

COYOTES

Figure 1. A juvenile coyote being collared. Photo by Ron Case.

OBJECTIVES

1. Explain key elements about coyote biology important for their control.
2. Effectively communicate control options to clients.
3. Describe the steps in setting a foothold trap for coyotes.
4. Describe how to set cable restraints for coyotes.
5. Identify various risks involved with controlling coyotes.

SUMMARY OF DAMAGE PREVENTION AND CONTROL METHODS**HABITAT MODIFICATION**

Eliminate all intentional and unintentional feeding of coyotes.

Remove carrion

EXCLUSION

Raise livestock in confinement

Put livestock in pens at night

Net-wire and/or electric, and roller exclusion fences

FRIGHTENING

Guarding dogs

Donkeys and llamas

Sonic and visual frightening devices: Strobe lights, sirens, propane cannons

Hazing and harassing coyotes in residential areas

REPELLENTS

None are registered

TOXICANTS

No toxicants are registered in Alabama.

FUMIGANTS

No fumigants are registered in Alabama.

SHOOTING

Shooting may eliminate a specific nuisance coyote.

TRAPPING

Cage traps

Foothold traps

Cable-restraints

OTHER METHODS

Select pastures that have a lower incidence of predation

Human presence during herding of livestock

Change lambing, kidding, and calving seasons.

Use shed lambing, kidding, and calving practices

SPECIES PROFILE

IDENTIFICATION

Coyote (*Canis latrans*)

PHYSICAL DESCRIPTION

Coyotes resemble a small German shepherd dog with erect pointed ears, slender muzzle, and a black tipped bushy tail (Figure 1). Coyotes are predominantly brownish gray with a light gray to cream-colored belly. Color varies greatly from nearly black to red or nearly white in some individuals and local populations. Most individuals have dark guard hairs over the back and tail.

Coyote-wolf hybrids exist in some areas and may vary greatly from typical coyotes in size, color, and appearance. Coyotes in New England may differ in color from typical western coyotes. Some are black and reddish. These colorations may be due partially to past hybridization with wolves. True wolves are present in some coyote ranges, particularly in Canada, Alaska, Montana, Idaho, Wyoming, Arizona, northern Minnesota, Wisconsin, and Michigan. Few wolves remain in the southern US and Mexico.

In western states, typical adult males weigh 25 to 45 pounds and females 22 to 35 pounds. In the east, coyotes are larger than their western counterparts, with males averaging 45 and females 30 pounds.

SPECIES RANGE

Historically, coyotes were most common on the Great Plains of North America. They have since extended their range from Central America to the Arctic, including all of the US (except Hawaii), Canada, and Mexico (Figure 2).



Figure 2. Coyote range in the lower US Image by PCWD.

VOICE AND SOUNDS

Coyotes are very sociable and use vocalizations to communicate among themselves. Coyotes have two basic vocalizations, a bark and a flat howl but with many variations. Other sounds include a yip, warble, laugh, and irregular howl. Two coyotes howling can give the impression of many more, which may lead to a perceived and unwarranted estimate of the true coyote population in a given area. Coyotes in urban areas do not always vocalize.

TRACKS AND SIGNS

Coyote tracks are more oval in shape compared with the rounder track of the domestic dog. Claw marks will be present when imprint is made in soft ground. On average, front tracks are 2½ to 3 inches long with the front tracks larger than the hind tracks (Figure 3).

Coyote scat may contain a variety of items including fur, bone fragments, berries, grass, etc. Color and composition varies according to diet. Coyote scat may taper at one end.

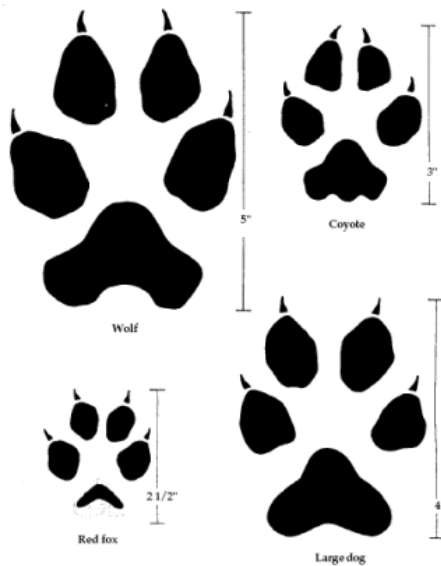


Fig. 2. Footprints of canid predators

Figure 3. Footprints of canid predators. Image by PCWDM. [Note: This coyote track is not the best example as it is too round and the top two toes should be closer together, but properly show the nails pointing inward towards each other.]

GENERAL BIOLOGY

Coyotes are most active at night and during early morning hours, especially where there is human activity and during hot summer weather. They may be active throughout the day where there is minimal human interference and during cool weather. Coyotes are more active during the daytime during mating and breeding season.

Coyotes flourish in the presence of human populations. Recent research has demonstrated that coyotes are compensatory breeders, meaning that they increase reproduction and immigration in response to human-induced population reduction.

REPRODUCTION

Coyotes usually breed between January and March, with a gestation period of approximately 63 days. Females sometimes breed during the winter following their birth, particularly if food is plentiful.

Average litter size is five to seven pups, although a litter of 13 has been reported. On rare occasions, more than one litter may be found in a single den; these may be from females mated to a single male. Even though coyotes are biologically capable of hybridizing with dogs and wolves, lack of reproductive synchrony and behaviors present challenges to young reaching maturity.

Adult male and female coyotes bring food to their young for several weeks. Other adults associated with the denning pair also may help in feeding and caring for the pups. Coyotes commonly hunt as singles or in pairs and extensive travel is common during hunting forays. If food is plentiful they will hunt in the same area regularly, occasionally burying (caching) food remains for later consumption.

Pups begin emerging from their den by 3 weeks of age, and within 2 months will follow adults to large kill or carrion. Pups normally are weaned by 6 weeks of age and frequently are moved to larger quarters such as dense brush patches and/or sinkholes along water sources. The adults and pups usually remain together until late summer or fall when pups become independent. Occasionally, pups are found in groups until the breeding season begins. In New York State pup dispersal occurs in late December and early January. Pups may disperse 50 miles or more from their natal home ranges.

Coyotes will inbreed with each other in areas where they are overpopulated, which can lead to disfigurement. Mange afflicts coyotes also. While most coyotes survive, some succumb (Figure 4).



Figure 4. Coyote with mange. Note the substantial loss of hair. Photo by John Consolini.

DENNING AND COVER

Coyotes bed in sheltered areas but generally do not use dens except when raising young. They may seek shelter underground during severe weather or when closely pursued. They have excellent eyesight and hearing and a keen sense of smell. Documented recoveries from severe injuries are indicative of high physical endurance. Although not as fast as greyhound dogs, coyotes have been measured at speeds of up to 40 miles per hour and can sustain slower speeds for several miles.

Coyote dens are found in steep banks, rock crevices, sinkholes, and underbrush, as well as in open areas. Dens usually are found in protected, concealed areas. Den sites typically are located less than a mile from water but occasionally may be much farther away. Coyotes will often dig out and enlarge holes dug by smaller burrowing animals. Dens vary from 3 feet to 50 feet and may have several openings.

BEHAVIOR

The birth of young in early spring (typically April and May) places heavy demands on the adult pair. It is at this time when livestock and pets are at the most risk. Pets also are at risk during the breeding season in January. The young of the year typically disperse in the fall and winter. Mating season generally is late January to early March.

HABITAT

Coyotes exist in virtually every type of habitat in North America. Coyotes live in deserts, swamps, tundra, grasslands, brush, dense forests, from below sea level to high mountain ranges, and at all intermediate altitudes. High densities of coyotes live in urban and suburban areas such as Los Angeles, Pasadena, Phoenix, Denver, New York City, and Chicago.

FOOD HABITS

Coyotes are opportunistic feeders with rabbits, carrion, rodents, ungulates (usually fawns), insects (such as grasshoppers), livestock and poultry, being consumed. Coyotes readily eat fruits such as watermelons (Figure 5), persimmons, berries, and other vegetative matter when available. According to Paul Curtis, pets smaller than 35 pounds are at the most risk of coyote attack.



Figure 5. Coyotes eat watermelon. Photo courtesy of UNL.

Coyotes generally take prey that are the easiest to secure. Among larger wild animals, coyotes tend to kill young, inexperienced, old, sick, and weak individuals. They are capable of catching and killing healthy, young, and in some instances, adult domestic animals. Prey selection is based on opportunity and behavioral cues. Strong, healthy lambs are often taken from a flock by a coyote even though smaller, weaker lambs are also present. Usually, the stronger lamb is on the periphery and is more active, making it more prone to attack than a weaker lamb that is at the center of the flock and relatively immobile.

Coyote predation on livestock is generally more severe during early spring and summer than winter. More intensive management of sheep and cattle occurs when livestock is contained in either feedlots or pastures close to humans during winter. Coyote predation on livestock in some areas is more

prominent in the fall and winter, when the diet changes from fibrous to protein based.

Coyotes bear young in the spring and raise them through the summer, a process that demands increased nutritional input for both the whelping and nursing mother and the growing young. This increased demand corresponds to the time when young sheep or beef calves are out on pastures or rangeland and are most vulnerable to attack. Coyote predation also may increase during fall when young coyotes disperse from their home ranges and establish new territories.

LEGAL STATUS

The legal status of coyotes varies depending on state and local laws. In Alabama, coyotes are classified as a furbearer and game animal. They may be hunted during daylight hours throughout the year. Permits are available from district Wildlife and Freshwater Fisheries offices to hunt coyotes at night. They may be trapped on privately owned lands with landowner permission throughout the year. There is a designated trapping season on public lands. Consult the current Alabama Regulations for Game, Fish, and Fur-bearing Animals to obtain season dates.

DAMAGE IDENTIFICATION

Determining whether predation has occurred, and by what species, requires knowledge and experience. Evidence must be gathered and evaluated with regard to predators in the area, time of day, season of year, types of wounds, and numerous other factors.

Sometimes, even experts are unable to confirm the cause of death and it may be necessary to rely on circumstantial information. For more information refer to "Procedures for Evaluating Predation on Livestock and Wildlife," at <http://texnat.tamu.edu/ranchref/predator/b-1429-1.htm>

Coyotes frequently scavenge on livestock carcasses, making the presence of tracks or droppings near a carcass insufficient evidence of predation. Other evidence around the site and on the carcass must be carefully examined to accurately determine the cause of death. Signs of a struggle may be evident, including scrapes or drag marks on the ground, broken vegetation, or blood around the kill site. The quantity of sheep or calf remains left after a kill vary widely depending on how recently the kill was made, size of the animal killed, weather, and number and species of predators that fed on the animal. Coyotes may be present when pet owners complain about missing pets.

DAMAGE TO STRUCTURES

Coyotes are not known to damage structures.

DAMAGE TO LIVESTOCK AND PETS

Look for the presence of subcutaneous (just under the skin) bleeding at the point of attack to determine whether an animal was killed by a predator. Bites to a dead animal will not produce evidence of bleeding but bites to a live animal will. If enough of the carcass remains, carefully skin out the neck and head to observe tooth punctures and hemorrhage around the punctures. Talon punctures from large birds of prey will cause hemorrhage also, but the location of the puncture wounds are usually at the top of the head, neck, or back. The determination procedure becomes less indicative of predation as the age of the carcass increases or if the remains are scanty or scattered.

Coyotes, foxes, mountain lions, and bobcats usually feed on a carcass at the flanks or behind the ribs and first consume the liver, heart, lungs, and other viscera. Bobcats and mountain lions often cover a carcass with debris after feeding on it. Bears generally prefer meat to viscera and often consume the udder from lactating ewes first. Eagles skin carcasses on larger animals and leave much of the skeleton intact. With smaller animals such as lambs,

eagles may bite off and swallow the ribs. Feathers and “whitewash” (droppings) usually are present where an eagle has fed.

Coyotes may kill more than one animal in a single episode, but often will only feed on one of the animals. Coyotes typically attack sheep at the throat, but young or inexperienced coyotes may attack any part of the body. Coyotes usually kill calves by eating into the anus or abdominal area.

Dogs generally do not kill sheep or calves for food and are relatively indiscriminate in how and where they attack. Sometimes it is difficult to differentiate between dog and coyote kills without also looking at other signs, such as size of tracks (Figure 3) and spacing and size of canine tooth punctures. Coyote tracks tend to be more oval-shaped and compact than those of common dogs. Nail marks are less prominent and the tracks tend to follow a straight line more closely than those of dogs. The average coyote stride at a trot is 16 to 18 inches, which is typically longer than that of a dog of similar size and weight. Generally, dogs attack and rip the flanks, hind quarters, and head, and may chew ears. The sheep are sometimes still alive but may be wounded severely.

Coyotes may attack or kill small dogs in residential areas.

DAMAGE TO LANDSCAPES

Coyotes damage watermelon plots (Figure 5), eat fallen and rotting fruit, and may bite irrigation hoses.

HEALTH AND SAFETY CONCERNS

Coyotes are not typically considered a threat to humans, though several documented attacks have occurred. Coyotes behaving unusually during daylight hours, especially those stalking humans, are cause for concern.

Distemper, hepatitis, parvo virus, demodectic and sarcoptic mange [caused by parasitic mites (Figure 3)

are among the most common coyote diseases. Rabies and tularemia also occur and may be transmitted to other animals and humans.

Coyotes harbor numerous parasites including mites, ticks, fleas, worms, and flukes. Mortality is highest during the first year of life, and few survive for more than 10 to 12 years in the wild. Human activity often is the greatest single cause of coyote mortality.

NUISANCE PROBLEMS

Coyotes can cause damage to a variety of resources including livestock, poultry, and crops such as watermelons. They sometimes kill pets and are a threat to public health and safety when they frequent airport runways and residential areas, or if they are infected with rabies. Predation will be the focus of the following discussion.

DAMAGE PREVENTION AND CONTROL METHODS

INTEGRATED PEST MANAGEMENT

Timing, economics, and methods

A variety of control methods must be utilized to manage coyote damage. No single method is effective in every situation and aversive techniques become less effective as coyotes become acclimated to human presence. Success usually involves an integrated approach, combining good husbandry practices and frightening techniques with effective lethal control of individual offending animals.

The focus of control efforts should be on damage prevention and targeting specific animals. It is neither necessary nor practical to kill all coyotes. Once a coyote has killed livestock or pets, it will probably continue to do so if given the opportunity.

Control of coyotes is most effective just before or after whelping. During this time, two generations of coyotes can be removed at once.

HABITAT MODIFICATION

Habitat features change in some areas depending on seasonal crop growth. Some cultivated fields are devoid of coyotes during winter but provide cover during the growing season, and a possible increase in predation on nearby livestock.

The creation of nearly 40 million acres of Conservation Reserve Program (CRP) acres may benefit many species of wildlife, including predators. These acres harbor prey for coyotes and foxes, and may increase predator populations locally. Clearing away weeds and brush from CRP areas may reduce predation problems since predators usually use cover in their approach to livestock. Generally, the more open the area where livestock are kept, the less likely that coyote loss will occur. Junk piles located near farmsteads serve as good habitat for rabbits and other prey and may bring coyotes into close proximity with livestock, increasing the likelihood for coyotes to prey on available livestock. Removing junk piles may be a good management practice. In urban and suburban settings, eliminating cover and food sources for prey species can make yards and landscapes less attractive to coyotes.

There are no documented differences in the vulnerability of various breeds of sheep to coyote or dog predation. Generally, breeds with stronger flocking behaviors are less vulnerable to predators.

In urban and suburban settings eliminate any intentional and unintentional feeding of coyotes (e.g., pet food or garbage). Do not allow small pets (less than 35 pounds) out unsupervised, especially at night or during the pre-dawn hours.

EXCLUSION

Most coyotes readily cross over, under, or through conventional livestock and residential fences. A coyote's response to a fence is influenced by various factors, including the coyote's experience and motivation. Total exclusion of all coyotes by fencing,

especially from large areas, is highly unlikely since some eventually learn to either dig deeper or climb higher. Good fences, however, can be important in reducing predation and increasing the effectiveness of other damage control methods (such as cable restraints, traps, or guarding animals).

Recent developments in fencing equipment and design have made this technique an effective practical method for protecting sheep from predation under some grazing conditions. Exclusion fencing may be impractical in western range sheep ranching operations.

Net-Wire Fencing. Net fences in good repair will deter many coyotes from entering a pasture. Horizontal spacing of the mesh should be less than 6 inches, and vertical spacing less than 4 inches. Digging under a fence can be discouraged by placing a barbed wire at ground level or using a buried wire apron. The fence should be about 5½ feet high to discourage coyotes from jumping over it. Climbing can usually be prevented by adding a charged wire at the top of the fence or installing a wire overhang.

Barrier fences with wire overhangs and buried wire aprons were tested in Oregon and found effective in keeping coyotes out of sheep pastures (Figure 6). The construction and materials for such fencing are usually expensive so fences of this type are rarely used except around corrals, feedlots, or areas of temporary sheep confinement.

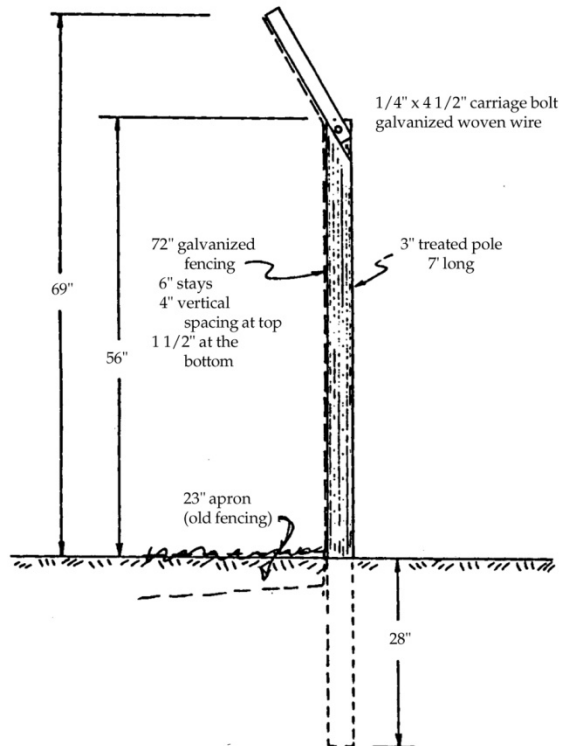


Figure 6. Barrier fence with wire overhang and buried apron. Image by PCWD.

Electric Fencing. Electric fencing has recently been revolutionized by the introduction of energizers and fence designs from Australia and New Zealand. The chargers, now also manufactured in the US, have high output with low impedance, are resistant to grounding, present a minimal fire hazard, and generally are safe for livestock and humans. The fences usually are constructed of smooth, high-tensile wire stretched to a tension of 200 to 300 pounds. The original design of electric fences for controlling predation consisted of multiple, alternately charged and grounded wires, with a charged trip wire installed just above ground level about 8 inches outside the main fence to discourage digging. Many recent designs have every wire charged.

The number of spaces between wires varies considerably. A fence of 13 strands gave complete protection to sheep from coyote predation in tests at the USDA's US Sheep Experiment Station (Figure

7). Other designs of fewer wires were effective in some studies, ineffective in others.

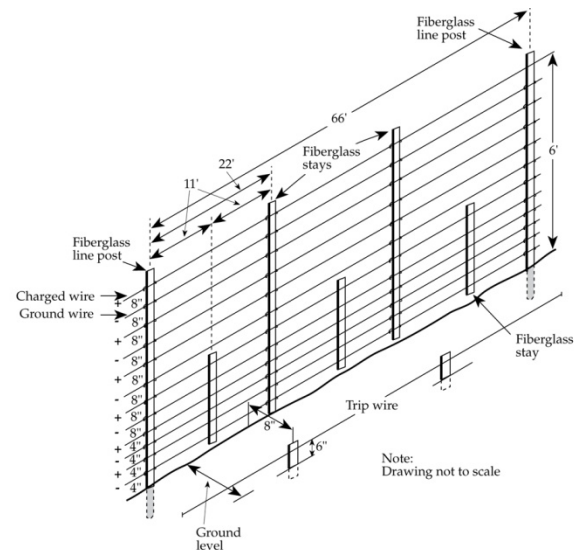


Figure 7. High-tensile, electric, anti-predator fence. Image by PCWD.

The amount of labor and the installation techniques required vary with each type of fencing. High-tensile wire fences require adequate bracing at corners and over long spans. Electric fencing is easiest to install on flat, even terrain. Labor to install a high-tensile electric fence may be 40% to 50% less than for a conventional livestock fence.

Labor to keep electric fencing functional can be significant. Tension of the wires must be maintained, excessive vegetation under the fence must be removed to prevent grounding, damage from livestock and wildlife must be repaired, and the charger must be checked regularly to ensure that it is operational.

Coyotes and other predators occasionally become "trapped" inside electric fences. These animals receive a shock as they enter the pasture and subsequently avoid approaching the fence to escape. Sometimes the captured predator may be easy to spot and remove from the pasture. Sometimes,

particularly in large pastures with rough terrain, the animal may be difficult to remove.

Electric Modification of Existing Fences. The cost to completely replace old fences with new ones, whether conventional or electric, can be substantial. Where existing fencing is in reasonably good condition the addition of one to several charged wires can significantly enhance the predator-detering ability of the fence and its effectiveness for controlling livestock (Figure 8). A charged trip wire placed 6 to 8 inches above the ground about 8 to 10 inches outside the fence is often effective in preventing coyotes from digging and crawling under. This single addition to an existing fence is often the most effective and economical way to fortify a fence against coyote passage.

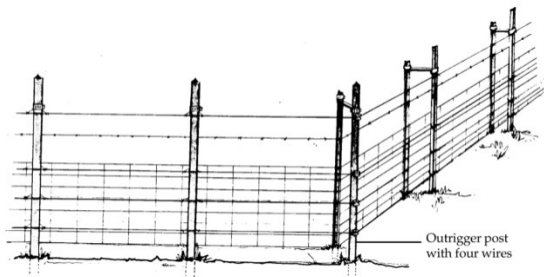


Figure 8. Existing woven-wire livestock fence modified with electrified wire. Image by PCWD.

If coyotes are climbing or jumping a fence, charged wires can be added to the top and at various intervals. These wires should be offset outside the fence. Fencing companies offer offset brackets to make installation relatively simple. The number of additional wires depends on the design of the original fence and the predicted habits of the predators.

Portable Electric Fencing. The advent of safe, high-energy chargers has led to the development of a variety of portable electric fences. Most are constructed with thin strands of wire running through polyethylene twine or ribbon, commonly called polywire or polytape. Polywire is available in single and multiple wire rolls or as mesh fencing of various heights. It can be quickly and easily installed

to serve as a temporary corral or to partition off pastures for controlled grazing. Portable electric fencing allows for the set up of temporary pens to hold livestock at night or during predator control activities. Range sheep that are not accustomed to being fenced may be difficult to contain in a portable fence.

Modification of Chain link and other Non-electric Fences. The Coyote Roller™ is marketed as a way to prevent coyotes from climbing fences. Coyotes normally do not jump 6-foot fences. Instead, they grab the top of the fence and pull themselves over (Figure 9). The Coyote Roller's™ spinning action makes it difficult for dogs, coyotes, and other animals to gain the "foothold" they need to pull themselves up and over the top of an enclosure (Figure 10).



Figure 9. Coyotes are quite capable of climbing chain link fences. Photo by Ron Case.



Figure 10. The Coyote Roller™ installs on top of chain link and solid fences. Photo by Coyote Roller Inc.

According to the manufacturer, Coyote Rollers™ ideally are suitable for fences at least 6 feet or taller. The fences must prevent coyotes from entering underneath them as well.

Fencing and Predation Management. The success of various types of fencing in keeping out predators ranges from poor to excellent. Density and behavior of coyotes, terrain and vegetative conditions, availability of prey, size of pastures, season of the year, design of the fence, quality of construction, maintenance, and other factors all interplay in determining how effective a fence will be. Fencing is most likely to be cost-effective where the potential for predation is high, where there is potential for a high stocking rate, or where electric modification of existing fences can be used.

Fencing can be effective when incorporated with other means of predation control. For example, combined use of guarding dogs and fencing has achieved a greater degree of success than either method used alone. An electric fence may help keep a guarding dog in and coyotes out of a pasture. If a coyote does pass through a fence the dog can keep it away from the livestock and alert the producer.

Fencing also can be used to concentrate predator activity at specific places such as gateways, ravines, or other areas where the animals try to gain access.

Traps can be set at strategic places along a fence to effectively capture predators. Smaller pastures are easier to keep free from predators than larger ones encompassing several square miles.

Fencing is one of the most beneficial investments in predator damage control and livestock management where practical factors warrant its use.

Fences can pose problems for wildlife. Barrier fences in particular exclude not only predators, but also many other wildlife species. Wildlife should be considered where fencing intersects migration corridors. Ungulates such as deer may attempt to jump fences, and they occasionally become entangled in the top wires.

FRIGHTENING DEVICES AND METHODS

Frightening devices are useful for reducing losses during short periods or until predators are removed. The devices should not be used for long periods of time when predation is not a problem. To avoid acclimation you can increase the effectiveness by varying the position, appearance, duration, or frequency of the frightening stimuli, or using them in various combinations. Many frightening methods have been ridiculed in one way or another; nevertheless, all of the techniques discussed here have helped producers by saving livestock and/or buying some time to institute other methods.

AUDIO FRIGHTENING METHODS

Bells and Radios. Some sheep producers place bells on some or all of their sheep to discourage predators. Where effects have been measured, no difference in losses was detected. Some producers use a radio tuned to an all-night station temporarily to deter coyotes, dogs, and other predators.

Propane Exploders. Propane exploders produce loud explosions at timed intervals when a spark ignites a measured amount of propane gas. On most models, the time between explosions can vary from one to 15 minutes. Effectiveness is usually only temporary,

but it can be increased by moving exploders to different locations and by varying the intervals between explosions. In general, the timer on the exploder should be set to fire every 8 to 10 minutes, and the location should be changed every 3 or 4 days. In cattle pastures, these devices should be placed on rigid stands above the livestock. The exploder should be turned on just before dark and off at daybreak, unless coyotes are killing livestock during daylight hours. Motion sensors are now available and likely improve their temporary effectiveness. Exploders are best used to reduce losses until more permanent control or preventive measures can be implemented. In 24 coyote depredation complaints over a 2-year period in North Dakota, propane exploders were judged to be successful in stopping or reducing predation losses until offending coyotes could be removed. "Success time" of the exploders appears to depend on how well they are tended by the livestock producer.

Hazing and Harassing. In residential areas yelling, waving arms, throwing things, blowing whistles, etc., may temporarily frighten coyotes. Direct your activities at the offending coyote. Otherwise, the coyote may simply discount the noise or activity. Harassing or chasing coyotes until they are out of sight may reinforce fear of humans a bit longer. To be at all effective these techniques must be widespread and consistent.

VISUAL FRIGHTENING METHODS

A study involving 100 Kansas sheep producers showed that using lights above corrals at night had the most marked effect on losses to coyotes of all the devices examined. Out of 79 sheep killed by coyotes in corrals, only three were killed in corrals with lights. Nearly 40% of the producers in the study used lights over corrals. There was some indication in the study that sheep losses to dogs were higher in lighted corrals, but the sample size for dog losses was small and the results inconclusive. Most of the producers (80%) used mercury vapor lights that automatically turned on at dusk and off at dawn.

Coyotes are more vulnerable when they enter the lighted area, as they often establish a fairly predictable pattern of killing. When this happens in a lighted corral, it is possible for a producer to wait above or downwind of the corral and to shoot the coyote as it enters. Red or blue lights may make the ambush more successful since coyotes appear to be less frightened by them than by white lights. Revolving or flashing the lights may enhance effectiveness in frightening away predators. Some speculate that the old oil lamps used in highway construction repelled coyotes, presumably because of their flickering effect.

Vehicles. Parking cars or pickups where losses are occurring often reduces predation temporarily. Effectiveness can be improved or extended by frequently moving the vehicle to new locations. Some producers place a replica of a person in the vehicle when losses are occurring in the daylight. If predators continue to kill with vehicles in place, the vehicle serves as a comfortable blind in which to wait and shoot offending predators.

Strobe Lights and Sirens. The US Department of Agriculture's National Wildlife Research Center developed a frightening device called the Electronic Guard (EG) (Figure 11). The EG consists of a strobe light and siren controlled by a variable interval timer that is activated at night with a photoelectric cell. In tests conducted in fenced pastures, predation was reduced by about 89%. The device is used in Kansas and other states to protect cows/calves from coyote predation, though most research on the effectiveness of this device has been done on sheep operations. Suggestions for using the unit differ for pastured sheep and range operations.

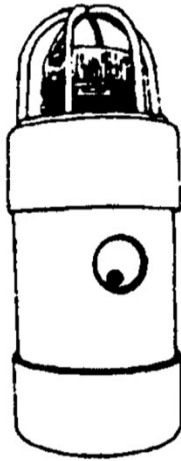


Figure 11. Electronic Guard frightening device. Image by PCWD.

To use the EG in fenced pastures (farm flocks):

- place EGs above the ground on fence posts, trees, or T-posts so they can be heard and seen at greater distances and to prevent livestock from damaging them,
- position EGs so that rain water cannot enter them and cause a malfunction, and
- locate EGs so that light can enter the photocell port or window. If positioned in deep shade, they may not turn on or off at the desired times.

The number of EGs used to protect sheep in fenced pastures depends on pasture size, terrain features, and the amount and height of vegetation in or around the pasture. In general, at least two units should be used in small (20 to 30 acres), level, short-grass pastures. Three to four units should be used in larger (40 to 100 acres), hilly, tall grass, or wooded pastures. Do not use EGs in pastures larger than about 100 acres because their effective range is limited. The device could be useful in larger pastures when placed near areas where sheep congregate and bed at night. EGs should be placed on high spots, where kills have been found, at the edge of wooded areas, near or on bedgrounds, or near suspected coyote travel ways. They should be moved to different locations every 10 to 14 days to reduce the likelihood of coyotes getting used to them.

To use the EG in open range (herded or range sheep):

- The number of EGs used will depend on the number of sheep in the band and the size of the bedground. Four units should be used to protect bands of 1,000 ewes and their lambs.
- When possible, place one EG in the center of the bedground and the other three around the edge of the bedground. Try to place the units on coyote travel ways.
- EGs should be placed on high points such as ridge tops, edges of clearings, or on high rocks or outcroppings. Hang the devices on tree limbs 5 to 7 feet above ground level. If used above timberline or in treeless areas, hang them from a tripod of poles.
- Herders who bed their sheep tightly will have better results than those who allow sheep to bed over large areas. Sheep that are bedded about 200 yards or less in diameter, or are spread out not more than 200 to 400 yards along a ridge top, can usually be protected with EGs.

REPELLENTS

During the 1970s, university and government researchers tested a wide variety of potentially repellent chemical compounds on sheep. Both olfactory (smell) and gustatory (taste) repellents were examined. The underlying objective was to find a compound that, when applied to sheep, would prevent coyotes from killing them. Tests were conducted with various prey species including rabbits, chickens, and sheep. Some repellents were applied by dipping target animals in them, others were sprayed on, and some were applied in neck collars or ear tags.

Coyotes rely heavily on visual cues while stalking, chasing, and killing their prey. Taste and smell are of lesser importance in actually making the kill. These factors may in part account for the fact that the repellent compounds were not able to consistently

prevent coyotes from killing, although some of the repellents were obviously offensive to coyotes and prevented them from consuming the killed prey. Several compounds were tested on sheep under field conditions, but none appeared to offer significant, prolonged protection.

If an effective chemical repellent was to be found, the obstacles in bringing it to industry use would be significant. The compound would not only need to be effective, but also persistent enough to withstand weathering while posing no undue risk to the sheep, other animals, or the environment. It would also have to withstand the rigorous Environmental Protection Agency (EPA) approval process.

High-frequency sound also has been tested as a repellent for coyotes, but the results were no more encouraging than for chemical repellents. Coyotes, like dogs, responded to particular sound frequencies and showed some aversion to sounds broadcast within 1 foot of their ear. Researchers were unable to broadcast the sound a sufficient distance to test the effects under field conditions.

Aversive Conditioning Baits. The objective of aversive conditioning is to feed a coyote a prey-like bait laced with an aversive agent that causes the coyote to become ill, resulting in subsequent avoidance of the prey. Unfortunately, a cost-effective method has not been found.

TOXICANTS

No toxicants are registered in Alabama.

FUMIGANTS

No fumigants are registered in Alabama.

SHOOTING

Shooting coyotes is legal in many situations, and it often ranks high among the choices for removing a predator. Safety is a critical factor that in some circumstances may preclude the use of firearms

(e.g., local laws may prohibit shooting, or neighbors may be too close).

For shooting coyotes, a medium-powered bolt-action rifle fitted with a scope is recommended. The .223 Remington, .22-250, .220 Swift, or the .243 Winchester are all capable of killing a coyote up to a distance of 250 yards. Since coyotes are able to detect human scent, the shooter should take a stand downwind from where the coyote will likely approach. Use an elevated location where the lighting works to the shooter's advantage. If predators are killing sheep in the daytime, construct a comfortable blind at a vantage point in the pasture where the killing has occurred. Whenever possible, rest the rifle on a solid support while aiming, such as a bi-pod.

Use of suppressed rifles and night vision can add further flexibility and stealth to a coyote control operation.

A shotgun, preferably a 12-gauge semi-automatic, can be used for shooting at short range (less than 50 yards). It is advisable to have both a 12-gauge shotgun and a scoped rifle available. Copper-coated (BB) lead shot, No. 4 buckshot (lead), and in newer shotguns, the larger-sized steel shot works well for killing coyotes. Use of a metro-barrel and subsonic rounds can significantly reduce the report and is quite helpful in urban areas.

Shooting From Ground Vehicles. Hunting from moving vehicles is illegal in Alabama.

Calling and Shooting Coyotes. Coyotes may respond to predator calls. Calling, like other methods of predation control, should be used sparingly. Coyotes can be called at any time of the day, although the first couple of hours after dawn and the last few hours before darkness are usually best. Call in areas where there are signs of coyotes, such as tracks or droppings.

In some situations, coyotes can be located by listening for howling at sundown and sunrise. Some

hunters use sirens to elicit howls from coyotes. A voice imitation of a coyote howl may work as well. Coyotes often come to a howl without howling back, so the prudent hunter is always ready to shoot.

Hunting at Night. Hunting coyotes at night is illegal in Alabama. Permits may be granted on an individual basis by contacting local Conservation Enforcement Officers.

Aerial Hunting. The use of aircraft for shooting coyotes is strictly regulated by the provisions of the Airborne Hunting Act and is allowed only under special permit in states where legal. Aerial hunting is selective and allows taking only the target species. Although it is costly, it may be one of the most cost-effective methods for reducing predator damage when all factors are considered. It is often the best method where conditions are right for removing depredating animals that have successfully evaded traditional ground control methods such as trapping.

Aerial hunting is illegal in Alabama. The habitat in Alabama is not conducive to the use of this method.

TRAPPING

CAGE TRAPS

Cage traps are an alternative in situations where footholds, cable restraints and shooting are restricted or prohibited (e.g., some states, municipalities, and residential areas), though their efficacy and efficiency tend to be much lower compared to other methods. One employee of L.A. Animal Control was able to cage trap 545 urban coyotes over his career. However, his career spanned 16 years and it took on average over 200 days per trap set in the field to catch 1 coyote. A 2002 study in Massachusetts had 29 captures over 1447 trap days (i.e., 1 coyote per 50 trap days); however traps were prebaited for 5559 trap days before being activated (i.e., 1 coyote per 241 total trap days). A 2005 USDA-APHIS-Wildlife Services

study comparing the efficiency of several capture devices caught no coyotes over 492 trap days using cage traps (i.e., zero efficiency). Other devices produced 13, 7, and 25 coyotes respectively over a similar number of trap days. The general consensus among wildlife control professionals is that cage traps are not very effective for coyote capture.

As other methods become more restricted, cage traps may become the only viable method available. They can be useful when urgency is not important.

Improving Efficiency. An old adage of successful coyote trappers is “think like a coyote.” Learn their habits, instincts, tendencies, weaknesses, motives, and exploit them. These may include: hunger, dominance, territoriality, curiosity, travel patterns, and diet. For example, find and set up at key coyote entry and exit points in a residential neighborhood. If coyotes are taking house cats regularly, use cat urine, droppings, fur, and parts as attractants. Repeat with cottontails if they are the preferred prey species. If red foxes are in the area, exploit coyote dominance or “rage factor” by using red fox smells. If coyotes are feeding from pet bowls, prebait and bait with pet food. During times when coyotes are highly territorial, use coyote droppings, gland lures, and urine to elicit an intruder response. Deep within a coyote’s territory something new, but non-threatening, can arouse a curiosity response. Be patient. It can take 30, 60, or 90 days or more to cage trap a coyote. In some situations, traps can be placed and left closed or wired open weeks or months ahead of the trapping start date so coyotes become accustomed to them.

Locating the Set. Location is key when setting traps (See Trapping: Footholds). Cage sets, especially in urban and suburban settings, can be crowded or even set up against something like a dog kennel or chain-link fence, or under a canopy of landscape shrubs or low evergreen limbs. Whatever is “natural” in that environment can be utilized.

Sizes and Styles of Traps. When cage trapping coyotes, size matters! Plenty of coyotes have been

caught in traps (all dimensions length x width x height) 36 to 42 x 15 x 15 to 18 inches. However, the minimum recommended size is 54 x 20- x 24 inches. Traps 60 to 72 x 20 x 26 inches are preferred. Larger traps may be better slightly but are not necessary. All traps must be heavy duty. Heavy gauge wire screen, frame rods, connectors, and trigger mechanisms are essential. Solid pans are best for blending purposes. Doors can be straight-drop (e.g., guillotine-style) or protruding, slightly above horizontal, style. Lock mechanisms must be rugged and foolproof. A rear bait door is convenient.

Trap Preparation and Care. Traps should be painted or dyed a natural or neutral color with a non-glare finish. They should be power-washed and sanitized (i.e., deodorized) after a catch or before setting. A leading Colorado trapper who has cage-trapped 134 coyotes over the past 6 years maintains the trap should be replaced with a sanitized/deodorized one after a catch, even if reset in the same place. Apparently, animal odors, hair, and blood on the trap (i.e., the foreign object), not at the site, make a difference. After a catch, the trap should be carefully inspected for flaws or damage, and repaired or reinforced as necessary. It only takes a couple of missing or weakened hog rings/cage clamps to allow the next coyote to escape.

Making the Set. Select the exact spot just off the natural travel way where the trap can be “blended” (e.g., up against a wire fence or tucked into a brush pile or cluster of shrubs). The trap needs to look subtle or natural, not imposing or out-of-place. It must be bedded well (i.e., level, stable/solid). Rebar stakes can be driven down through the trap at the sides to stabilize it. The floor and pan should be well blended with sifted soil or native dirt. Where cover is present, the trap sides, back and top should be covered with pruned limbs from local brush, shrubs, or trees. Again, the objective is to blend the trap into a natural look. In more open areas (e.g., along a wire fence), very little blending may be necessary. To a coyote, the trap appears to be part of the fence. A ½-inch diameter stepping stick can be placed just in

front of the pan 1 to 2 inches off the floor. As with foothold trapping, minimizing human scent by wearing gloves and knee pads and making sets quickly early in the day can pay big dividends.

Lures, Scents, and Baits. Luring and baiting can take several approaches. One is purely a natural, scent-post approach using coyote droppings, gland lure and/or urine near the back of the trap behind the pan. An alternative is red fox smells or small domestic dog smells. This method appeals to coyote territorial or dominance instincts. Using housecat droppings, smells, and pieces of fur adds a food or curiosity dimension as well. With a bait approach, scraps of deer meat and fur, a road-killed rabbit carcass, or even dried pet food can be effective. At times, a call lure on a spiked down fur patch behind the pan or a rub lure on a fur patch attached to the back of the trap can be effective. Prebaiting with the trap wired open can be useful to build confidence and boldness in a coyote. Simply placing the trap at the site with no attractants for several weeks prior to setting can help coyotes habituate to its presence. A favorite trick of the Colorado trapper referred to earlier is to use his dog to scent mark the set area and go in and out of the trap. While focusing on the dog smells, perhaps a coyote is more oblivious to the trap as a threat. Plan to leave the trap set for 2 to 4 months, if necessary.

Checking and Resetting Traps. Most states require cage traps to be checked at least daily. In residential areas, twice a day is recommended, especially where pets might be caught. Check from a distance if possible. Often, the property owner or client can check for you. Traps can be relured or rebaited at 1 or 2 weeks, depending on weather and approach. A .22 rim fire short or CB cap to the head is a good dispatch method (if allowed in your municipality). If you are authorized to use immobilization or tranquilizer drugs, the animal can be sedated and moved to another location to be euthanized. This method is useful where shooting is prohibited or indiscreet. In public areas, transport the carcass in a large trash bag to avoid detection. After a catch, the

same site can be reused but it is best to replace the dirty trap with a sanitized and deodorized one.

BODY GRIPPING TRAPS

Body gripping traps are not appropriate for coyote control.

FOOTHOLDS

Figures 12a through 12f illustrate the procedures for making a set.



Figure 12a. Equipment used for coyote trapping. Photo by Ron Case.



Figure 12b. Dig out a depression for the trap slightly larger than the trap being used and drive stake in bottom. Photo by Ron Case.



Figure 12c. Set the foothold and insert a trap-pan pad (shown) or cover (see Figure 12d.) to prevent soil from interfering with the pan. Pan and jaws should be level and flat. Place the pan cover so that the dog or trigger can move upward without binding it in. Anything that slows the action of the trap can cause a miss or a toe hold. Photo by Ron Case.



Figure 12d. Place foothold in soil. Be sure it is properly bedded. (Note the white cloth to prevent soil from interfering with the pan.) Stretch the pan cover tightly across the pan and under the jaws. The trap should be set about a ¼-inch below the level of the surrounding ground. The set must look natural. The soil around the trap and over the springs, chains, and stake should be packed to the same firmness as the ground the coyote walks on in its approach to the set. Only soft soil should be directly over the trap pan within the set jaw area. Use a curved stick, brush, or rib bone to level soil over the trap. Photo by Ron Case.



Figure 12e. Use a stake or trowel to make a hole behind the set trap and apply bait. Photo by Ron Case.



Figure 12f. Place a backing such as a stone or log behind the hole. Backing helps direct the coyote to approach the hole from the trap side. Photo by Ron Case.

Materials needed for placing a set:

- 24-inch rebar stake ½-inch diameter or other means of anchoring the trap,
- trowel for digging trap bed (i.e., depression) and hole for bait,
- hammer for digging and driving the trap stake into the ground,
- gloves to protect hands and minimize human scent,
- kneeling pad, knee pads or ground cloth
- Pan cover or under-pad to keep dirt from obstructing trap pan movement,
- screen sifter for sifting soil over the trap,
- whisk broom or other device to level and blend soil over the trap, and
- lure, scent, or bait for an attractant.

Locating the Set. Location of the trap set, including the general area and the specific spot, is extremely important. It should be precisely where the coyote(s) will quickly and readily find it, generally right on the natural travel pattern where activity is concentrated. Agricultural areas are good examples where multiple travel ways, land features, and borders come together to funnel coyote activity through a small area (e.g., where several farm roads and stock trails funnel through a gate or at a creek crossing). Other concentrated areas include prey concentration areas and isolated distinctive features (e.g., stock ponds, carcass dumps, brush piles or brushy cover, prairie dog towns, etc.). In urban and suburban areas, entry and exit points from open space into residential areas, waterways under bridges, or through large culverts or utility easements often work well. The specific spot should be where the prevailing wind would waft the odor of the lure toward the travel way. Two or three different sets can be made in close proximity at strategic locations.

Sizes and Styles of Traps. There are many makes and models of traps suitable for catching coyotes. Older style double-longsprings are still favored by some. Newer coil spring models have several advantages and are the preferred style today. Jaws can be square, round, offset (i.e., with a slight gap) and thickened (e.g. malleable cast or laminated). The better models are equipped with about 18 inches of kinkless anchor chain, center-swiveled on the bottom of the trap. Additional swivels help minimize foot damage and non-target catches by providing pan tension adjustment. Rubber-padded jaws can minimize foot damage and have public relations value in public areas or where pets could be caught. State laws dictates that foothold traps are limited to smooth jaws only; no teeth or serrated edges. In addition, foothold traps are limited to a 6" jaw spread or less.

Care and Preparation of Traps. New traps should be cleaned of oil, slightly rusted and dyed (i.e., coated). Various commercial dyes are available through trap supply companies (e.g., logwood dye/wax and water

or gasoline based dips). Old or dirty traps should be cleaned of debris and excess rust and dyed. Traps should be adjusted so that the pan is level when set and has a short, crisp action, ideally at about 3 pounds of tension.

Anchoring Traps. Traps should be anchored to the ground with a rebar stake or cable anchor. It is paramount that a trapped coyote cannot pull the stake and escape. Various lengths of stakes or even double stakes can be used depending on soil conditions. A swiveling action at the stake is important to prevent kinking.

In rocky, hard soil conditions, an alternative to staking is attaching the trap to a heavy, pronged drag. Heavy cover or brush must be present and a much longer chain is required (6 to 8 feet, Figure 13).

Lures, Scents, and Baits. Most trap sets involve bedding the trap so the pan is within 6 to 9 inches of some odor and/or visual attractant. The most natural lures are droppings and urine from coyotes or even red fox, and domestic dogs. Scents made from just coyote glands/urine are very effective.

Compounded or call lures are a blend of glands, oils, and food items that can have multiple appeals: food, curiosity, territoriality, and sex. Skunk essence can be added for more calling power in cold conditions. Baits generally are food-based compounds or meat scraps.

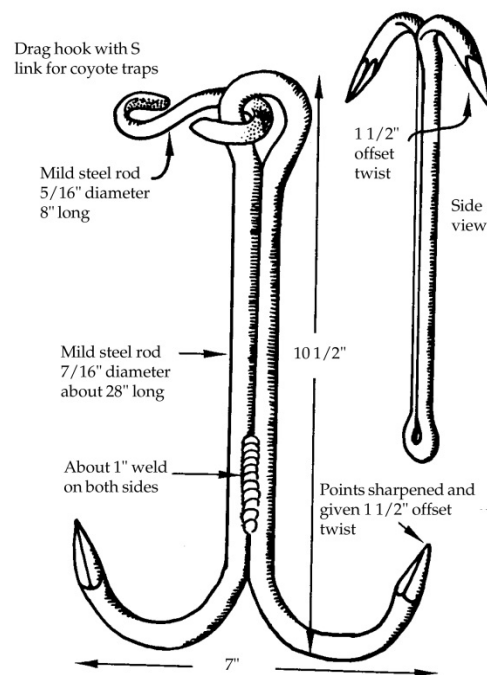


Figure 13. Trapping drag. Image by PCWD

Making the Set. Types of sets can be categorized as hole sets, flat sets, or blind sets. The classic dirt hole set simulates where an animal has dug a hole to bury or retrieve something. The trap is placed near the hole under the apron of dug out dirt. Flat sets utilize some type of lure holder on top of the ground such as a patch of hide, small bone, or animal dropping. Blind sets are carefully concealed right in the coyotes' natural travel way (e.g., cow trail) with no other attractant.

Steps to make a typical set.

- Select the exact spot close to the travel way or distinctive feature, preferably upwind. Level, open areas, even if relatively small, are preferred over steep terrain or heavy cover. A low backing (e.g., small shrub, grass clumps, rock, cow pie, etc.) is helpful.
- Dig a dish shaped depression where you want the trap. It should be slightly larger than the trap and deep enough that the set trap will be $\frac{1}{4}$ inch below the surrounding ground. The excess dirt can be put in the sifter or discarded if wet or

unsuitable. Drive the stake through the connector into the ground slightly off-center in the trap bed. Set the trap and press or twist it into the bed with the trap dog (i.e., trigger) toward the attractant. The trap must be level and firmly bedded (i.e., very stable). The chain and stake can be used to help support the loose jaw. With under pad or pan cover in place, sift and pack soil over, around, and inside the trap until smoothly covered. Note: Extra sifted, dry dirt can be carried to the set if necessary. When dealing with wet or frozen conditions, peat moss, pulverized manure or table salt can be mixed with dry soil.

- Dig a 3-inch diameter hole on a 45° angle away from the trap and 6 to 8 inches deep. Some of the fine, loose dirt from the hole can be pulled or lightly raked over the trap to blend it better. A few pebbles or small dirt chunks can be placed strategically to subtly guide the coyote to step on the pan. A couple of chunks of bait or a tablespoon of paste bait can be placed in hole. Several drops of gland or call lure can be placed on the lip of the hole, or a few squirts of urine can be used on the backing. A whisk broom can be used to further blend area and brush out tracks. A flat or blind set needs to be blended a lot more naturally than a dirt hole set. The trap pan should be 6 to 9 inches from the attractant and offset right or left an inch or two. Note: Some expert trappers prefer to set 2 traps at each set.

Checking and Resetting Traps. Check state regulations for trap check requirements. Once per day, once every 24 hours, or every other day are typical time periods, though earlier in the day is better. In urban or residential areas, twice daily is recommended to minimize the length of time an animal is in the trap. Check from a distance if possible. Relure traps once a week. If a catch is made, the best way to dispatch the animal is with a shot to the head or heart/lung area with a .22 rim fire caliber (if allowed in your municipality). Shorts or

CB caps are adequate for head shots. After a catch, the same trap and set can be used if cleaned and thoroughly blended with the surrounding area.

Problems in Trapping Coyotes. Once the basics are mastered, coyotes are not difficult to trap. A good variety of different lures and sets can improve your catch by continually offering a coyote something new or different. Many educated or “trap-shy” coyotes can be caught that way. On occasion, 2 traps at a set, blind sets or snares/cable restraints may be necessary. Non-target catches, including pets, can be a problem but lure selection, pan tension and set location can minimize the likelihood. In urban and suburban areas (e.g., an HOA), local residents should be warned and set locations can be posted. People, especially dog walkers, residents opposed to trapping, and media personnel, can pose challenges. Having full support and authorization for your activities, “staying under the radar,” and proper handling of the media can help.

Human Scent and Coyote Trapping. The majority of coyotes can be trapped without minimizing human scent at sets (e.g., wearing gloves and clean footwear, using a ground cloth or knee pads, bathing before setting traps, using scent neutralizers, etc.). This is especially true in more urban areas where coyotes associate with people on a daily basis. However, in some instances or with some coyotes cleanliness can be the difference. Such measures certainly do not hurt. Setting traps early in the day and making sets quickly can minimize the human scent issue significantly.

Opposition to Trapping. Much opposition to foothold trapping, occurs in urban populations. Banning their use has been a top priority of animal rights groups for some time. The most common objections to trapping are: 1) traps are perceived as “cruel and inhumane” devices and 2) concern over catching and harming non-target animals, especially endangered species and pets. Many of these arguments are inaccurate and unfounded. Footholds and cable restraints are some of the most effective and safe tools available to wildlife managers. For

example, heavy-duty longspring traps are a primary tool for recapture of reintroduced wolves to re-collar them, No. 3 padded-jaw traps were the primary tool used to capture lynx for reintroduction into Colorado, and snares with stops were the primary tool used to initially live-capture wolves for reintroduction to Yellowstone. The design and technology of traps is improving constantly and new devices often surpass the stringent humane trap standards of the USA-EU International Standards Organization. When used properly, they are effective and safe.

CABLE RESTRAINTS

Snaring is the technique of setting a steel cable loop in an animal's path to capture it by the neck, body or leg. Lethal cable restraints are designed and set to capture an animal around the neck and kill it quickly by strangulation. Cable constraints (non-lethal cable restraints) capture an animal by the neck or foot and hold it alive.

Only powered foot snares are legal for use in Alabama.

Regulations for Snaring. Cable restraints are not legal in all states. Only powered foot snares are legal for use in Alabama. Where cable restraints are legal, most states have regulations which require that cable restraints be visually inspected every 24 hours. Cable restraints should be checked early in the morning to increase the probability of releasing non-target animals unharmed.

OTHER TRAPS

Collarum® Trap. The Collarum Trap is a cable restraint type device that captures canines by throwing a relaxing noose around their neck (Figure 14). It is highly selective for canines because the

trigger mechanism requires a bite and pull response. Animals are relatively uninjured (coyotes sometimes break their teeth chewing on the cable), so the trap is a superb choice for use in areas with lots of non-target animals (check laws on its use in your state). The trap has been used successfully by animal control agencies in the capture of stray dogs. The trap is manufactured by Wildlife Control Supplies, LLC. Consult its literature on use. More information is available at WildlifeControlSupplies.com.

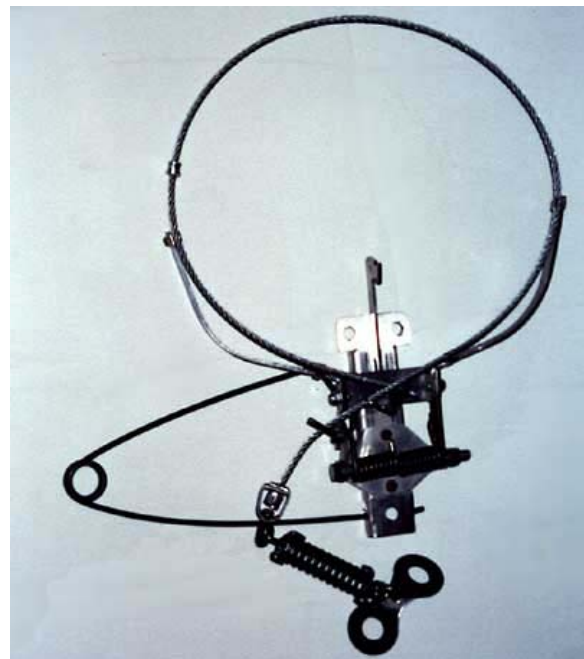


Figure 14. Collarum® trap. Photo by Wildlife Control Supplies LLC.

HANDLING

RELOCATION

Relocation is illegal in Alabama.

TRANSLOCATION

Translocation is illegal in Alabama.

EUTHANASIA

Shooting in the head or heart/lungs with a .22 caliber is the most common method. Check local and state laws first.

Carbon-dioxide is also an appropriate method. Use a snare-pole to control the coyote. Release coyote from the trap and transfer into a suitable cage.

DISPOSAL

Refer to Volume 1 of the National Wildlife Control Program and your state regulations regarding carcass disposal.

OTHER METHODS

LIVESTOCK GUARDING DOGS

A livestock guarding dog (Figure 15) stays with sheep or cattle without harming them, while aggressively repels predators. Its protective behaviors are largely instinctive, but proper rearing plays a part. Breeds most commonly used include the Great Pyrenees, Komondor, Anatolian Shepherd, and Akbash Dog. Other Old World breeds used to a lesser degree include Maremma, Sharplaninetz, and Kuvasz. Crossbreeds are used also.



Figure 15. Livestock guarding dog (Akbash dog). Image by PCWD.

The characteristics of each sheep operation will dictate the number of dogs required for effective protection from predators. If predators are scarce, one dog is sufficient for most fenced pasture operations. Range operations often use two dogs per band of sheep. The performance of individual dogs will differ based on age and experience. The size, topography, and habitat of the pasture or range must also be considered. Large, flat, open areas can be adequately covered by one dog. When brush, timber, ravines, and hills are in the pasture, several dogs may be required, particularly if the sheep are scattered. Sheep that flock and form a cohesive unit, especially at night, can be protected by one dog more effectively than sheep that continually scatter and bed in a number of locations.

The goal with a new puppy is to channel its natural instincts to produce a mature guardian dog with the desired characteristics. This is best accomplished by early and continued association with sheep, producing a bond between the dog and sheep. The optimum time to acquire a pup is between 7 and 8 weeks of age. The pup should be separated from litter mates and placed with sheep, preferably lambs, in a pen or corral from which it cannot escape. This socialization period should continue with daily checks from the producer until the pup is about 16 weeks old. Daily checks do not necessarily include petting the pup. The primary bond should be between the dog and the sheep, not between the dog and humans. The owner should be able to catch and handle the dog to administer health care or to manage the livestock. At about 4 months, the pup can be released into a larger pasture to mingle with the other sheep.

A guarding dog likely will include peripheral areas in its patrolling. Some have been known to chase vehicles and wildlife and threaten children and cyclists, activities which should be discouraged. Neighbors should be alerted to the possibility that the dog may roam onto their property and that some predator control devices such as traps, snares, and M-44s present a danger to it. Many counties

enforce stringent laws regarding owner responsibility for damage done by roaming dogs. It is in the best interests of the owner, dog, and community to train the dog to stay in its designated area.

The use of guarding dogs does not eliminate the need for other predation control actions, though they should be compatible with the dog's behavior. Toxicants (including some insecticides and rodenticides) used to control various pest species can be extremely hazardous to dogs and are therefore not compatible with the use of guarding dogs.

The M-44 device is particularly hazardous to dogs. Some people have successfully trained their dogs to avoid M-44s by allowing the dog to set off an M-44 filled with pepper or by rigging the device to a rat trap. The unpleasant experience may teach the dog to avoid M-44s, but the method is not fool-proof. One error by the dog, and the result is usually fatal. With the exception of toxic collars, which are not legal in all states, toxicants should not be used in areas where guarding dogs are working unless the dog is chained or confined while the control takes place.

Dogs caught in a steel trap set for predators are rarely injured seriously if they are found and released within a reasonable period of time. If snares and traps are used where dogs are working, the producer should: (1) encourage the use of sets and devices that likely are not to injure the dog if it is caught, and (2) know where traps and snares are set so they can be checked if a dog is missing. Aerial hunting and calling and shooting coyotes should pose no threat to guarding dogs. Ensuring the safety of the dog is largely the producer's responsibility.

Dogs may be a first line of defense against predation in sheep and cow/calf operations in some cases. Their effectiveness can be enhanced by good livestock management and by eliminating predators with suitable removal techniques.

DENNING

Predation can frequently be resolved by locating coyote dens and removing the pups and/or the adults responsible for depredations. Denning may also be warranted as a preventive control strategy if coyote predation has historically and consistently occurred in a particular area during the lambing season.

Breeding pairs of coyotes are extremely territorial. They vigorously defend their territories against other canine intruders. Coyotes often den year after year in the same general location. If a particular denning pair of coyotes has a history of existing with and not preying on livestock, it may be to the producer's advantage to leave them alone. Their removal will open up a territory that may become occupied with coyotes that are more likely to prey on livestock.

Although tracking a coyote from a livestock kill back to its den requires skill and persistence, it is probably the most foolproof method to locate the den of the offending animals. If tracking is not feasible, there are alternatives that may be used.

Coyotes will howl in response to a howl from another coyote near their den, though this may not always be the case in urban areas. One or both adult coyotes will often be near the den between 7:30 to 9:00 a.m. A response can be elicited by voice howling, blowing a coyote howler call, or broadcasting recorded calls from an electronic player. It is usually best to wait 30 minutes to an hour between howls because the same coyotes may not respond again within that period.

Once the approximate location of a den is determined, careful planning is required to ensure the best chance of immediately removing the adult coyotes. The hunter should approach the den unseen and downwind to within calling distance, armed with a high powered rifle and/or repeating shotgun loaded with heavy shot. A call that imitates the whines or yelps of a coyote pup can be very effective under these circumstances, especially when

used in conjunction with a dog trained to act as a decoy. A small-to medium-sized dog moving in the vicinity of the den gives the coyotes something to focus on and reduces the likelihood that the hunter will be detected. The sounds of a pup in distress along with the sight of a dog near the den will cause most coyotes to display highly aggressive behavior, frequently chasing the dog back to within close proximity of the hunter.

After the adults are removed the pups can be killed by fumigating the den with a gas cartridge registered for this purpose, or the pups can be dug out by hand. If attempts to shoot one or both adults are unsuccessful, the chances of trapping or snaring them are improved if the pups are left alive and confined in the den. This can be accomplished by driving stakes 2 inches apart down through the den entrance. Carefully place blind sets in the den trails or at the den mound. Capture will often result when the adults return to investigate the area. If the adults are not captured within a reasonable period of time, the pups should be destroyed. Removal of the pups is often effective in stopping predation even if the adult coyotes are not removed.

Aircraft can be used very effectively to locate coyote dens when depredations occur in spring or early summer in open prairies or sagebrush terrain. Early morning hours provide the best light conditions for locating adult animals near the den site or as they return from hunting. The low angle light reflects on the coyote and provides good contrast with the surrounding vegetation and soil. Actual den signs, however, show up better during the middle of the day with light coming from directly overhead. Dens are most easily located after the pups have begun venturing outside. The pups soon trample down the vegetation around the den, making the site more visible from the air. If aerial shooting is legal, it is often possible to remove the adults and pups in one operation. In open terrain, landings can often be made within walking distance of the den.

Although removing coyotes from dens requires special skills, training, and often considerable time,

the advantages can be significant. A cost-benefit analysis conducted during one study determined that the cost to remove a den of depredating coyotes could be recovered if only 3.6 lambs were saved. In the same study, the average number of lambs killed by each depredating pair of coyotes was 4.9 per week. While these findings indicate that denning could be cost effective after only a few days, the benefits actually continue in most instances for the duration of the season. Denning can be very selective for the offending animals and can resolve some depredation problems at relatively low cost.

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RESOURCES

KEY WORDS

Wildlife, wildlife control, damage management, coyote, predator, canine, nuisance, attack, trap, snare.

ON-LINE RESOURCES

<http://wildlifecontroltraining.com>

<http://icwdm.org/>

<http://wildlifecontrol.info>

QUESTIONS FOR REFLECTION

1. List the seasons and the biological reasons for increased human-coyote conflicts.
2. What types of non-lethal control methods can be used to manage coyote damage? .
3. What types of lethal methods can be used to manage coyote damage?
4. Explain what integrated pest management (IPM) means.
5. List factors that contribute to a good trap set location.
6. List the main objections to using foothold traps.
7. Describe differences between lethal snares and cable constraints.
8. Describe uses of dogs in coyote control.
9. Describe situations which might warrant the use of cage traps.

OBJECTIVE QUESTIONS

DISCLAIMER

Implementation of wildlife damage management involves risks. Readers are advised to implement the safety information contained in Volume 1 of the National Wildlife Control Training Program.

Some control methods mentioned in this document may not be legal in your location. Wildlife control providers must consult relevant authorities before instituting any wildlife control action. Always use repellents and toxicants in accordance with the EPA-approved label and your local regulations.

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