Man's Best Friend

An ancient ally is enlisted in war on bovine tuberculosis.

A Great Pyrenees mix bonds with dairy calves to prepare for future work as a livestock protection dog.

Story & photos by
ED HAAG

"Livestock protection dogs have been used in Europe since the time of Christ," says Kurt VerCauteren, a wildlife biologist with the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS). "The USDA introduced them into the U.S. in the mid-1970s to protect sheep from coyotes."

When APHIS scientists first determined that bovine tuberculosis (TB) was well-established in Michigan white-tailed-deer herds in 1997, they knew they were looking at a potentially problematic disease-control issue. Until then, bovine TB appeared to be on the short list for eradication in the United States; however, with deer populations exploding across the country, an emerging, seemingly uncontrollable vector threatened to reintroduce the disease back into the general cattle population.

Subsequent surveys conducted by the Michigan Department of Natural Resources and Michigan State University Animal Health Diagnostic Laboratory at Ann Arbor, Mich., identified a self-perpetuating reservoir of bovine TB in free-ranging white-tailed deer in northeast Michigan. For some, it was only a matter of time until the same disease appeared in cattle.

With that prospect in mind, Michigan deer populations were closely monitored by government wildlife and health agencies, and in June 1998 the first suspected transmission of the disease from deer back to cattle was documented and confirmed.

Further investigation established more links between the wild deer population in the area and the cattle diagnosed with bovine TB.

In 2001, the National Wildlife Research Center out of Fort Collins, Colo., initiated a comprehensive investigation of bovine TB in Michigan. Research efforts focused on developing a greater understanding of the role deer and other wildlife species played as reservoirs and vectors of the disease.

Other research, conducted by USDA's National Animal Disease Center (NADC) in Ames, Iowa, confirmed that white-tailed deer infect each other when they inhale or ingest infectious organisms. It is believed transmission is aided by high deer densities and prolonged contact with each other, such as feeding at a concentrated and single source of feed, such as at a hay stack or cattle feeding site.

For VerCauteren, the evidence was clear. Studies reported in the *Journal of Wildlife Diseases* in 2004 by colleague Mitchell Palmer of the NADC in Ames, Iowa, had shown conclusively that bovine TB bacteria could not only be passed via contaminated feedstuff from deer to cattle, but, under cooler winter conditions, could remain alive on feedstuffs for up to 16 weeks.

Control measures evaluated

The challenge VerCauteren and his fellow researchers at the National Wildlife Research Center faced was to develop a practical, cost-effective strategy that would prevent deer from accessing the same feed as cattle. Initially, VerCauteren explored three categories of deterrents —psychological, physical and biological.

The psychological deterrents were primarily frightening devices, such as automated scarecrows, timed propane canons, horns, lasers and recordings of deer in distress. With the exception of one automated scarecrow dubbed "very scary man," all others failed in intimidating the deer long term.

Physical deterrents such as fences fared better. Twelve types of fencing were extensively tested for efficacy, price, maintenance factors and longevity. "Fencing — single or double — is tried and true," VerCauteren says, "but the issue becomes cost-effectiveness."

He notes that the more effective the fence is at keeping deer out (maximum of 99% effective), the higher the price the beef producer must pay. Costs ranged from single braid, baited electrical fence (80%-90% effective) at an average cost of $2 a meter to chain-link fence at $20 a meter (90%-99% effective).

"There is also the issue of social acceptance of a fence that actually keeps deer out," VerCauteren says. "What farmer wants a 6-foot-tall woven-wire fence around his place?"

For the deterrent to gain widespread acceptance by livestock producers, it has to be cost-effective, nonintrusive and easily integrated into the daily routine of a livestock operation, VerCauteren proposed. For him, the answer was a historically proven biological deterrent — one which would be intimidating enough to discourage deer from consuming feed meant for cattle.

Already proven to protect sheep from coyotes, VerCauteren and his colleagues had to determine whether the livestock protection dogs (LPDs) could be trained to guard against deer.

Study launched

In order to answer that question, VerCauteren and associates Michael Lavelle and Gregory Phillips initiated a study in Michigan to determine if livestock protection dogs, raised and bonded with calves, could reduce direct and indirect contact between white-tailed deer and cattle.

"The idea was to bring up LPDs with cows so they would be as protective toward them as they would be of sheep," VerCauteren says. "If the dogs did a good job of keeping coyotes away from sheep, they might do an excellent job keeping deer away from the cattle."

The research team hypothesized that if their prognosis was correct, LPDs would initially reduce activity levels of deer around pasture perimeters, cut the number of deer entering cattle pastures, impede the access of deer to concentrated cattle feed and limit occurrences of deer approaching cattle, particularly within the 5-meter radius that represented the distance TB could be spread by aerosol transmission.

They also surmised that deer would eventually habituate to LPDs, learning to access pastures and concentrated feed despite the presence of dogs.

Livestock protection dogs separate deer from cattle. [PHOTO BY KURT VERCAUTEREN, USDA APHIS WS NATIONAL WILDLIFE RESEARCH CENTER]

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Two fenced-in Michigan game farms were selected as study sites. One had deer populations of 147 deer per square mile, while the other had 389 deer per square mile. As VerCauteren notes, both farms had whitetail populations several times higher than the 25-animals-per-mile average found in the wild.

"We needed to make that contact between deer, dogs and cattle happen," he says. "Going with much higher densities than you would see in the wild accelerated that process."

One year before the scheduled start of the study, VerCauteren purchased four Great Pyrenees pups (three females and one male). He selected Pyrenees because of their overall reliability and their tendency, as a breed, to mature earlier than other livestock dogs. That decision would prove dramatically fateful to one of the beef-producing families participating in the study (see "Beyond the call of duty").

Training the dogs involved allowing them to establish a close association with young calves — first in an enclosed pen and later in increasingly larger pastures. The trainer enforced dog-calf bonding by treating the two animals as littermates.

Prior to beginning the study, four 3-acre pastures were selected for each of the two game farm locations. A perimeter of two-strand electric polyrope fence was strung around each of them to contain the calves that would be used in the study. An invisible fence wire was added to prevent the dogs from wandering beyond the pasture boundaries. Corn and alfalfa were placed at the center of each pasture to encourage deer use.

At the start of the study VerCauteren introduced four calves to each of the eight pastures. He notes that each game farm had two study pastures guarded by one dog per pasture and two control pastures without dogs.

From March 6, 2003, through Aug. 15, 2003, the dynamics within the study areas were monitored by direct observation, motion-activated video, passive track indices and electronic trail monitor indices. In order to negate any site-selection bias, approximately halfway through the study the researchers changed unprotected pastures to protected pastures.

Impressive results

For VerCauteren and his colleagues, the results confirmed that trained livestock protection dogs made a big difference. They were 100% effective in preventing deer from approaching cattle in core areas of the pasture, 99% effective at denying deer access to the cattle feed and 69% effective at keeping deer out of pastures.

"Just the presence of these dogs kept the deer away," he says. "All they had to do was walk toward them, and the deer would take off."

VerCauteren adds that just because the LPDs succeeded in controlling the deer's movements, it shouldn't be assumed that the same could be accomplished by any dogs.

"A lot of time was spent training these dogs and conditioning them to be

A trainer enforces dog-calf bonding by treating the two animals as littermates.

protective of the cattle," he says, noting there are some additional advantages to taking the time to imprint the dogs on the cattle. "If you don't want predators around your cattle, these dogs are equally good at discouraging coyotes and raccoons."

He notes that even after successfully imprinting the dogs to the cattle, some measures must be taken to keep them close. "It is also important to spay and neuter them so they wouldn't go looking for friends," VerCauteren says.

In addition, he recommends using an invisible fence collar to keep the dogs from wandering beyond the pasture they are supposed to protect. The invisible fence and similar devices help establish the dog's external boundaries with a wire that functions as a perimeter. If the dog approaches the wire, its collar emits a beep. If the dog continues to move in that direction, it receives a shock. VerCauteren warns that for the system to be effective it must remain on continuously.

"There are those dogs that will test the fence regularly," he says. "And if it doesn't hear the beep it won't be long before he will be playing with your Labrador in the backyard."

VerCauteren notes that his study's findings are preliminary; the data are still being analyzed. When that process is complete, the final results will be submitted for publication to a scientific journal.

Beyond the call of duty

If there were any doubts about how well Kurt VerCauteren's Great Pyrenees livestock protection dogs (LPDs) would be received by the residents of their new Northern Michigan home, those doubts disappeared on a cold winter's day in 2004 when a child with Down's syndrome went missing from his parents' farmhouse.

"The whole town was out looking for the child," VerCauteren recalls. "Everyone was very nervous because it was below zero, and he wasn't wearing boots or a jacket."

As an afterthought, the father of the child decided to look inside the doghouse built for the protection dogs. There was the child, a dog on either side of him, warm and asleep. "Those dogs never used that shelter until that day," VerCauteren says. "Most of us believed they were in there just to keep the child warm and safe."