captured (Table 2). The Kelley, DWRC, and Gregerson snares released 67, 48, and 30% of the captured deer, respectively (2 df, $P = 0.071$). Forty of 91 deer escaped from snares by breaking the locks. Forty-two deer captured by the neck and 9 by a leg were unable to exert the force required to break the snare locks; 47 of these animals died in the snares and 4 were released by study participants. Six cows or calves were caught in DWRC snares and all escaped. No cattle were captured in the Gregerson or Kelley snares.

Discussion

Lower capture rates for DWRC and Gregerson snares resulted from 2 factors. First, the aluminum shear pin used in the DWRC lock was apparently too weak to hold all coyotes and some exerted sufficient force to shear the pin. Other coyotes captured in the DWRC snares chewed through the cable because the lock did not tighten sufficiently to cause mortality. Similar factors reduced the capture rate for the Gregerson snare. Although only 1 coyote was able to break a Gregerson lock, 16 were able to chew through the cable and escape.

The high capture rate of the Kelley snare was probably due to the rapid death of the captured animals. Several participants noted that coyotes captured in Kelley snares disturbed little vegetation at capture sites compared to coyotes captured in other snares. The coil-spring incorporated into the snare locking system apparently caused the cable to close quickly and tightly on the coyote's neck, resulting in relatively rapid death by asphyxiation. Quick death of a snared coyote is desirable because it is more humane and allows repeated use of the same set location.

Most deer that escaped from snares probably were captured by a leg. Deer caught in this manner are more apt to escape from snares than those caught by the neck because neck muscles tend to cushion or reduce the force applied to the lock. Most neck-caught deer asphyxiate without breaking the locks; however, some of our personnel at capture sites found indications (long hairs on the snare cable) that some neck-caught deer successfully escaped. Phillips et al. (1990) demonstrated that coyotes and deer fawns (<34 kg) generate a similar force on a snare. Hence,

Table 2. Number of deer and cattle captured and released in 3 types of snares in Montana, North Dakota, and South Dakota, 1992–1994.

Snare type	Deer			Cattle	
	No. captured and held		No. escaped	No. captured	No. escaped
	Neck	Leg			
DWRC	18 (94)[a]	6 (67)	22	6	6
Gregerson®	20 (95)	3 (100)	10	0	0
Kelley	4 (100)	0	8	0	0

[a] Numbers in parentheses indicate percentage of animals dead when snares were checked.

it will be difficult to design a breakaway system that holds all coyotes and releases all deer. However, evidence suggests that snare locks can be developed to hold all coyotes and release nearly all livestock (Phillips et al. 1990). Based on the breaking strength of the Gregerson and Kelley locks, these snares probably would release most large hoofed animals.

The snare locks used in this study were all effective in capturing coyotes and in releasing at least 47% (46/97) of larger nontarget animals. Individual experience and trapper expertise on the proper use and placement of snares will continue to influence accidental captures despite the availability of effective breakaway locks. In snaring coyotes, areas frequently used by livestock or deer should be avoided to prevent capturing these species. Also, snare loops greater than 28 cm should be avoided as larger loops tend to increase deer catches (Krause 1983). To achieve the most rapid asphyxiation of coyotes, snares should only be placed where entanglement in brush is likely. Information on the proper use of snares should be a part of trapper education programs.

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