(guard dogs, llamas, and donkeys), and improvements in animal husbandry practices, such as proper disposal of dead livestock carcasses. Lethal control measures include foothold traps, neck snares and shooting.

Trapping is usually conducted for 10-15 days and is restricted to within a half mile of the farm's boundaries. Control devices are checked daily, and captured wolves are shot. Selective removal of livestock-depredating wolves in Minnesota has helped resolve wolf-livestock conflicts while facilitating wolf recovery. ■

Bill Paul is the Assistant State Director for the USDA Wildlife Services program in Minnesota, U.S.A., where he coordinates federal wolf depredation control activities. He has been involved with wolf research and control programs in Minnesota for 25 years under both the U.S. Fish & Wildlife Service and USDA and has helped train American and foreign wolf researchers and control personnel in wolf capture techniques and management of wolf-livestock conflicts.

USDA

A trap set in the ground to catch depredating wolves.

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Non-lethal Wolf Depredation Control Methods: How Well Do They Work?

by Liz Harper

Wolf depredation is a concern wherever wolves co-exist with livestock.

Lethal methods are most often used in response to depredation, but several alternative methods have also been tried. These methods include the use of guard animals, electric fences, sirens and strobe lights, improved animal husbandry practices, wolf translocation, electronic training collars, sterilization, diversionary feeding, taste aversion and flagging ("fladry").

Guard animals, such as dogs and llamas, can be useful predator deterrents, because they bond with livestock and help protect them by either chasing away predators, or by deterring predators with their presence. For example, llamas have an inherent dislike of canids and will attempt to chase them away. They can also provide passive protection by being alert to predators. A predator that has been detected may leave the area. Although this may work well for coyotes and foxes, because of the size and pack nature of wolves, llamas (as well as guard dogs) are at risk of being killed by wolves.

Guard dogs have long been used in Europe, but their success depends on the shepherding techniques in those countries. Shepherds remain with the flocks and work with the dogs to protect the stock. In the United States, where livestock often move unattended, guard dogs have not been shown to reduce depredation by wolves.

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Bill Paul installs a lighting and siren device in an attempt to scare away depredating wolves.

Electric fences can be used to exclude predators; however, 6-7-foot-tall woven-wire fences with electrically charged wires along the top and bottom are required to keep wolves out. This may work well for small barnyards or chicken coops, but for larger pastures, these are costly to build and maintain. They also interfere with movement of other animals such as deer and pronghorn.

Sirens and strobe lights may be placed around a pasture and set to act at regular or irregular intervals or when a radio-collared wolf is in the area (Radio Activated Guard box). They may reduce depredations temporarily by scaring the wolves from the area, but wolves can become habituated to these deterrents and ignore them, or avoid them to enter a pasture. Once habituation occurs, depredations may recur.

There has long been a belief that wolves prey on livestock because of poor husbandry practices. However, a recent study in Minnesota could find no changes in animal husbandry practices that were certain to prevent wolf depredations.

John Shivik

Above: Llamas are guard animals that are sometimes tried in non-lethal depredation control. However, wolves have killed some llamas, so it is not clear whether llamas will be effective.

USDA

Right: Guard dogs may be useful predator deterrents, because they bond with livestock and help protect them from predators by either physically chasing away predators, or by passively deterring predators with their presence. However their success depends on the presence of shepherds too.

Moving wolves from areas where they are depredating is a technique that is often useful in areas of low wolf populations. When wolf numbers are high in an area, however, the depredating wolf may be moved into another pack's territory and be killed as a trespasser. Even in areas of low wolf numbers, translocation is often unsuccessful, as depredating wolves often find their way home, or begin depredating in their new territory.

The use of electronic training collars to teach predators to avoid livestock has shown some success during preliminary studies in Wisconsin and Montana. Researchers have used these collars to deliver a shock to captive wolves when they approach cattle, in hopes that when the wolves are released again, they will no longer kill livestock. There may be a limit to the length of time this training keeps wolves from depredating. Furthermore, this method is logistically difficult.

Sterilizing wolves may reduce livestock depredation by retarding local wolf population growth and eliminating pups. (Providing for pups is believed to be an important motivation for livestock depredations.) Because tested sterilization requires surgery, this technique is not viable as a widespread method. If sterilization were to be used as a technique in the future, nonsurgical sterilization methods would need to be developed.

Diversionary feeding, or providing an alternate food source for predators, has been tested as a method to reduce predation in wild prey. Diversionary feeding has shown limited success in increasing calf-to-cow ratios and is expensive and time-consuming. This method has not been tested to see if it could decrease livestock depredations by wolves, and in fact, is discouraged.

Taste aversion conditioning, a technique involving baits laced with lithium chloride, has been used on several species to limit consumption of food. It has been tested on wolves, but shows no promise as a depredation control technique. The reason for this is that wolves are trained to avoid the baits, but they are not trained to avoid attacking and killing live animals.

The use of "fladry" or flagging, is an old European hunting technique of hanging long rows of closely spaced flags to direct wolf movements. It may hold some promise in reducing wolf depredations as wolves may be deterred by the flagging. To be successful, flags must be less than 20 inches apart and must touch the ground. When it was tried around cows in Minnesota, the cows ate the flags! This technique may be difficult to maintain on a large scale, and habituation by wolves is probable.

Many of these methods show promise in reducing livestock depredations under some circumstances, but none has been shown to consistently prevent wolf depredations. On the other hand, most have not been extensively tested on wolves. Perhaps combinations of several types of deterrents or new techniques may prove beneficial in the future. ■

Liz Harper is the information specialist for the International Wolf Center, and is finishing her master's degree on wolf depredations in Minnesota, U.S.A. For the last decade, she has worked on a variety of projects, including the black-footed ferret reintroduction in Wyoming, the Minnesota wolf project, and various projects for Minnesota's County Biological Survey, the Smithsonian, and Moorhead State University, U.S.A.

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