Virtual Containment

Electronic collars and GPS offer new fencing solutions.

by Heather Smith Thomas

Permanent or portable fencing traditionally kept livestock in designated pastures. Now, ranchers have another option. Electronic fences are invisible to grazers downrange. They create invisible boundaries using GPS coordinates that can be moved using a computer or smart phone. Cattle are fitted with boundary-sensing collars and trained to respect the defined boundaries.

Communication towers connect collars on the cows to the GPS coordinates. As an animal approaches the virtual boundary, the collar emits a warning beep. The animal receives an electric shock if it continues to approach the invisible boundary. So, cattle learn to respect the virtual fence.

Paul Meiman, University of Nevada-Reno Extension specialist, leads a virtual fencing research project for a couple of Nevada ranches. Graduate student Nathan Jero has been assisting with this research. Jero was involved with virtual fences as an undergraduate at the University of Idaho. He became interested in using virtual fence as a conservation management technique to target-graze invasive species like cheat grass. Specifically, Jero wants to learn how stocking density impacts fence effectiveness and whether desired density can be achieved to control various plant species in areas that otherwise would never be grazed and become a fire hazard.

Typically, target grazing requires fencing, herding or use of supplements to keep cattle in the desired areas. But virtual fencing could be a low-labor option to use in landscapes where other containment methods are difficult or impossible. Virtual fences could also be used to create moving water gaps, protect fragile riparian systems and maintain ecological health while allowing grazing animals access to streams and streambanks. Riparian areas — land bordering streams and rivers — need to be grazed, but not overgrazed. It’s beneficial to avoid using permanent fences in some of these areas.

“One of the ranches we’re working with sometimes has issues with larkspur and prevent losses would be helpful,” Jero says.

“We also want to see if we can use virtual fencing to decrease the amount of time ranchers have to ride to keep cattle out of creeks or riding fences and gathering cattle that cross into the wrong areas. Even if virtual fence is not entirely successful at completely containing the animals, it might make enough difference that riders might only have to go out once a week instead of every day or two. It could save a lot of time.”

Virtual fence in action

Maggie Creek Ranch is one of the ranches involved in the research. The ranch agreed to try virtual fencing for two years at its stocker operation near Lamoille, south of Elko, Nev. Travis Whiteley is the Lamoille division foreman.

“In 2020 we collared 200 yearlings,” Whiteley says. The yearlings were kept in relatively small pastures, with about 80 head per 100-acre pasture.

“We were trying to see if we could do rotational grazing using virtual fence rather than periodically moving electric fence,” Whiteley explains. “We wanted to see how intense we could get — if we could cut the pasture in half, or quarters, and keep the cattle in those portions — or graze certain areas harder than others.”

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“The collar still beeped when the animal approached the virtual fence, but cattle lost respect for the fence. This was a problem because cattle seemed to respect the fence, but lost respect when it was moved.”

“During the summer we always have to doctor a few cattle for pinkeye or foot rot on those meadows. We just catch them out there, rather than bring them to a corral. I wondered how those collars would hold up when we roped those yearlings, and whether they’d run through the virtual fence when we were trying to catch them.”

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“In our situation, that’s not as much of a concern because we have people on the ground going through those cattle and looking at them, so we are seeing them anyway,” Whitely says.

Multiple research projects underway are exploring virtual fencing systems as a feasibility in big range pastures as well as for more intensive rotational grazing on smaller farms.

Other researchers with current projects include the University of Arizona Santa Rita Experimental Range station and the Agricultural Research Service (ARS) at the Central Plains Experimental Range station in Colorado.

**Other considerations**

A growing number of companies with varied goals and focuses offer virtual fencing. As an example, Vence, a U.S. company, is developing applications for extensive rangeland-based operations. On the other hand, Halter, a New Zealand company, is working with dairies to achieve higher-accuracy rotational grazing.

“Battery life in the collars is a major consideration,” Meiman says. “Higher accuracy information about animal locations requires more battery power. For cattle on a big range pasture all summer, you’d need a longer-lasting battery, and in most rangeland systems, we’re not trying to keep cattle in a tiny area. We might have a pasture thousands of acres in size and want to subdivide that into multiple subunits, but these would still be huge compared to a small farm in more productive country that wants to rotational graze a 50-acre pasture divided into four pieces.”

The ARS in Oregon recently finished a study with the Vence system, looking at whether they can keep cattle out of burned areas with a virtual fence. When public rangeland burns, the burned area is typically off-limits to grazing for a couple years to allow it to recover. Virtual fence might be an alternative to conventional fence or resting the entire area.

Chad Boyd, ARS research leader in Burns, Ore., worked with the research project to see how virtual fencing might be beneficial on federal allotments.

“If 20% of a 10,000-acre pasture burns, you are looking at either building a fence to exclude cattle from that portion of the allotment or non-use of the whole pasture,” Boyd says.

Even if the ranch in this example wanted to build fence, he explains doing so on public land means going through a lot of different administrative processes that take time. Never mind the fact that terrain is challenging on wide swaths of public land.

“We wondered if virtual fencing might be a management alternative to keep cattle out of burned areas, enabling ranchers to graze areas that didn’t burn. Virtual fencing could be a great option during the recovery period, and not impede wildlife with an actual fence,” Boyd says.

“There is a cost to utilize virtual fence, however. We paid $40 per collar. With the company we worked with, you lease the collars rather than buy them. This is probably a good thing, because the technology is evolving so fast that if you spend a lot of money purchasing collars, those might be obsolete in a year or so.”

Additionally, there is a cost for requisite base stations.

“For smaller areas, one base station may be adequate, but for larger areas, or more complex topography, additional base stations may be needed,” Boyd says.

Still, virtual fencing could be cheaper than physical fence in some situations. Virtual fence might also offer temporary solutions.

**Editor’s Note:** Heather Smith Thomas and her husband, Lynn, have ranched near Salmon, Idaho, for more than four decades. She also writes cattle articles that appear in numerous U.S. and Canadian cattle publications, including Hereford World. She is the author of numerous books, including “The Cattle Health Handbook.”