

to future control efforts. If followed, these recommendations could keep more livestock and wildlife living and save taxpayer money.



Ranchers herding cattle.
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The team, consisting also of Miha Krofel from the University of Ljubljana in Slovenia (<http://uni-lj.academia.edu/MihaKrofel>) and Jeannine McManus from the University of Witwatersrand in South Africa (<http://wits.academia.edu/JeannineMcManus>), began its research by pulling together scientific experiments on lethal or nonlethal methods to reduce predation on livestock. Although they limited the findings to those published in English and conducted in North America and Europe, they amassed a paper mountain of more than 500 articles.

Of those, only 12 met a high level of scrutiny. That’s because the researchers spent two years examining the design of each experiment and then evaluating its effectiveness according to a specific framework. In so doing, they were able to systematically ask questions about the study to decide, based on the answers, whether it met a "gold" standard.

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Was the strategy randomly assigned? Check. Did another group receive no strategy as a comparison? Check. Were measurements and reporting unbiased? Check. Were the results reviewed anonymously by a group of experts? Check.

"Silver" standards were those experiments that came close, but lacked the random assignment.

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Interestingly, none of the studies that met a silver or gold standard came from the USDA's Wildlife Services (<http://www.seeker.com/why-is-the-government-killing-millions-of-animals-1792462111.html>), a federal agency that kills millions of animals per year as part of a management strategy. In 2015 alone, they killed 3.2 million (https://www.aphis.usda.gov/wildlife_damage/pdr/PDR-G_Report.php) animals (https://www.biologicaldiversity.org/news/press_releases/2016/wildlife-services-06-20-2016.html), including not only apex predators, but also beavers, blackbirds, starlings, crows, prairie dogs, snakes and feral swine, to name just a few.

"They have a big research arm funded for 40 or 50 years and they can't seem to do any quality work," said Robert Crabtree, chief scientist and founder of Yellowstone Ecological Research Center (<http://www.yellowstonersearch.org/>). "Shouldn't someone take a look at what's going on here and evaluate the millions of dollars spent for decades trying to justify lethal control?"

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Of the 12 studies that did hold up to scrutiny, five were non-lethal experiments and seven were lethal.

When Treves and his colleagues looked at which methods were the best at keeping predators away from livestock, nonlethal came out on top: 80% were shown to be effective compared to 29% of lethal strategies.

Although it may seem counterintuitive that nonlethal interventions are more effective, there's a good explanation.

"Nonlethal methods seem to repel the predators without disrupting the social organization of the predators," said Treves. "Disrupting the social organization by killing long-term resident predators (<http://www.seeker.com/killing-wolves-can-increase-livestock-attacks-1769352373.html>) seems to invite newcomers that prey on livestock more than did the older residents that were there before."



A string of flags called fladry scare off wolves.
IFT Mexican Wolf

At Lava Lake Land & Livestock (<https://www.lavalakelamb.com/>)in Blaine County, Idaho, cofounder and owner Brian Bean knows all about lethal and nonlethal interventions. His family-owned ranch, which runs nearly 2,000 sheep on several hundred thousand acres of public and private rangeland, has been dealing with predators since the ranch was founded in 1999.

"We have black bears, gray wolves (<http://www.seeker.com/wolves-are-kinder-more-tolerant-than-dogs-1769764200.html>), coyotes, mountain lions, golden eagles -- in fact, just about everything except grizzly bears -- so far," he said.

From the very beginning, coyotes (<http://www.seeker.com/watch-out-urbanites-here-come-the-carnivores-1766300665.html>) preyed on Lava Lake's livestock. They remain the number one predator of his sheep, taking at least 30 sheep a year.

But in 2002, Bean had his first experience with wolves. Seven ewes were attacked and killed at a spring on the Main ranch. Lava Lake lost 25 ewes, two rams and a guard dog to an attack the next season. Another time, wolves killed 35 sheep in a single six-hour period.

"It was eye-opening," said Bean.

(<http://www.seeker.com/watch-out-urbanites-here-come-the-carnivores-1766300665.html>)**RELATED: Watch Out Urbanites, Here Come the Carnivores (<http://www.seeker.com/watch-out-urbanites-here-come-the-carnivores-1766300665.html>)**

All states with wolves have a compensation program to reimburse ranchers for livestock lost to predation. But Bean was more interested in learning how to prevent the attacks in the first place. He began working closely with the conservation group Defenders of Wildlife (<http://www.defenders.org/>) to get up to speed on nonlethal methods.

Now he manages his sheep using a variety of nonlethal tools and techniques. A kit he puts together for his sheep herders -- and also makes available to other livestock operators through the Wood River Wolf Project (<http://www.woodriverwolfproject.org/tools/>)-- contains spotlights, flashing LED lights, airhorns, a boombox, a starter pistol and various other deterrents that keep wolves away from sheep.

The project also maintains a supply of simple, light-weight electrified fencing that includes flapping red flags. This so-called "turbo-fladry" (<https://www.youtube.com/watch?v=BmB6-4MplU0>)" can be very effective at night on bedgrounds. The cost for the kit, which the project shares among ranchers, is about \$2,000 and lasts four to five years. Bean also uses sheep-herding dogs and three to five guard dogs per group of sheep, called a band, which consists of roughly 850 to 950 ewes and their 1,200 to 1,400 lambs.





Wolf
Sub
Wolf

Dog guards a herd of sheep.
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In their analysis, Treves and his colleagues found that fladry and guard dogs proved the most effective at keeping predators away from livestock.

However, no tool works, said Bean, without one important addition: people.

"Human presence is the single most effective deterrent to wolf depredation," said Bean. "Some ranchers place two herders with each sheep band in wolf country, if they have the people available."

These days he still has to contend with coyotes, but loses just one to three sheep every two to three years to a wolf attack.

But not every rancher wants to invest the time, money or personnel into nonlethal methods. In 2012, Washington used \$76,500 of state funds to eliminate the eight members of the Wedge Pack. It's unknown how much it will cost to kill all 11 members of the Profanity Peak pack. (Washington Department of Fish & Wildlife did not respond to requests for an interview.)

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"If lethal control was unsubsidized on public lands, meaning the rancher had to pay [for it], the phone would be ringing off the hook in terms of people wanting to understand nonlethal methods and how to reduce depredation," said Bean.

In large parts of America, getting ranchers to adopt nonlethal strategies is a struggle. Ranching is part of their livelihood, a tradition passed down through the generations. And in an industry where profit margins are tight, trying something different might pose too large of a risk.

"In the US, some of these things are new to the livestock community because we wiped the country clean of wolves and folks have been ranching on wolf-free landscapes for a hundred years," Amaroq Weiss, West Coast wolf organizer at the Center for Biological Diversity (<http://www.biologicaldiversity.org/>).

It may take a while to shift the culture to nonlethal interventions, but knowing which methods are most effective is critical information for state and federal wildlife agencies.


Treves recommends that future experiments keep investigators themselves unaware of the control method used on a test herd. In other words, studies that analyze predation control should surpass both silver and gold and go platinum.

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