

Wildlife Services

Protecting People
Protecting Agriculture
Protecting Wildlife

Factsheet

May 2010

The Livestock Protection Collar



Wildlife Services (WS), a program within the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), provides Federal leadership and expertise to resolve wildlife conflicts that threaten the Nation's agricultural and natural resources, human health and safety, and property.

When nonlethal methods to limit predatory attacks on sheep and goats prove inefficient or ineffective, WS employs tools that target the offending predators.

Coyotes are the leading cause of predation losses for sheep and goat producers. The livestock protection collar (LPC) is a wildlife damage management tool carefully used by WS personnel to protect sheep and goats in fenced pastures from depredating coyotes.

The LPC is the most selective method available to manage coyote predation on sheep and goats—only the coyote that attacks a sheep or goat fitted with an LPC is killed. The collars contain two reservoirs with low concentration doses of Compound 1080, which is fatal to predators when ingested during an attack.

In 2006, WS fitted 2,041 collars on producers' sheep and goats. Of the 47 predators killed by LPCs that year, all were coyotes, the target species. WS is authorized to use the LPC in nine States and on average releases only 0.05 pounds (e.g., less than one ounce) of Compound 1080 annually.

The LPC is registered by the Environmental Protection Agency (EPA) as a restricted use product. WS personnel using the LPC must be trained in its use and a State certified pesticide applicator. They must follow all label directions and EPA use restrictions. A 2009 EPA review of WS' use of the LPC supports the program's registration of Compound 1080. The EPA review highlighted the program's priorities of safe, effective, and environmentally responsible use, storage, and accountability.

How the Collar Works

Two sizes of LPCs are available. The small collar—for lambs and kids weighing less than 50 pounds—is a dollar bill-sized rubber rectangle. The larger collar—for sheep and goats weighing more than 50 pounds—is approximately 1.5 times longer. Both sizes contain two small rubber reservoirs, each filled with 15 ml of a 1-percent solution of Compound 1080 in water, or 150 mg sodium fluoroacetate per reservoir.

When biting the throat of a collared animal, a coyote receives a dose of Compound 1080 in the mouth. The naturally occurring organic fluorine compound is fatal to predators when ingested during an attack.



Coyotes generally attack prey of this size with a crushing bite to the neck. The LPC is placed under the throat of a sheep or goat and held in place with Velcro™ straps. When a coyote attacks a collared animal, biting the throat where the LPC is positioned, the coyote receives a dose of Compound 1080 in the mouth. Typically, only one reservoir is punctured during an attack.

Compound 1080 blocks energy production in the Krebs cycle, a major metabolic mechanism that releases energy from food. Within 5 hours of receiving the dosage, the coyote will die from cardiac failure or central nervous system failure. (The collar-wearing sheep or goat usually will also die due to suffocation caused by the coyote attack.)

Livestock Damage

Coyotes and feral dogs cause substantial damage to livestock and poultry producers, particularly those with sheep and goats. In a 2004 survey of producers, the National Agricultural Statistics Service (NASS) found that coyotes nationwide killed an estimated 135,600 sheep and lambs worth a total of \$10.7 million. Dogs and foxes accounted for an additional 34,000 lamb and sheep deaths worth \$3.1 million. According to the same NASS survey, an estimated 155,000 goats were killed by predators (of all kinds). Based on the survey's data, WS estimates that the number of goats killed by canids (i.e., coyotes and wild dogs) could total approximately 117,000 animals, valued at about \$12.1 million.

After studying a petition to ban LPCs, EPA determined that predation accounts for a significant portion of premature livestock losses. EPA found that the use of LPCs have significant benefits in reducing predation on livestock without negative long-term impact on the target predators or other nontarget species.

Nontarget Hazards

Overall, the LPC's design makes the risk of nontarget species contacting the collar's contents extremely

low. To further ensure that the collar is safely and responsibly used, WS experts routinely use their knowledge of animal behavior patterns and biology to determine what risks, if any, may be present to nontarget animals. When specialists recommend using LPCs for a particular situation, they are required—according to the program's decision model—to determine the risk to nontarget animals.

Sodium fluoroacetate (Compound 1080) can be classified as highly toxic to mammals and birds. Species vary considerably in their response to sodium fluoroacetate, with primates and birds ranking least sensitive, and carnivores the most susceptible. A few fish species are slightly sensitive to the toxicant, but most show no sensitivity at all.

Livestock carcasses contaminated with the toxicant on the wool or hair near punctured collars may pose a risk to some scavengers. However, in research studies that allowed dogs, skunks, magpies, and eagles to feed on contaminated carcasses, researchers found that these species were not adversely affected because they did not eat the contaminated wool or hair.

Because sodium fluoroacetate does not accumulate in tissues at toxicologically significant levels, the secondary hazards from toxic residue accumulation in target coyote tissue are low. In research studies, scavenger species were given tissues to eat from coyotes killed by Compound 1080, and they showed no negative effect.

Environmental Safety and Security

Sodium fluoroacetate is a naturally occurring organic fluorine compound extracted from the West African plant "ratbane" (*Dichapetalum toxicarium*). The chemically stable, nonvolatile compound is relatively insoluble in most organic solvents. If the compound spills to the soil during a predator attack, it is degraded by soil microorganisms. Most soils contain a microbial population sufficiently varied and abundant to result in degradation of any sodium fluoroacetate that spills. Plants produce enzymes that are capable of degrading

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sodium fluoroacetate and of limiting its accumulation in plants.

LPCs' toxic contents are dyed for easy detection if spilled. Affected soil can be scooped up according to pesticide label directions. At least once a week, applicators check the livestock with collars in the enclosed pastures where the devices are used.

Because of potential security issues related to hazardous materials, WS personnel take appropriate security measures in the handling and storing of LPCs. In a 2007–09 review, EPA consulted with the Department of Homeland Security and agreed that it is not necessary for security reasons to cease the use of LPCs.

After a 2001 management alert regarding the inventory and accountability of hazardous materials, WS worked with USDA's Office of the Inspector General (OIG) to refine and strengthen hazardous materials management, including Compound 1080. All OIG audit report recommendations have been implemented, particularly those refining inventory and reconciliation processes. In 2007, WS contracted with the U.S. Public Health Service's Federal Occupational Health Services for a review of pesticide safety, including Compound 1080. Its report showed no noncompliance with Federal or State inspections during the past 5 years at studied sites and stated that the program's "storage requirements are far more stringent than current regulations require."

Wildlife Services Program

As a Federal service that shares costs with cooperators, WS is authorized by Congress to manage wildlife

damage. WS employees recognize wildlife is an important public resource valued by the American people, and they conduct their wildlife damage management programs accordingly.

WS addresses damage using an integrated wildlife damage management approach. In selecting control techniques for specific situations, damage is confirmed and assessed. Personnel then consider the species responsible, frequency, extent of the damage, status of the species, local environmental conditions, environmental impacts, and other factors. These factors are evaluated and used to formulate strategies that may include use of one or more nonlethal or lethal techniques. A 2004 study showed that 31.9 percent of sheep and lamb producers used at least one nonlethal predator control method; these producer's nonlethal methods totaled a cost of approximately \$9.8 million. The LPC is one of many tools available to WS for predator management.

Additional Information

For more information about this and other WS programs or to request assistance from your WS State office, please telephone 1-866-4USDA-WS or contact the WS Operational Support Staff at (301) 851-4009. Additionally, you can contact WS by mail at: USDA, APHIS, WS, 4700 River Road, Unit 87, Riverdale, MD 20737.

You can also find information on WS programs by visiting our Web site at www.aphis.usda.gov/wildlife_damage/.



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United States Department of Agriculture
Animal and Plant Health Inspection Service

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